Department of Pharmacology
Faculty of Pharmacy
University of Karachi

Self Assessment Report
Pharm. D Programme - 2014

Submitted to:

QUALITY ENHANCEMENT CELL
University of Karachi

Assessment Team

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DEPARTMENT OF PHARMACOLOGY
University of Karachi

INTRODUCTION

Pharmacology is the study of drug's action. It involves examining the interactions of chemical substances with living systems, with a view to understanding the properties of drugs and their actions, including the interactions between drug molecules and drug receptors and how these interactions elicit an effect. Pharmacology courses examine the different classes of drugs, how they are used therapeutically, their mechanisms of action, how they are handled by the human body, and their role in society.

Pharmacology provides the scientific basis and principles for a variety of special applications, such as the study of drug actions in the health sciences, the use of drugs as therapeutic agents in medicine or as tools in scientific research, and the development and regulation of pharmaceuticals. Pharmacology is a multi-disciplinary science with many subspecialties including clinical pharmacology, cardiovascular pharmacology, behavioural pharmacology, toxicology, neuropsychopharmacology, pharmacogenetics, pharmacoeconomics and allied courses like physiology, anatomy and pathology.

The Department of Pharmacology is one of the important Departments of the Faculty of Pharmacy since 1973, not only sharing a major load at the under graduate level but also preparing students to fill the gap by suitably qualified manpower in the field of Pharmacy at Post graduate levels. The expansion of the Department and graduate Programme s in the areas of modern pharmacology including Neuropharmacology, Toxicology, and Biochemical Pharmacology is expected to place the Department among high research ranking Departments of the University.

The major academic objectives of the Department are to facilitate Basic and Applied Research, educate under graduate, graduate and professional students in various disciplines and provide academic excellence. Department of Pharmacology has so far produced the highest number of PhDs in the faculty of Pharmacy and a large number of M. Phil and M. Pharm. The Department is composed of highly competent primary faculty, research faculty, graduate students and technical support staff.

CRITERION-1

PROGRAMME MISSION, OBJECTIVES AND OUTCOMES

Criterion-1: Program Mission, Objectives and Outcomes

Institutional Mission

Department of Pharmacology now train the Pharm.D undergraduate students regarding the various aspects of drug therapy and enrich them with correct knowledge of drugs .At the end of the course they come out of the institution as efficient Pharmacist , prescribing right medicine to the right patient in the right dosage .

The department also plans to associated with the Drug Information System situated at University Clinic for the benefit of all pharmacist studying at the faculty.

The broad goal of teaching undergraduate Pharmacology and Therapeutics is to impart the knowledge, skills and attitude that a student should learn in order to prescribe drug safely and effectively and to maintain these competence throughout his or her professional life.

Pharm. D Program Mission

The mission of Pharm. D program is to provide the information of Pharmacology to learn safe and effective utilization of medicines for society, to understand the effects of various doses of medicinal substances, as well as the different ways in which medicine can be introduced into the body.

Pharmacology is the study of the interaction of drugs with living systems and an essential component in the study of pharmacy and is included as one of the four major areas in the pharmacy degree program. The effects of drugs and poisons and the means to overcome them are studied in pharmacology.

Generally, animal tests are required to learn the strength of drugs. Pharmacists know a great deal about pharmacology yet, as the expert about medications, the pharmacist must maintain this knowledge to an even greater extent. This subject has a fascinating history and continues to be relevant in modern times. It deals with a number of questions related to pharmacotherapy.

Projects are submitted by small groups of students based on various clinical problems collected from the hospital. This makes the students aware of rational drug use, over-prescription, under-prescription, drug interactions and adverse drug reactions.

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

Program Objectives:

The teaching programme is being carried out efficiently on a regular basis with the help of lectures, practices, seminars, demonstration and integrated classes.

The goal of Pharmacology is to have students possess a comprehensive understanding of the general field of pharmacology, in addition to specific expertise in their particular area of interest. They build on their knowledge of pharmacology so that they are able to think critically about specific areas in pharmacology. They should be able to knowing mechanism of action of drugs, as well as carry out and interpret the information. They should show capacity for continuing significant contributions in pharmacology and for conducting independent research.

Student should possess functional professional expertise in Pharmacology and a deep understanding and knowledge of his/her particular area of interest. Pharmacology department objectives in Pharm. D are as follows:

1. Education of Preclinical and Clinical Pharmacology.
2. Flexible in learning new areas of Pharmacology like Toxicology.
3. Self-motivated and self-teaching.
4. Capability and the desire for Pharmacology thought and action.
5. Relate the knowledge of Pharmacology with Therapeutics.

Strategic Plan

1. **Education to Clinical Pharmacology.**
    - Clinical pharmacology has always been oriented towards a mechanistic understanding of drug response directly linked to the safe, optimal use of drugs in living organisms.
    - The science of clinical pharmacology, which has always been part of early drug development, now has a tremendous opportunity to apply expertise to critical areas such as the optimal design of clinical trials.
    - In this area, there is truly a need to be innovative, in order to improve the efficiency of drug development.

2. **Flexible in learning new areas of Pharmacology by Seminars.**

- Learner empowerment – actively involving students in learning development and processes of co-creation.
- Future-facing Pharmacology education – enabling people to think critically, creatively and flexibly to generate alternative visions in the field of Pharmacology.
- Decolonizing education – extending intercultural understanding and experiences of students so they can be sensitive to global ways of working.
- Transformative capabilities – seeing capabilities not just as abilities but being able adapt a skill to be used in both familiar and unfamiliar circumstances.
- Crossing boundaries – to support interdisciplinary, interprofessional and cross-sectoral learning.
- Social learning – developing cultures and environments for learning that harness the emancipatory power of spaces and interactions outside the formal curriculum, particularly through the use of new technologies and co-curricular activities.

3. Self-motivated by panel discussions and series of lectures.

- Being self-motivated means being ready for driven, focused discussion and behavior.
- It also means being sharp and smart enough not to be manipulated and to be open to positive learning.

4. **Capability and the desire for pharmacology thought and action by presentations.**

- Capability (including potential creativity, problem solving and interpretational ability).
- The desire for independent scientific thought and action.

5. Relate the knowledge of Pharmacology with Therapeutics.

- Imparting the theoretical and practical knowledge of Pharmacology for the safe and effective use of medicines in the society through expertise in clinical therapeutics.

Table: Programme Objectives Assessment

S. No.	Objectives	How Measured	When Measured	Improvement Identified	Improvement Made
1	Education to clinical Pharmacology	Teachers Evaluation Survey	Second semester 2014	Hand on Clinical training required	MOU signed b/w Pharmacy faculty and different Hospitals. DPIC setup established.
2	Flexible in learning	Alumni Survey	Second semester 2014	More Practical knowledge required	Conduct hospitals/clinic visits for practical exposure
3	Self-motivation	Alumni Survey	During semester 2014	Slight Stage fright	Counseling and more self motivation seminars conducted
4	Capability and the desire of thought	Teachers Evaluation Survey , Alumni Survey	During semester 2014	Think critically and relate things with one another	Provide evaluation, short coming and critical thinking
5	Relate the knowledge of Pharmacology with Therapeutics.	Teachers Evaluation Survey, Alumni Survey	Second semester 2014	More clinical exposure required	Clinical clerk ship Programme introduced. Clinical rounds with Clinical pharmacist and Doctors started.

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

1. Our student has knowledge to drug function as it relates to individuals, with the goal of improving benefits and reducing side effects of new and existing pharmaceuticals.
2. Pharm. D students are focusing on both chemistry of drugs and their end results, bridging the gap between medication production and real-world effects and usage.
3. Pharmacist and pharmacologist examine how drugs work and look for ways to improve benefits and lessen side effects.
4. Education in pharmacology to our student emphasizes new research, both in studying and analyzing drug effects in patients. In addition to department

courses in Pharm. D degree Programme require the completion of manuals of experimental pharmacology.

5. Areas of study they have, might include the following:
    a. Fundamentals of basic sciences such as anatomy, pathology, physiology, biochemistry.
    b. Studies in toxic effects of drugs.
    c. Overview of pharmacology.
    d. Drug research: Ethics and contemporary issues.
    e. Experimental trials.
6. Can expect courses focused on pharmaceutical studies in relation to human patients. Topics might include the following:
    a. Theories of Pharmacometrics
    b. Development of new drug design
    c. Pharmacokinetics
    d. Principles of biostatistics
    e. Pharmacodynamics
    f. Drug effects and outcomes
    g. Contemporary issues related to medication and drug therapy
    h. Toxicology and toxicity management.

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

a. Essentials for betterment:

1. Through a presentation and case analysis activities, students will learn about good Programme learning assessment practices and understand how it is different from other forms of assessment and evaluation.
2. Through a workshop and small group exercises, the students will learn the resources and techniques related to collaborative adaptation of rubrics, rater training, inter-rater consistency check, and presenting rubric results.

3. Assessment is necessarily a collaborative activity.
4. Introduces several basic facilitation techniques to help Pharm. D education lead a collaborative meeting.
5. Assessment data collection (e.g., after administering a test, after evaluating using a rubric, after receiving questionnaires.
6. Facilitated table conversations about Pharm. D Programme assessment of student learning
7. Assessing student learning outcomes with projects and assignments.
8. Open-ended survey questions are great tools for Pharm. D Programme and student learning.

b. Teachers strengths in Department

1. Department of Pharmacology has 6 PhD teachers.
2. 2 professors and 5 assistant Professors are in the Department.
3. Professionally trained Teaching staff having Expertise in Hospitals and Industries.
4. MOU signed between Pharmacy Faculty and different Hospitals for hospital clerkship Programme .
5. Remarkable Research Publications in impact factor journals.

c. Department Deficiencies

- No associate professor in the Department.
- Department has one multimedia facility
- Poor computer and internet facilities
- Poor laboratory facilities
- Lack of Equipment.
- Outdated and/or insufficient research lab equipment making it difficult to conduct experiments and research.
- Not enough space in laboratories for experiments and research
- Lack of communication with hospitals and industries.
- Not enough faculty

- Not enough trained lab staff
- Lack of cooperation with companies /other departments
- Large number of students
- Teacher student ratio need to be rationalized
- Lack of funds
- Not enough collaboration among faculty
- Low faculty and student commitment
- Not enough social interactions

d. Departmental Needs

- Multimedia, more computers and internet facilities.
- Increase the number of classrooms, labs and lab maintenance.
- Increase experienced faculty members and funds for graduate students.
- Introduce the systems to motivate and improve quality education and research.

Standard 1-4: The department must assess its overall performance periodically.
Department overall performance for Pharm. D Programme me

A. Student enrolment

S.NO	Passing Year	1st Year	*Ratio	2nd Year	*Ratio	3rd Year	*Ratio	4th Year	*Ratio	5th Year	*Ratio	Total
1	2013	261	29.1:1	254	28.2:1	229	25.4:1	229	25.4:1	217	24.1:1	1190
2	2012	237	26.3:1	215	23.8:1	213	23.6:1	203	22.5:1	217	24.1:1	1085
3	2011	235	26.1:1	217	24.1:1	209	23.2:1	204	22.6:1	201	22.3:1	1066
4	2010	249	27.6:1	202	22.4:1	204	22.6:1	197	21.8:1	198	22:1	1050
5	2009	226	25.1:1	222	24.6:1	188	20.8:1	185	20.5:1	186	20.6:1	1007

B. Duration of Pharm. D Programme

Five years degree Programme

C. Student/Faculty Ratio

*****Ratio is given in above columns with number of students.

D. Passing Marks

50%

E. Cumulative Grade Point Ratio (CGPR)

2.45 CGPR

F. Performance Improvement of the Department.

Provide necessary skills and knowledge of Pharmacology and therapeutics. Continuously upgrading the information related to drugs by newsletter (**Pharmacology Newsline**) for changing requirements of the job. Develops interpersonal skills by taking certain assessment in terms of poster presentations, quiz, tests, viva, presentations, panel discussion, assignments and seminars etc.

G. Assessing Learning in Graduate Programme s

The goal of Seminars in the Department is to support improvement of graduate Programme assessment of student learning and help students develop assessment strategies that best fit their Programme context. The facilitator will showcase assessment strategies and provide tools and resources. Students will have ample time to reflect, brainstorm with colleagues, draft assessment plans, and take back resources for plan implementation through demonstration and interactive activities.

CRITERION-2

CURRICULUM DESIGN AND ORGANIZATION

Criterion-2 Curriculum Design and Organization Programme of Studies offered

A. The Department of Pharmacology, Faculty of Pharmacy, University of Karachi offers Five Years Pharm. D degree Programme.

Course Schedule

Pharm. D. First Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-307	Pharmacology - Physiology & Histology-I	3
PHL-309	Pharmacology - Biochemistry-I	3
PHL-311	Pharmacology - Biochemistry (Lab)	3
Total Courses 3		Cr. Hrs. 09

Course No.	Course Title (Second Semester)	Cr. Hours
PHL-308	Pharmacology - Physiology & Histology -II	3
PHL-310	Pharmacology - Biochemistry -II	3
PHL-314	Pharmacology - Anatomy	2
Total Courses 3		Cr. Hrs. 08

Pharm.D. Second Professional

Course No.	Course Title (Third Semester)	Cr. Hours
PHL-407	Pharmacology - Physiology & Histology (Lab)	3
PHL-409	Pharmacology -Pharmacology & Therapeutics-I	3
PHL-413	Pharmacology - Pathology	2
Total Courses 3		Cr. Hrs. 08

Course No.	Course Title (Fourth Semester)	Cr. Hours
PHL-410	Pharmacology - Systemic Pharmacology	3
Total Courses 1		Cr. Hrs. 03

Pharm. D. Third Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-507	Pharmacology - Systemic Pharmacology	3
PHL-509	Pharmacology - Pathology (Lab)	3
Total Courses 2		Cr. Hrs. 06

Course No.	Course Title (Second Semester)	Cr. Hours
PHL-510	Pharmacology - Pharmacology (Lab)	3
Total Course 1		Cr. Hrs. 03

Pharm. D. Fourth Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-609	Pharmacology - Systemic Pharmacology	3
Total Courses 1		Cr. Hrs. 03

Course No.	Course Title (Second Semester)	Cr. Hours
PHL-612	Pharmacology- Pharmacology (Lab)	3
Total Courses 1		Cr. Hrs 03

Pharm. D. Fifth Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-711	Pharmacology - Clinical Pharmacology	3
Total Courses 1		Cr. Hrs. 03

Course No.	Course Title (Second Semester)	Cr. Hours
PHL-712	Pharmacology - Toxicology	3
Total Courses 1		Cr. Hrs. 03

Standard 2-2: Theory, Problem Analysis/ Solution and Design in Programme

The following table indicates the elements covered in core courses:

S.no	Objective	Elements	Course no.
1	Education to clinical Pharmacology	Theory courses	PHL 307,308,309,310409,410,413 507,609,711,712
2	Flexible in learning	Practical courses	PHL 311,407,509,510,612
3	Self-motivation	Theory courses	PHL 307,308,309,310,314,409,410, 413 ,507,609
4	Capability and the desire of thought	Theory and Practical courses	PHL 311,407,409,410,413,414 507,509,510,609612,711,712
5	Relate the knowledge of Pharmacology with Therapeutics.	Theory courses	PHL 309,310,409,410,413 507,609,711,712

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

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

The curriculum adopted by Department of Pharmacology has been approved by Academic council, competent authority and statutory bodies of University of Karachi.

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

Programme	Major Course	Basic Sciences	General courses	Others
Pharm. D	Pharmacology	Anatomy Physiology Pathology Biochemistry Toxicology	Mathematics Statistics Islamiat Pak.Studies	Internship (200 Hours) Projects Assignments Seminars

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

Pharm.D. Third Professional

Course No.	Course Title (Fifth Semester)	Cr. Hours
PHT-513	Computer Application in Pharmacy	2

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

Development of Oral and Written communication skills of the student in the following courses occur:

Pharm.D. First Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-311	Presentation in Biochemistry lab course	3

Pharm.D. Second Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-407	Oral communication in Physiology lab course	

Pharm.D. Third Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-509	Oral and Poster presentation in Pathology lab course	3

Pharm.D. Fourth Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-609	Assignments for written communication skills in theory courses	3

Pharm.D. Fifth Professional

Course No.	Course Title (First Semester)	Cr. Hours
PHL-711 PHL-712	Assignments for written communication skills in theory courses	3 3

CRITERION-3

LABORATORY AND COMPUTING FACILITIES

CITERION-3: Laboratory and Computing Facilities

Laboratory Facilities

Pharmacology laboratories have contiguous spaces that include wet laboratories, computer area, instruments, write-up spaces, office areas, and other spaces with varying degrees of chemical use and hazards.

Maintaining a positive safety culture and at the same time meeting the safety and comfort needs of laboratory personnel are challenging under these circumstances.

Pharmacology laboratory personnel have laboratory and office support space. Their desire to be aware of procedures and to have a constant presence in the laboratory usually demands that office space be located near the laboratory. The need for personnel safety, evolutionary technology allowing for computer-based research and data monitoring outside of the laboratory, as well as a desire to foster better interaction between students has driven the offices outside the laboratory proper.

There are many advantages and problems in Pharmacology laboratories

Advantages include

- Visibility among students.
- Better communication and collaboration;
- Easy to share resources, including equipment, space, and support staff.
- Flexibility for lectures.
- Significant space savings compared with smaller.

Problems and limitations

- Low spacing among students due to large number of students.
- Due to low spacing, balance of ventilation system improper.
- No proper setup of Pathology lab.
- Limitations to the size or placement of the laboratory (e.g., the floor of the building, the type of research) because of chemical storage code limitations for flammable and other materials.

- Need for isolated spaces because of specific types of work being conducted, such as cell or tissue work where cross-contamination is an issue, use of certain materials, glass-washing facilities.
- Noise from students and equipment may be higher.

The Pharmacology laboratory's mission is to provide a high quality drug analysis service and other experimental work of Pharmacology. The laboratory provides high quality and prompt analysis of drugs and hormones in a variety of biological matrices, usually plasma or serum. In addition to providing analytical services, laboratory facilities are available for interpretation of results and consulting on drug therapy in preclinical trials, including individual evaluation, dose determination, and pharmacokinetic studies.

Laboratories Equipments and available techniques

The Department of Pharmacology has following laboratories,

a. Biochemistry, Physiology and Histology Lab
b. Pharmacology Lab

a. Biochemistry, Physiology and Histology Lab

Biochemistry and Toxicology: offers a complete range of standard toxicology protocols designed for short-term and long-term toxicity testing. With multiple test species available within many different parameters including,

- Hematological
- Biochemical parameters

General Toxicology capabilities include:

- Single Dose Toxicity Studies
- Repeated Dose Toxicity Studies
- Up to 90 days

- Routes of administration: oral, intravenous (injection and infusion), intramuscular, subcutaneous, intraperitoneal and others.
- Animal species: mice, rats and rabbits.

Physiology: Physiology Lab is fully equipped to complete various physiological and biological research. The laboratory is equipped with a full complement of utilities, including

- Haemocytometer
- Perimetry
- Spirometer
- Blood Test Kit
- Stethoscope
- Blood Pressure Monitor
- Sthetograph and kymograph

Histology: Lab offers investigations to stomach, intestine, lungs, kidney, appendix and RBC slides and other subjects of interest.

Pathology: Pathology laboratory course offers a complete range of laboratory testing services. Our laboratories are equipped to provide the highest level of support to pathology Programmes.

Pathology capabilities include:

- Urine Analysis
- Hematology
- Serum Chemistry
- Coagulation and Hemostasis
- Microbiology and Immunology

Histopathology: Microscopic evaluation of tissues and pathological testing facilities available in laboratory.

Histopathology capabilities include:

- Tissue and Slide Preparation
- Tissue Image
- Pathological tests

b. Pharmacology Lab

These laboratories are equipped with many instruments for Pharm. D students.

Behavioral Testing

Several behavioral tests are performed to mouse, rats and rabbits models and evaluate effects of compounds in different doses and different days.

- General health and motor ability tests by Inclined plan test.
- Learning and memory tests by stationary rod.
- Anxiety tests by head dip method
- Anti-depressive test by force swim test

Other equipments are in Pharmacology Lab including,

- Digital Plethysmometer
- Analgesiometer (Tail Flick)
- Analgesiometer (Hot Plate)
- Kymographs
- Weighing balances
- Students Organs Bath
- Isolated tissue assembly
- laboratory microscopes

Animal House Facility

The Animal House Facility available in the Department of Pharmacology on the basis of protection of the animals used in experimentation and other scientific and educational purposes, as well as on the premises where these should be carried out. Its main purpose is the

support of the scientific research and teaching, providing the Department community and kept in constant environmental conditions and the required provisions for their experimental and/or educational works. Rodents (mice and rats) diseased models are available for drug evaluation, toxicity and development in different doses of test drug in different days.

Main Role of Departmental Animal House Facility:

- Provide for all the activities implying the use of experimentation animals.
- Promote the good use and care of the animals with research, teaching and other scientific purposes.
- Technical help is provided by a trained animal house caretaker and availability of the technical personnel to carry out to a good end the investigation in course.
- Favor and support the achievement of the suitable degree of preparation and training on the part of the students working with animals.

Computer and Internet Facility

Student computing facilities: Access information on open access student computing facility in digital library provides better IT facilities to Pharm. D students.

Software Information: Find information on the accessibility software, specialist teaching software, standard applications and utilities available at the Pharmacy library. Standard software includes:

- Internet Explorer 9
- Windows 7
- Microsoft office 2013
- Adobe Acrobat Reader 10
- SPSS Statistics 21
- Minitab 16

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

All laboratories are equipped with laboratory manuals / instructions.

Launching of laboratory manuals

Course no:

PHL: 311 Biochemistry lab

PHL: 407 Physiology and histology lab

PHL: 509 Pathology lab

PHL: 510 Pharmacology lab

PHL: 612 Pharmacology lab

All manuals are for students learning and understanding of the fundamental principles of experiments.

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

Trained laboratory staff must understand how chemical laboratory facilities operate. Given the chance, they should provide input to the laboratory designers to ensure that the facilities meet the needs of the functions of the laboratory. Laboratory personnel need to understand the capabilities and limitations of the ventilation systems, environmental controls, laboratory chemical hoods, and other exhaust devices associated with such equipment and how to use them properly. To ensure safety and efficiency, the experimental work should be viewed in the context of the entire laboratory and its facilities. Department of Pharmacology has trained staff in labs.

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

i) Computing Facilities

Department of Pharmacology has computing facility but it is insufficient for lot of students.

ii) Multimedia

Department has one multimedia in lab but no any in classrooms.

iii) Website

Department of Pharmacology is linked with Karachi University Website that is http://www.uok.edu.pk and most of teachers' staff has its own Karachi University e-mail address.

iv) Internet

All computer of Department are interconnected with Karachi University internet server.

CRITERION-4

STUDENT SUPPORT AND ADVISING

Criterion-4 Student Support and Advising

Pharm. D Programme is a department of Pharmacology comprehensive undergraduate academic support Programme. Our student support and advising: to provide learning assistance services that help students fulfill their goals for an undergraduate education for hospitals and pharmaceuticals; and to provide learning support to the academic community which enables undergraduate students to have the opportunity for an honors university experience at a research university.

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

Departmental Strategy for Course Offering

The Department of Chemistry offers five years Pharm. D Programme as per following weekly schedule.

Programme	Courses	Theory classes/ Week	Practical Classes/ Week	Research Guidance
Pharm. D	PHL: 307	Three lecture hours per week	-	Provide research Guidance for: -Needs assessment studies -Job feasibility Research -Competitive Analysis -Needs assessment studies
	PHL: 308	Three lecture hours per week	-	
	PHL: 309	Three lecture hours per week	-	
	PHL: 310	Three lecture hours per week	-	
	PHL: 311		Nine practical hours per week.	
	PHL: 314	Two lecture hours per week	-	
	PHL: 407	-	Nine practical hours per week.	
	PHL: 409	Three lecture hours per week	-	
	PHL: 410	Three lecture hours per week	-	
	PHL: 413	Two lecture hours per week	-	
	PHL: 507	Three lecture hours per week	-	
	PHL: 509	-	Nine practical hours per week.	
	PHL: 510	-	Nine practical hours per week.	
	PHL: 609	Three lecture hours per week	-	
	PHL: 612	-	Nine practical hours per week.	
	PHL: 711	Three lecture hours per week	-	
	PHL: 712	Three lecture hours per week	-	

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

Course distribution is made in the departmental meeting under supervision of department chairperson concerning respective field of the teaching staff members. There is also provision for interactive classes for greater interaction between students and teachers.

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

- **Career counseling service:** Faculty of Pharmacy provides career counseling services in collaboration to Pharm Evo Private Limited and they provide services as:

  - They help students, what they want out of their education, career, and professional life.
  - They talk to about their thoughts, ideas, feelings, and concerns about career and educational choices, who will help student sort out, organize, and make sense of his/her thoughts and feelings.
  - Help students to identify the factors influencing on career development, and help them to assess interests, abilities, and values.
  - They locate resources and sources of career information.
  - Counseling member help them to determine next steps and develop a plan to achieve goals.

- **Student Advisor Facility:** Student Advisor provides guidance for developing and achieving meaningful educational, professional, and personal goals. Dean faculty of Pharmacy nominates a faculty member as 'Students Advisor' who is available for course decision and career choices. The Student Advisor, dean and department chairperson help the students by providing information regarding career opportunities available for them.

- **Students Club:** Students Club plays an important role in student life. Student clubs and organizations help to develop leadership skills, provide networking opportunities, enhance education outside the department and faculty, and strengthen the communication between faculty, staff, and students. The various clubs and organizations in the faculty of Pharmacy are available in which students may participate.

  Karachi University Pharmacy Students Club (KUPSC) came in to being in 2013, exclusively for Pharmacy students. The club has number of enrolled students for participating and organizing different events, related to sports, literature, science and leisure activities. KUPSC is looking after these areas under the supervision of Pharmacy Faculty members as the patrons.

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.

Standard 5-1: ADMISSION PROCESS

Eligibility

Admissions in Karachi University are given according to merit. There is no discretionary quota for admissions.

- For admission in the Faculty of Pharmacy, the candidate should have obtained minimum of 60 per cent marks (B-Grade) in Intermediate/H.S.C. (Biology Group).
- Candidates desirous of taking admission on the basis of degrees/certificates other than University of Karachi should get the equivalence of their degrees/certificates determined by the University Equivalence Committee well before the scheduled date of admissions.
- Candidates passing 'O' Level, 'A' Level or other foreign degrees/certificates should get the equivalence of their grades and marks determined before the scheduled date.
- Certain seats are reserved for disabled persons and children of university teachers and employees. For these seats also, admissions are given on the criterion of merit.

Evaluation and Grading System:

As per University rules.

Rules Concerning the Promotion and Repetition

As per University rules.

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.

The Central Admission Committee admits the students as eligibility criteria.

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.

HEC rules with approval by the University Syndicate are applied for appointment.

Appointments/ Promotion Procedure

Basic Pay Scale (BPS)

Appointments are based on HEC rules given below.

a. Lecturer (BPS- 18):

Minimum Qualification

Master's Degree (first Class) in the relevant field with no 3rd division in the Academic Career from HEC recognized University/Institution. During the next two years (i.e. until June 30th, 2008) if no candidate is available without 3rd division in the academic record, then the University may forward the case for appointment of a selected candidate to the HEC for consideration and approval.

No experience required.

No publication required.

b. Assistant Professor (BPS- 19):

Minimum Qualification

Ph.D. in the relevant field from HEC recognized University/Institution.

No experience required.

OR

Master's Degree (foreign) or M.Sc (Hons). (Pakistan) in the relevant field from HEC recognized University/Institutions, with 4 years teaching/research experience in a recognized university or a post-graduate Institution**.**

04 publications required.

c. Associate Professor (BPS- 20)

Minimum Qualification

Ph.D. in relevant field from HEC recognized University / Institution.

Experience

10-years teaching / research in HEC recognized University or a post-graduate Institution or professional experience in the relevant field in a National or International Organization.

OR

5-years post Ph.D. teaching/research experience in HEC recognized University or a post-graduate Institution or professional experience in the relevant field in a National or International Organization.

Minimum Number of Publications

10 research publications (with at least 2 publications in last 5 years) in internationally abstract Journals recognized by the HEC.

d. Professor (BPS-21)

Minimum Qualification

Ph.D. from HEC recognized Institution in relevant field.

Experience

15-years teaching / research experience in HEC recognized University or post-graduate Institution or professional experience in the relevant field in a National or International Organization.

OR

10-years post-Ph.D teaching/research experience in a recognized University or a post post-graduate Institution or professional experience in the relevant field in a National or International Organization.

Minimum Number of Publications

15 research publications in internationally abstracted Journals recognized by the HEC.

Bases for Appointments / Promotions

Four main areas where a candidate is evaluated for Tenure Track Scheme;

- Teaching
- Research
- Service
- Personal Characteristics

General Criteria for Appointment on TTS

All faculty members in any discipline are eligible to apply for appointment provided they fulfill the following minimum eligibility conditions;

a. Assistant Professor

Minimum Qualification

PhD from a recognized University with excellent communication/presentation skills.

b. Associate Professor

Minimum Qualification

PhD with 6 years post - PhD teaching / research experience in a recognized University.

Minimum Number of Publications

10 research articles published in journals having impact factor.

c. Professor: Minimum Qualification

PhD with 11 years post-PhD teaching / research experience from a recognized University.

Minimum Number of Publications:

15 research articles published in journals having impact factor.

Faculty Evaluation Process

University rules are adopted.

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.

All teachers in the Department are to get ready to interact with students in the classroom. Chairperson, department of Pharmacology and teachers they controlling the student behavior, and office staffs are actually guiding and solving student's problem.

1. Department teacher effectiveness research found support for the following individual variables:
   - Use of positive reinforcement
   - Cues and corrective feedback
   - Cooperative learning activities
   - Higher order questioning
   - Use of advance organizers
2. Process to ensure teaching and delivery of course material:
   - Time table is strictly followed by all faculty members
   - Chairperson of the department frequently gets feedback from the students during the semester.

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. **Rules Concerning the Promotion and Repetition of Courses**

The student passing at least 80% courses in an academic year would be promoted to next higher class. There would be no special examination for courses of Pharm-D first to fifth professional class. Students requiring passing such a course shall repeat it along with the regular class. There may be a supplementary examination for the failures of the Pharm. D. This examination will be held after six weeks of the announcement of the Pharm. D (final year) result.

2. Attendance

Attendance in each subject is compulsory for all students and no student shall be eligible to appear at any University examination unless he/she has attended 75 per cent attendance in the course.

i. The attendance of students admitted in the Faculty will be counted from the 1st day of semester and not from the date of admission.
ii. Students called for national duty such as participation in Olympics, National Games, Inter-varsities, and going to perform Haj would be given exemption in attendance for the actual period of national duty/Haj. These cases would be decided individually.
iii. If a student is unable to attend classes continuously for 15 days or more without informing the Dean/Chairperson of the Department (in writing) his/her admission will also stand cancelled. In case of illness or other similar situation, application along with a medical certificate from a registered medical practitioner duly verified by the Senior Medical Officer of the University must be submitted within two days after the incident.
iv. Shortage of attendance may be condoned by 5% by the Chairman of the department for bonafide reasons. The Vice Chancellor may condone a further shortage of 10% in cases of special hardships, but no student whose attendance falls below 60% shall be sent up for any University examination.
v. Original attendance register is to be submitted to the Dean/Chairperson for record and future reference.

3. Maximum Duration for Completion of Degree

Degree enrollment of the Pharm. D will remain valid for two more years after the expiry of the required duration for the completion of the Pharm. D degree (i.e. 5 years).

i. However a student unable to complete his/her degree requirement within the validity of his/her enrollment, will have to re-validate/extend his/her enrollment for not more than 2 years by paying a prescribed fee with the permission of the Dean.

4. Cancellation of Admission/Readmission

i. If a student admitted in Pharm.D First year for the first time fails to attend the class for the first 15 days his/her admission shall stand cancelled.

ii. If a student absents himself/herself for 15 consecutive days during the semester without any information, his/her admission shall also be cancelled. Re-admission would be granted in the same semester by the Dean if he/she can complete his/her attendance requirement.

iii. If a student is unable to continue his/her studies during his/her studies, his/her admission will be treated as cancelled. He/she may however be re-admitted after the payment of prescribed fee in the same semester where he/she had left. Permission would be granted by the Dean.

iv. He/she may be allowed 3 chances to pass/get promoted in the next higher class if he/she has completed the attendance requirements.

5. Unfair means

All the cases of unfair means will be forwarded to the Committee appointed for the purpose and the matter will be dealt with in accordance with the rules and regulations of the University.

6. Interpretation of Semester Rules

The decision of the Deans' Committee would be final for the interpretation of semester rules. In case of any appeal Deans' Committee would dispose it off on its merits.

7. In the Examination Hall

a. No candidate shall be admitted into the examination hall without the prescribed admit card and enrolment card, issued by the university. Candidates are liable to expulsion from the examination Hall for failure to produce the University Admit Card, the Enrolment Card and the University Identity Card.

b. Do not forget to attach the photocopy of the admit card, which is only the proof of fee-payment.
c. No one should smoke inside the Examination Hall.
d. In case of Walk-out here shall be no re-examination under any circumstances.
e. No materials or electronic devices shall be brought into the room or used at an examination. Unauthorized materials include, but are not limited to: books, class notes, or aid sheets. Unauthorized electronic devices include, but are not limited to: cellular telephones, laptop computers, calculators, MP3 players (such as an iPod), Personal Digital Assistants ("PDA' such as a Blackberry), electronic dictionaries, Compact Disc Players, and Mini Disc Players.

CRITERION-6

FACULTY

Criterion-6 Faculty

Teaching is one of the most important and complicated jobs today. Teaching staff of Department of Pharmacology provide a broad knowledge of subject , curriculum, and standards. enthusiasm, a caring attitude, and a love of learning, knowledge of discipline and classroom management techniques.

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.

Teaching staff of Department of Pharmacology:
Professor: 02
Associate Professor: Post is advertised.
Assistant Professor: 05
Lecturer: 02
Co-operative Teacher: 01
06 Teachers are Ph.D in the Department of Pharmacology, Faculty of Pharmacy, University of Karachi.

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.

- Teachers engage students and get them to look at issues in a variety of ways.
- Department teachers have lecture plans that give students a clear idea of what they will be learning, what the assignments are and what the grading policy is. Assignments have learning goals and give students ample opportunity to practice new skills.
- They are mostly in their classrooms early and ready to teach. They present lessons in a clear and structured way. Their classrooms are organized in such a way as to minimize distractions.
- Teachers are warm, accessible, enthusiastic and caring for the students.
- Teachers with these qualities are known to stay after university timings for research.
- And make them available to students who need them.

- They are involved in Department research committee and other Department activities such as arrangement of seminars forthcoming issue of newsletter etc.
- They involve in conferences and workshops.
- They don't hesitate to achieve more knowledge in relevant field.

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

- Department ensure fair, timely selection, appointments/promotions.
- Access to evaluation criteria established by HEC.
- Selection criteria are the reasonable and professional requirements to ensure that teaching is performed safely, efficiently and effectively. They are measurable and reflect the needs of the organization articulated in terms of an individual's set of competencies, not limited to: qualifications, knowledge, skills, experience and abilities.
- The selection criteria must reflect the staffing principles of merit, fairness and equity.

CRITERION-7

INSTITUTIONAL FACILITIES

Criterion-7 Institutional Facilities

To create and manage a physical environment that promotes academics, student life, healthcare, research, and public service at the University of Karachi through Department of Pharmacology core values of teamwork, trust, integrity, professionalism and quality.

Department of Pharmacology has well equipped laboratories, which fully cater to the teaching and research needs of the various degree Programmes.

Moreover, there is a good library of the Faculty well equipped with an e-library and internet facility. Department has two more research labs in the Institute of Pharmaceutical Sciences under its auspices so as to give more impetus to scientific and technological research and development. Recently, new building of department of Pharmacology is being constructed and almost ready to handover.

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

a) Library

Faculty of Pharmacy has its own library. Seminar library of Faculty of Pharmacy has stock of about 5500 books and reference books and at-least 55 National and International research journals on various fields of Pharmacy.

b) **Internet Facility**

Every teacher and student has access to computer facilities. An e-mail address is provided via the University.

University Internet system has been established in the department of Pharmacology to design, install and maintain university network of computers to provide Internet and Intranet facilities to students and faculty members.

Internet facilities are available in all research and graduate laboratories, library and rooms of faculty members. Students are provided with free Internet accounts to access educational resources. Access to full text of all major research journals are also available free of charge from the computer network installed in the department.

c) Offices

The department of Pharmacology has 11 faculty members engaged in teaching and research but numbers of rooms are 05 including chairperson room. Due to shortage of rooms in the department, they are shared by two or three members. The department needs a new building as early as possible which is being constructed.

d) Class Rooms

Faculty of Pharmacy has an auditorium and four lecture rooms, which are not sufficient for the students.

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.

Tasks of Pharmacy library include selecting, acquiring, cataloguing, classifying, circulating, and maintaining library materials; and furnishing reference, bibliographical, and readers' advisory services. Also perform in-depth, strategic research, and synthesize, analyze, edit, and filter information. New books are regularly purchased.

It also set up or works with databases and information systems to catalogue and access information.

The seminar librarian and an attendant are responsible for proper management of seminar library. They Keep records of circulating materials and organize collections of books, publications, documents, and other reference materials for convenient access.

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

Classrooms

Teachers face the deficiency in overhead projectors and multimedia in the classrooms, which can be a powerful tool for learning and comprehension.

Faculty Offices

The Department of Pharmacology has minimal space to accommodate their teaching and non-teaching staff but a new campus is being under construction.

CRITERION-8

INSTITUTIONAL SUPPORT

Criterion-8 Institutional Support

Pharm. D Programme is designed to encourage innovative and sustained growth of Pharmacy studies in the faculty of Pharmacy. Institution should formulate convincing proposals that enhance the teaching of Pharmacy, quality of research, quality of equipment and materials (including lab and libraries), and institution provides more opportunities for students.

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.

HEC rules may be made more attractive for highly qualified professional teachers.

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

Degree Programme	**Years**					
	2008-2009	***Ratio**	**2010-2011**	***Ratio**	**2012-2013**	***Ratio**
M.Phil (Pharmacology)	05	2.5:1	14	7:1	08	4:1
Ph.D (Pharmacology)	06	3:1	03	1.5:1	13	6.5:1
Research/ Teaching Assistants	02		02		02	

*Student/Researcher Ratio

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

University of Karachi provides insufficient financial resources to the department of Pharmacology to meet Programme objectives and there must be adequate administrative support to acquire and maintain library holding, laboratories and computing facilities.

Course Details

FIRST SEMESTER

First Professional

PHL-307 Physiology & Histology Cr. Hrs. 3

1. **Physiology of Nerve and Muscle**

   Chemical changes during muscle contraction, nerve action potential, skeletal, smooth muscle and cardiac excitation contraction.

2. **Blood**

   Composition, functions and genesis of formed elements. RBC, WBC and platelet. Fate of RBC, jaundice, reaction of blood, blood groups. Rh factors, ESR, blood volume, function of spleen, blood coagulation, hemophilia, classification of anemias.

3. **Circulatory System**

   Properties of cardiac muscles, origin and conduction of heart beat, cardiac cycle, ECG, heart sounds, cardiac output, stroke volume and heart rate. Nerve supply to heart, coronary, pulmonary and skin circulation. Blood pressure, vasomotor center. Arterial pulse, venous pulse, hemorrhage, circulatory changes in exercise, composition and circulation of lymph, shock.

4. **Skin**

   Structure and functions of skin, temperature regulation.

5. **Digestive System**

   Mastication, deglutition, digestive juices (gastric, pancreatic, bile and intestinal juices) their composition, function and mechanism of secretions. Movement of stomach and intestine, function of large intestine, defecation, functions of liver and gall bladder.

PHL-309 Pharmaceutical Biochemistry Cr. Hrs. 3

1. **Introduction and Basic Biochemical Principles**

   Role of pharmaceutical biochemistry in the health profession, nature of biochemical reactions.

2. **Basic Chemistry of Biomolecules**

   a) Carbohydrates

Chemistry, classification, reactions, optical activity, biological and pharmaceutical importance of carbohydrates.

b) Lipids

Chemistry of fatty acids and lipids classifications, (saponifiable and non saponifiable lipids, simple, complex and derived). Reactions of fatty acids and other lipids. Essential fatty acids, biological and pharmaceutical importance of lipids.

c) Proteins and Amino acids

Chemistry, classification, reactions of proteins and amino acids. Organizational level, macromolecular nature, biological and pharmaceutical importance of proteins and amino acids.

3. Metabolic Fate of Biomolecules

a) Carbohydrates

Brief digestion and absorption, aerobic and anaerobic breakdown of glucose, glycolysis, pentose phosphate pathway, glycogenolysis, gluconeogenesis, citric acid cycle, energetics of various metabolic processes.

b) Lipids

Brief digestion and absorption, oxidation of fatty acids through beta oxidation, Biosynthesis of fatty acids, neutral lipids, and cholesterol.

c) Proteins and Amino-acids

Brief digestion and absorption, metabolism of essential and non essential amino acids, Biosynthesis and catabolism of Haemins and porphyrin compounds.

4. Bioenergetics

Principles of bioenergetics, electron transport chain and oxidative phosphorylation.

5. Enzymes

Chemistry, classification, mode of action, kinetics (Michaelis Menten Equation and some modifications), Inhibition, activation, specificity, allosteric enzymes. Factors affecting the

rate of an enzyme catalyzed reaction, Biological and pharmaceutical importance, mechanism of action of some important enzyme (Chymotrypsin, Ribonuclease).

PHL-311 Pharmaceutical Biochemistry (Practical) Cr. Hrs. 3

1. **Qualitative Analysis**

   Carbohydrates, amino acids, peptides and proteins. Lipids and sterols (Cholesterol) bile salts and bilirubin. Blood sugar analysis, uric acid, bilirubin, cholesterol and creatinine.

2. **Quantitative Analysis**

   Carbohydrates–Glucose (reducing sugar) and any other carbohydrate using Benedict and anthrone method. Amino acids. Peptides and proteins using Biuret and Ninhydrin (Spectrophotometric) method. Analysis of normal and abnormal constituents of urine sugar. Uric acid, bilirubin, cholesterol and creatinine

Second Professional

PHL-407 Physiology & Histology (Practical) Cr. Hrs. 3

1. **Introduction to Experimental Physiology**

2. **Blood**

   Determination of hemoglobin. Determination of ESR, RBC count, WBC count, differential leucocytes count, bleeding and clotting time, blood groups.

3. **Respiration**

   Estimation of vital capacity and its relation to posture and standard vital capacity. Determination of tidal volume. Demonstration of artificial respiration.

4. **C.V.S.**

   Recording of arterial pulse, recording of arterial B.P.

5. Eye

Visual acuity, far vision, near vision and field of vision.

6. C.N.S.

Nerve muscle preparation in frog, effect of temperature on muscle, Demonstration of special reflexes.

7. Histology

Demonstration, preparation and staining of the slides, histological examination of slides, epithelium, connective tissue, muscle tissue, organ system - lungs, kidney, appendix, skin, gall bladder, stomach, intestine.

PHL – 409 Pharmacology & Therapeutics Cr. Hrs. 3

1. Introduction

History and scope of Pharmacology, classification of Pharmacology, classification of drugs and their sources.

2. Definitions

Bioavailability, bioequivalence therapeutic index, potency, efficacy, risk benefit ratio, selective toxicity, plasma half-life, dose response curve, desensitization and tachyphylaxis.

3. Drugs Delivery System

Advantages and disadvantages of oral medication. Advantages and disadvantages non-oral medication.

4. Pharmacokinetics

Drug solubility and passage of drugs across body membranes, plasma concentration of drugs and various factors affecting it. Factors affecting absorption, distribution, biotransformation and excretion.

5. Pharmacodynamics

Drug receptors and theories, agonist and antagonists, mechanism of drug action, specificity of drug action, and factors modifying the action.

6. Drugs Acting on Blood

Antianemic (Vit B_{12}, folic acid, iron). Coagulants and anticoagulants.

7. Autonomic Nervous System

Introduction to autonomic pharmacology.

8. Drugs Acting on ANS

Sympathetic agonists,sympathetic antagonists, parasympathetic agonists and antagonists, anticholinesterases, ganglion blockers and neuromuscular blockers.

PHL – 413 Pathology Cr. Hrs. 2

1. Scope of Pathology and Concept of Diseases

2. Definition and Terminology

Ischemia ….. Hypoxia

Necrosis ….. Infarction

Atrophy ….. Hypertrophy

Hyperplasia ….. Metaplasia

Aplasia ….. Anaplasia

3. Response of Body to Injury and Infection

Acute inflammation, chronic inflammation. Immunity , allergy and hyper sensitivity.

4. Specific Diseases

Peptic and duodenal ulcer, hypertension. M.I., SLE, Nephrotic syndrome, COPD.

5. Diagnosis of Cancer

Fate, survival and prognosis of tumors. Leukemia, malignant carcinoma, sarcoma lymphoma.

Third Professional

PHL – 507 Systemic Pharmacology Cr. Hrs. 3

1. Drugs Acting on Cardio Vascular System

Angina and antianginal drugs. Thrombosis and thrombolytic agents, Congestive heart failure and its treatment. Cardioactive glycosides, Bipyridines, β-adrenergic blockers. Xanthine derivatives, vasodilators. Antiarrhythmic drugs, Hyperlipidemia and hypocholesterolemic agents. Hypertension, antihypertensives and diuretics.

3. Dermatological Agents

Factors affecting topical absorption of drugs, Pharmacology of dermatological agents.

3. Drugs Acting on Respiratory System

a) Drugs used for Cough:

Antitussives, demulcents, steam inhalation, local anesthetics. Narcotic antitussives, non-narcotic antitussives. Expectorants. Mucolytic agents.

b) Bronchodilators, Corticosteroids and other anti-inflammatory drugs, Muscarinic receptor antagonists, Mast cell stabilizers; β agonists, Leukotriene inhibitors.

PHL – 509 Pathology Practical Cr. Hrs. 3

1. **Study of Pathological Slides of various Pathological Conditions**

   Acute inflammation; chronic inflammation; chronic specific inflammation. Different types of degeneration. Thrombosis, embolism, infarction, necrosis, gangrene, hyperplasia, metaplasia, pigmentation, calcification, C.B.C., papilloma, adenoma, chondroma, fibroma, neofibroma, sq. cell carcinoma, Basal cell carcinoma, transitional cell carcinoma.

   Adenocarcinoma, fibrocarcinoma, rhabdomyosarcoma, leiomyosarcoma, lymphosarcoma, liposarcoma, reticular cell sarcoma, Hodgkin's disease, breast carcinoma, osteogenic, Sarcoma, osteoclastoma.

2. **Examination of Different Body Fluids in various Pathological Conditions**

   Urine complete examination stool examination, blood complete examination. Semen examination, cerebrospinal fluid examination, pericardial fluid examination, pleural fluid examination, aseptic fluid examination, blood sugar, blood urea, blood cholesterol etc.

3. **Tests for various Specimens of Clinical Importance**

   Techniques of clinical blood examination for various diseases, gastric analysis, Tests for liver function and renal function. Test for endocrine abnormalities, biopsies and cytological techniques.

Fourth Professional

PHL – 609 Systemic Pharmacology Cr. Hrs. 3

1. **Drug Acting on Central Nervous System**

   Hypnotic and sedatives, analgesics, narcotic analgesics and opioids antagonists, anxiolytics, antipsychotics, antidepressants, antimanic, cerebral stimulants, spinal cord stimulants, drug treatment of epilepsy, drug treatment of parkinsonism and other movement disorders.

2. **Insulin, thyroxin and other agents affecting endocrine function**

3. **Ocular Pharmacology**

   Use of autonomic agents in eyes, chemotherapy of diseases in eye.

   Use of immunomodulatory drugs for ophthalmic therapy; Use of anesthetics in ophthalmic procedures.

4. **Oxytocic drugs**
5. **Drugs Acting on Reproductive System**

   Contraceptives; Fertility drugs; Testosterone and contraception in males; erectile dysfunction and pharmacotherapy.

Fifth Professional

PHL – 711 Clinical Pharmacology Cr. Hrs. 3

1. **Introduction to Clinical Pharmacology**

   Terminology, basic components and scope.

2. **Role of Drug Monitoring in Therapeutics**

   Patient profile, diseases profile, drug profile, monitoring responses, monitoring plasma concentration.

3. **Factors Affecting Drug Response**

   Pharmacogenetics, drug interactions.

4. **Development of New Drugs**

   Process of drug development, preclinical studies, types of clinical trials, choice of patients, exclusion criteria of patients.

5. **Drugs in Pregnancy**

   Prescribing in pregnancy, harmful effects on fetus, pharmacokinetics in pregnancy.

6. **Drugs in Infants and Children**

   Practical aspects of prescribing drugs, pharmacokinetics.

7. **Drugs in Elderly**

   Pharmacokinetics changes, Pharmacodynamic changes.

8. **Drug Toxicity**

Adverse drug reactions, monitoring adverse drug reactions, risk benefit ratio.

9. **Pharmacology of Nutrients**

SECOND SEMESTER

First Professional

PHL – 308 Physiology and Histology Cr. Hrs. 3

1. **Respiratory System**

   Mechanics of respiration, intrathoracic, intrapulmonary pressure. Pulmonary ventilation. Lungs volume and capacities. Composition of inspired air, expired air and alveolar air, carriage of oxygen and CO_2 by the blood. Regulation of breathing (Nervous and Chemical control).

2. **Urinary System**

   Urine formation, composition of urine, urea clearance. Formation of concentrated and dilute urine, Regulation of osmolarity, and pH (acidic and basic urine), process of micturition (nervous control), renal failures.

3. **Nervous System**

   Spinal reflexes. Reflex regulation of movement and posture. Cerebral cortex functions, Voluntary movements, Descending tracts of spinal cord. Basal ganglia, cerebellum, thalamus, C.S.F. Autonomic nervous system.

4. **Special senses**

   Elementary knowledge of structure and function of the special senses.

5. **Endocrinology**

   Definition of hormone. Nature of different types of hormone. Mechanism of action of hormones including pituitary hormones with abnormalities, thyroid gland with pathologies

para thyroid hormone, pancreatic hormone with diabetes mellitus, Adrenal glands with cushing syndrome, Addison's disease. Male and female sex hormones.

1. **Histology**

   Underlying principles of histological techniques and staining specific tissues. Staining of paraffin and frozen sections.

2.

PHL – 310 Pharmaceutical Biochemistry Cr. Hrs. 3

1. **Vitamins**

   Chemistry, classification (fat-soluble and water-soluble vitamins), biological and pharmaceutical importance of vitamins.

2. **Hormones**

   Chemistry, classification (proteinous and non-proteinous hormones, amino acid derivatives, steroids), Biological and pharmaceutical importance of hormones.

3. **Regulation of Metabolic Processes**

   Role of Vitamins, Physiological role of fat-soluble and water-soluble vitamins. Co-enzymes and their role in the regulation of metabolic processes. Niacin, thiamine, riboflavin, pyridoxine, pantothenic acid, biotin, folic acid and vitamin B_{12}.

4. **Receptor Mediated Regulation (Hormones)**

   Mechanism of action of hormones, physiological roles of various hormones, site of synthesis and target sites of hormones, action, regulation, signal transduction mechanism, role of cAMP, calcium ions and phosphoinositides, tyrosine kinase, JAK-kinase in the regulation of metabolic processes.

5. **Gene Expression**

Regulation of gene expression, chemistry, transcription and translation, introduction to biotechnology and genetic engineering. Basic principles of recombinant DNA technology, Pharmaceutical applications. Genetic switch, inducers, fusion, genes, regulatory genes, zinc finger, Helix-turn helix motif, the leucine-zipper motif.

PHL – 314 Anatomy Cr. Hrs. 2

1. **Introduction**

   Anatomical terminology, definition of cell, tissue, organ, structure of cell membrane, cytoplasm, organelles, nucleus, cell cycle.

2. **Tissues of Body**

   Cartilage, bone structure and types of bones and joints.

3. **Muscle**

   Structure of skeletal, smooth muscles, and cardiac muscles.

4. **Integumentary System**

   Including skin, glands, hair and nail.

5. **Cardio Vascular System**

   Structure of heart, location, blood supply to heart, types of blood vessels.

6. **Elementary System**

   Name and structure of different parts of elementary system and their interrelationship.

7. **Urinary System**

   Name and structure of organs of urinary system and their inter relationship.

8. **Male and Female Reproductive Systems**

Endocrine system including pituitary, thyroid and adrenal glands with their structures.

9. Central Nervous System

Including neuron, organization of CNS, brain, cerebrum, cerebellum, brain stem, Pons and medulla oblongata, thalamus, hypothalamus, cranial nerves. Internal structure of spinal cord CSF, sensory and motor pathways, spinal reflexes, peripheral spinal nerves.

10. Autonomic Nervous System

Sympathetic and Parasympathetic nervous system.

Second Professional

PHL – 410 Systemic Pharmacology Cr. Hrs. 3

1. Autacoids and their Antagonists

Serotonin and serotonin antagonist, other autacoids; Histamine and antihistamines, prostonoids.

2. Inflammatory Disorders

Medication for inflammatory disorders; Uricosuric agents; Glucocorticoids.

3. Drugs Acting on G.I.T. System

Gastroesophageal reflux disease and its treatment; emesis and antiemetics; Constipation and laxatives. Diarrhea and antidiarrheals; Peptic and duodenal ulcer, drugs used in their treatments; Drugs for inflammatory bowel disease, and for cholelithiasis; Prokinetics.

4. Chemotherapy

Introduction, principles of cell proliferation and chemotherapy. Principles of combination therapy, resistance of chemotherapy.

5. Chemotherapeutic Drugs

Antimicrobial, antiviral, antiprotozoal, antifungal, anthelminthic, antimycobacterial, and antineoplastic drugs.

Islamic Ideology Pakistan Studies **Cr. Hrs. 2**

PHL – 414

1. The Need of Religion

A critical analysis of the sources of human knowledge and importance of why (Divine revelation).

2. Islamic Concept of Life

Islamic concept of universe, the position of mankind, the earth, the goal for men's activities.

3. Islamic Beliefs

Iman and aqida the role of iman in character building and in the development of civilzation. Aqida-e-Tawhid (Belief in unity of God) its details and its impact on character. Iman bil Malaikah (Belief in Angels). Aqida Risalat (Belief in Prophethood) its details, its importance in the development of islamic civilization, the distinguishing features of Muhammad (PBUH) Prophethood, the doctrine of the last Prophet. Iman bil Kutub (Belief in the revealed books). Aqida Akhrat (belief in the life hereafter) its details, Quranic style of arguments on the life hereafter. The impact of Aqida Akhrat on individual and society. A comparison and Islamic concept of Ibadat with other religions. Salat (Prayer). Zakat, its philosophy, rates and minimum zakat amount, its impact on economy. Sawm (Fasting). Haj (Pilgrimage): Manasik and its importance.

4. Pakistan Studies

Ideology of Pakistan and its basic elements, two nation theory; Aims and objective for establishment of Pakistan; The Khilafat Movement. The struggle for Islamic System (with the

special reference to Constitution of Pakistan 1973); The common problems of Muslim Ummah and their solutions.

5. Islamic Moral Values

Philosophy of morality in Islamic moral values.

Third Professional

PHL – 510 Pharmacology (Practical) Cr. Hrs. 3

1. Research methods and experimental techniques in pharmacology.
2. Development of experimental design and animal handling.
3. Routes of administration.
4. Preparation of physiological salt solutions.
5. To demonstrate the effects of sympathomimetic and sympatholytic drugs on frog's heart.
6. To demonstrate the effects of parasympathomimetic and parasympatholytic drugs on frog's heart.
7. To demonstrate the effects of an unknown drug on frog's heart
8. To demonstrate the effects of vasoconstrictor drugs on frog's blood vessels.
9. To demonstrate the effects of stimulant drugs on rabbit's intestine.
10. To demonstrate the effects of depressant drugs on rabbit's intestine.
11. To demonstrate the effects of an unknown drug on rabbit's intestine and identify the (unknown) drug.
12. To study the effects of adrenaline on rabbit's eyes.
13. To study the effects of homatropine on rabbit's eyes.
14. To study the effects of pilocarpine on rabbit's eyes.
15. To study the effects of local anesthetic drug.
16. To determine the analgesic response of the given drug.

Fourth Professional

PHL – 612 Pharmacology (Practical) Cr. Hrs. 3

1. To study the convulsant effect of strychnine and picrotoxin in frogs and to determine the site of action.
2. To observe the effect of drugs on gross behavioral changes of animal.
3. To observe the effect of drugs on exploratory behavior of mice.
4. To identify the unknown (convulsant) drug and determine its site of action.
5. To observe the anti inflammatory effect of given drug by hind paw method.
6. To observe the effect of a diuretic in animal.
7. To observe the hypoglycemic effect of drugs in rabbit.
8. To identify and differentiate the effects of unknown drug on human and the nerve plexus of frog.
9. To demonstrate the effects of acetylcholine on the rectus abdominus muscle of frog and competitive pharmacological antagonism by Neuromuscular blocking agents.
10. To identify the unknown drug by performing pharmacological competitive antagonism on rectus abdominus muscle of frog.
11. To study the effects of heparin and oral anticoagulants on rabbits.
12. To identify the unknown anticoagulant drug using rabbits.
13. To identify unknown concentration of acetylcholine from graded dose-response curves.
14. To observe the effect of drug on swimming induced depression.
15. To observe the effects of drug on learning behavior of animal.
16.

Fifth Professional

PHL – 712 Toxicology Cr. Hrs. 3

1. Principles of Toxicology

Principles of treatment of poisoning, classification of toxic agents, spectrum of undesired effects, mechanisms of toxicity.

2. **Disposition of Toxicants**

   Absorption, distribution and elimination of toxicants, biotransformation of xenobiotics.

3. **Target Organs of Toxicity**

   Toxic responses of the blood, toxic responses of the liver, toxic responses of the heart, toxic responses of the kidney, toxic responses of reproductive system.

4. **Environmental Toxicology**

   Air pollution and ecotoxicology.

5. **Applications of Toxicology**

   Food toxicology, forensic toxicology, clinical toxicology, occupational toxicology, risk assessment.

Faculty CVs

DEPARTMENT OF PHARMACOLOGY
FACULTY MEMBERS

Name	Dr. Rahela Najam (Chairperson)
Designation	Professor
Qualification	Ph.D., M.Pharm., B.Pharm (University of Karachi)
Year of association	1994
Subjects of Interest	Haematology, Physiology, Neuropharmacology
Area of Research Interest	Neuropharmacology
Email:	aarahila18@gmail.com
Phone Number	(+9221) 99261300-7 Ext 2206

Name	Dr. Rafeeq Alam Khan
Designation	Professor
Qualification	Ph.D., M.Pharm., B.Pharm (University of Karachi)
Year of association	1988
Subjects of Interest	Cardiovascular Pharmacology
Area of Research Interest	Biochemical Pharmacology
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Phone Number	(+9221) 99261300-7 Ext 2206

Name	Ms. Tasneem Mariam
Designation	Assistant Professor
Qualification	M.S. (University of Illinois, USA)., M.Pharm., B.Pharm (University of Karachi)
Year of association	2000
Subjects of Interest	Toxicology
Area of Research Interest	Endocrine disruption by environmental pollutants
Email:	tmariamsajid@hotmail.com
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Name	Dr. Syeda Afroz
Designation	Assistant Professor
Qualification	Ph.D., M. Phil., B. Pharm (University of Karachi)
Year of association	2006
Subjects of Interest	General Pharmacology
Area of Research Interest	Neuropharmacology
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Phone Number	(+9221) 99261300-7 Ext 2206

Name	Dr. Afshan Siddiq
Designation	Assistant Professor
Qualification	Ph.D., M. Phil., B. Pharm (University of Karachi)
Year of association	2006
Subjects of Interest	Systemic Pharmacology, Biochemistry, Toxicology
Area of Research Interest	Biochemical Pharmacology
Email:	siddiq.afshan@gmail.com
Phone Number	(+9221) 99261300-7 Ext 2206

Name	Ms. Sadia Ghousia Baig
Designation	Assistant Professor
Qualification	M.Phil., B.Pharm (University of Karachi)
Year of association	2006
Subjects of Interest	Biochemistry, Neuropharmacology
Area of Research Interest	Biochemical Pharmacology
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Name	Dr. Nuzhat Sultana
Designation	Assistant Professor
Qualification	Ph.D., M. Phil., B. Pharm (University of Karachi)
Year of association	2012
Subjects of Interest	General Pharmacology, Toxicology
Area of Research Interest	Neurobehavioral Pharmacology, Biochemical, hematological and toxicological screening
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Name	Dr. Azra Riaz
Designation	Assistant Professor
Qualification	M.Phil., B.Pharm (University of Karachi)
Year of association	2012
Subjects of Interest	Pharmacology, Physiology, Biochemistry
Area of Research Interest	Biochemical and hematological parameters, Coagulation, Inflammation and Neuropharmacology
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Phone Number	(+9221) 99261300-7 Ext 2206

Name	Ms. Saira Saeed Khan
Designation	Lecturer
Qualification	M.Phil., B.Pharm (University of Karachi)
Year of association	2012
Subjects of Interest	Systemic Pharmacology, Biochemistry, Clinical Pharmacology
Area of Research Interest	Neuropharmacology, Biochemical and hematological studies
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Name	Mr. Shadab Ahmed
Designation	Lecturer
Qualification	M.Phil., B.Pharm (University of Karachi)
Year of association	2012
Subjects of Interest	Physiology, Pathology, Biochemistry, Pharmacology
Area of Research Interest	Neuropharmacology
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Survey's Result

QEC Self Assessment Survey

Teacher's Evaluation Survey

FACULTY OF PHARMACY

Department of Pharmacology

University of Karachi

Course no.310

(DR.SADIA GHOUSIA BAIG)

S.No.	Particulars	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Total
1	The instructor provides lesson plan in the first Lecture.	0.00%	0.00%	0.00%	36.00%	64.00%	100.00%
2	The instructor arrives and leave on time.	0.00%	0.00%	10.00%	42.00%	48.00%	100.00%
3	The instructor comes prepared for each lecture/practical.	0.00%	0.00%	0.00%	21.00%	79.00%	100.00%
4	The instructor demonstrate knowledge of the subject.	0.00%	6.00%	15.00%	26.00%	53.00%	100.00%
5	The instructor provides additional material apart from the text book.	5.00%	15.00%	21.00%	28.00%	31.00%	100.00%
6	The instructors creates an enviornment that is conductive for learning.	5.00%	5.00%	26.00%	10.00%	54.00%	100.00%
7	The subject matter presented in the course has increased your knowledge of the subject.	5.00%	15.00%	15.00%	45.00%	20.00%	100.00%
8	The instructor has completed the entire course.	0.00%	0.00%	4.00%	42.00%	54.00%	100.00%
9	The instructor is fair in evaluation.	5.00%	0.00%	10.00%	31.00%	54.00%	100.00%
10	The instructor returns the graded assignments,quizzes,answer sheets etc within specified time period.	0.00%	9.00%	26.00%	44.00%	21.00%	100.00%
11	The instructor remain available for consultation during specfied office hours.	0.00%	5.00%	36.00%	36.00%	23.00%	100.00%
12	The instructor follows moral and ethical norms.	0.00%	5.00%	10.00%	26.00%	59.00%	100.00%

QEC Self Assessment Survey
Teacher's Evaluation Survey
FACULTY OF PHARMACY
Department of Pharmacology
University of Karachi
Course no.314
(Prof.Dr.Raheela Najam)

S.No.	Particulars	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Total
1	The instructor provides lesson plan in the first Lecture.	18.70%	6.25%	6.25%	37.50%	31.30%	100.00%
2	The instructor arrives and leave on time.	6.25%	0.00%	18.75%	12.50%	62.50%	100.00%
3	The instructor comes prepared for each lecture/practical.	0.00%	12.50%	12.50%	6.25%	68.75%	100.00%
4	The instructor demonstrate knowledge of the subject.	18.75%	6.25%	0.00%	6.25%	68.75%	100.00%
5	The instructor provides additional material apart from the text book.	18.75%	18.75%	18.75%	6.25%	37.50%	100.00%
6	The instructors creates an enviornment that is conductive for learning.	18.75%	18.75%	18.75%	0.00%	43.75%	100.00%
7	The subject matter presented in the course has increased your knowledge of the subject.	5.00%	15.00%	10.00%	35.00%	35.00%	100.00%
8	The instructor has completed the entire course.	18.75%	6.25%	0.00%	18.75%	56.25%	100.00%
9	The instructor is fair in evaluation.	12.50%	25.00%	18.75%	12.50%	31.25%	100.00%
10	The instructor returns the graded assignments,quizzes,answer sheets etc within specified time period.	37.50%	12.50%	12.50%	12.50%	25.00%	100.00%
11	The instructor remain available for consultation during specfied office hours.	43.75%	0.00%	12.50%	12.50%	31.25%	100.00%
12	The instructor follows moral and ethical norms.	18.75%	6.25%	18.75%	18.75%	37.50%	100.00%

QEC Self Assessment Survey

Teacher's Evaluation Survey

FACULTY OF PHARMACY

Department of Pharmacology

University of Karachi

Course no.308

(DR.SHADAB AHMED)

S.No.	Particulars	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Total
1	The instructor provides lesson plan in the first Lecture.	0.00%	1.38%	2.77%	20.38%	75.47%	100.00%
2	The instructor arrives and leave on time.	0.00%	0.00%	1.38%	6.94%	91.68%	100.00%
3	The instructor comes prepared for each lecture/practical.	1.38%	0.00%	6.94%	26.38%	65.30%	100.00%
4	The instructor demonstrate knowledge of the subject.	0.00%	0.00%	6.94%	40.27%	52.79%	100.00%
5	The instructor provides additional material apart from the text book.	1.38%	4.16%	19.44%	31.94%	43.08%	100.00%
6	The instructors creates an enviornment that is conductive for learning.	0.00%	2.77%	15.20%	37.50%	44.53%	100.00%
7	The subject matter presented in the course has increased your knowledge of the subject.	0.00%	5.00%	15.00%	50.00%	30.00%	100.00%
8	The instructor has completed the entire course.	4.16%	2.77%	6.94%	19.44%	66.69%	100.00%
9	The instructor is fair in evaluation.	1.38%	4.16%	8.33%	34.70%	51.43%	100.00%
10	The instructor returns the graded assignments,quizzes,answer sheets etc within specified time period.	5.55%	8.33%	11.11%	34.71%	40.30%	100.00%
11	The instructor remain available for consultation during specfied office hours.	0.00%	4.16%	12.50%	30.55%	52.79%	100.00%
12	The instructor follows moral and ethical norms.	2.77%	1.38%	2.77%	31.94%	61.14%	100.00%

QEC Self Assessment Survey

Teacher's Evaluation Survey

FACULTY OF PHARMACY

Department of Pharmacology

University of Karachi

Course no.410

(DR.AZRA RIAZ)

S.No.	Particulars	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Total
1	The instructor provides lesson plan in the first Lecture.	12.19%	7.31%	12.19%	9.75%	58.56%	100.00%
2	The instructor arrives and leave on time.	0.00%	2.43%	0.00%	19.51%	78.06%	100.00%
3	The instructor comes prepared for each lecture/practical.	4.87%	7.31%	19.75%	26.82%	41.25%	100.00%
4	The instructor demonstrate knowledge of the subject.	0.00%	17.07%	34.14%	31.70%	17.09%	100.00%
5	The instructor provides additional material apart from the text book.	17.07%	17.07%	19.51%	17.07%	29.28%	100.00%
6	The instructors creates an enviornment that is conductive for learning.	4.87%	4.87%	26.82%	24.42%	39.02%	100.00%
7	The subject matter presented in the course has increased your knowledge of the subject.	5.00%	5.00%	15.00%	45.00%	30.00%	100.00%
8	The instructor has completed the entire course.	4.87%	0.00%	12.19%	26.82%	56.12%	100.00%
9	The instructor is fair in evaluation.	2.43%	17.09%	21.95%	24.39%	34.14%	100.00%
10	The instructor returns the graded assignments,quizzes,answer sheets etc within specified time period.	21.95%	12.19%	14.63%	26.84%	24.39%	100.00%
11	The instructor remain available for consultation during specfied office hours.	4.87%	2.43%	17.07%	34.14%	41.49%	100.00%
12	The instructor follows moral and ethical norms.	0.00%	4.87%	7.31%	24.39%	63.43%	100.00%

ALUMNI SURVEY
FACULTY OF PHARMACY
DEPARTMENT OF PHARMACOLOGY

S.No.	Particulars	Excellent	Very Good	Good	Fair	Poor	Total
	Knowledge						
1	Math,Science and Engineering Skills	13%	22.00%	44.00%	16.00%	5.00%	100.00%
2	Problem formulation and solving skills	11.00%	33.00%	44.00%	11.00%	1.00%	100.00%
3	Collecting and analyzing appropriate Data	5.00%	22.00%	55.00%	16.00%	2.00%	100.00%
4	Ability to link theory to practise	19.00%	22.00%	27.00%	27.00%	5.00%	100.00%
5	Ability to design a system component or process	2.00%	16.00%	38.00%	44.00%	0.00%	100.00%
6	Computer knowledge	19.00%	33.00%	22.00%	16.00%	10.00%	100.00%
	Communications Skills						
7	Oral Communications	24.00%	22.00%	38.00%	16.00%	0.00%	100.00%
8	Report writing	17.00%	22.00%	44.00%	11.00%	6.00%	100.00%
9	Presentation Skills	30.00%	16.00%	33.00%	16.00%	5.00%	100.00%
	Interpersonal Skills						
10	Ability to work in teams	18.00%	44.00%	27.00%	11.00%	0.00%	100.00%
11	Independent thinking	18.00%	44.00%	27.00%	11.00%	0.00%	100.00%
12	Appreciation of ethical values	30.00%	27.00%	27.00%	16.00%	0.00%	100.00%
13	Professional development	52.00%	16.00%	27.00%	5.00%	0.00%	100.00%
	Work Skills						
14	Time management Skills	16.00%	30.00%	27.00%	22.00%	5.00%	100.00%
15	Judgement	18.00%	33.00%	38.00%	11.00%	0.00%	100.00%
16	Discipline	18.00%	27.00%	50.00%	0.00%	5.00%	100.00%

Some important Suggestions by the Alumni which would Strengthen Our Faculty and Programmes:

- *There should be more advance computer skills training Programme s.*
- *Clinical Pharmacy practice based learning should be started with Clinical Pharmacist and Doctors.*
- *Multimedia facilities should be available in class rooms and Labs.*
- *Biostats and Pharmacokinetics Courses should be revised, based upon the latest software's.*
- *Research methodology should be included along with research projects.*
- *House jobs should be started.*
- *Industrial internships should be started.*