UNIVERSITY OF KARACHI

Self-Assessment Report
MPhil/ PhD programme

Department of Pharmaceutical Chemistry
Faculty of Pharmacy and Pharmaceutical Sciences
University of Karachi

Submitted to

Quality Enhancement Cell
University of Karachi

PROGRAMME TEAM
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CONTENTS

INTRODUCTION

The Department of Pharmaceutical Chemistry is a vital part of the Faculty of Pharmacy actively involved in teaching and research. Department offers Pharm. D., M.Phil. and Ph.D. courses encompassing organic, inorganic physical, analytical and medicinal chemistry. All the courses have been planned in such a way that they instill the concept of variety of disciplines including Organic Chemistry, Physics, Mathematics, Chemo-informatics, Pharmacology and Physiology related to drug discovery and drug designing.

Over the past five decades this department have been fortunate enough to have a number of eminent and senior professors, among these 3 professors served as Dean of the Faculty. It is an honour that one of the Vice Chancellor of Karachi University Professor Dr. Z.S. Saify belongs to this department.

At present, there are 11 full-time faculty members among them, 8 are PhD degree holders and out of which 2 are HEC recognized supervisors. Faculty members are actively engaged in research studies related to different fields of drug designing like synthesis of biologically active compounds, physicochemical studies of novel drug molecules, Targeted synthesis by computer aided drug designing, drug interaction studies, method development, stability and validation studies.

This department has the prestige of producing the first Ph.D. of Faculty moreover up till now 44 Ph.D., 68 M. Phil. and 54 M. Pharm. degrees have been awarded.

Prof. Dr. Shamim Akhtar
Chairperson
Department of Pharmaceutical Chemistry
Faculty of Pharmacy and Pharmaceutical Sciences
University of Karachi

CRITERION-1

PROGRAMME MISSION, OBJECTIVES AND OUTCOMES

Criterion-1: Programme Mission, Objectives and Outcomes

Institutional Mission

The department is dedicated in providing firm groundings in the field of drug designing, stability, method development, validation and quality control. Curriculum also focuses on laboratory experience supported by an excellent teaching staff. The department not only believes but also striving to provide standard education with professional and personal grooming to the future Pharmacists.

Programme Mission Statement

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

1-1 Programme Mission and Objectives

At research level objective is

- To produce M.Phil. and Ph.D. scholars
- To improve knowledge and skills in the related topics
- To improve decision making and confidence of research students
- To improve independent thinking to solve the problems or queries related to subject or topic.
- To be a good scientist to continue and grow in the particular field of research by producing research students and research papers
- To progress in their respective field like industry hospitals and teaching

Over all to offer better research and developmental prospects to make their research activities stronger

Table: Programme Objectives Assessment

S. No.	Objectives	How Measured	When Measured	Improvement Identified	Improvement Made
	Number of M.Phil and PhD students	Number of students produced	Each year	student financial support is required	Students apply for scholarships/ get teaching jobs
	Quality of theory courses	Number and contents of course	-	Modification in present courses plus more courses are required to design	Under process
	Quality of research work	Research papers /Thesis produced	Each year	Basic /advanced facilities are required	Proposals have been submitted. up till now no instruments are provided for research activity Students visit other institutes for practical work
	Confidence and knowledge of students	Presentations / class discussions	Every semester	Need more exposure	Attend workshop, seminars and conferences
	Student progress in profession	Performance at job place	After getting degree	Need more skills	Assigned independent projects and problem base learning

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

1-2 Program Outcomes

- Get higher degree of M.Phil. and Ph.D.
- Students should be more focused and confident
- Able to link knowledge with skills
- Able to write research papers/ projects and supervise students
- Progress in their respective fields in terms of performance and promotions

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

a) Strengths and Weaknesses of the Programme

i) Strengths:

Strong and competent faculty is available to conduct research work in their respective area of research

ii) Weaknesses

Financial support is required for research activity basic needs like computer lab or internet facility is not available to students and teachers

b) Future Development Plans

Joint ventures with different institutes are designed to conduct research activity. Proposals have been submitted to provide instruments /equipment plus sufficient financial support to research supervisor for each research student

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

a) Student Enrolment

S. No	Year	Degree			
1	2013	M.Phil	2	PhD	3
2	2014	M.Phil	2	PhD	2
3	2015	M.Phil	2	PhD	1

b) Student/Faculty Ratio

maximum 10 students are enrolled every year in M.Phil. course

PhD students enrolled on the availability of facilities and supervisor consent

c) i) Time for M. Phil 2-5 years

ii) Time for Ph.D. 2-5 years

d) The average student grade point (CGPA) 3.0 for M.Phil. and PhD

CRITERION-2

CURRICULUM DESIGN AND ORGANIZATION

Criterion-2 Curriculum Design and Organization

Courses offered

M.Phil

Course Work					
1st Semester			**2nd Semester**		
Course No.	**Title of Course**	**Cr. Hr.**	**Course No.**	**Title of Course**	**Cr. Hr.**
PHC-821	Biostatistics	3	PHC-822	Computer Application in Pharmacy	3
PHC-823	Drug Design	3	PHC-824	Macromolecular Targets	3
PHC-825	Spectrophotometric Analysis	3	PHC-826	Carbohydrate Chemistry	3
PHC-827	Drug Stability	3	PHC-828	Spectroscopic Techniques In Structure Elucidation	3
PHC-829	Clinical Chemistry	3	PHC-830	Physical Organic Chemistry	3
PHC-831	Electroanalytical Techniques	3	PHC-832	Quality Control and Quality Assurance	3
PHC-833	Solvent Extraction and Chromatographic Techniques	3	-	-	-
PHC-835	Medicinal Chemistry	3	-	-	-
PHC-837	Polymer Chemistry	3	-	-	-
Out of 15 courses the student have to opt 8 courses (each course is of 3 Cr. Hrs.) in two semester, while the thesis is mandatory.					

Ph.D. Courses

Course Work					
Course No.	**Title of Course**	**Cr. Hr.**	**Course No.**	**Title of Course**	**Cr. Hr.**
PHC-901	Research Methodology	3	PHC-902	Kinetic Methods of Analysis	3
PHC-903	Environmental Pharmacy	3	PHC-904	Advanced Medicinal Chemistry	3
PHC-905	Drug Development	3	PHC-912	Seminars on Current Advances in the Discipline	4
PHC-911	Research Seminars	4	PHC-914	Development of Research Proposal for Funding agenesis	6
PHC-913	Thesis and Manuscript Writing Skills	4			
Total 9 Courses making 33 Credit Hours. Student will complete 18 credit hours Mandatory: Thesis on Research work					

M.Phil Courses

FIRST SEMESTER

PHC-821 Biostatistics Cr. Hrs. 3

1. **Introduction**: What is biostatistics? Application of statistics in biological and pharmaceutical sciences.

2. **Sampling Method**: Sample and Population, Simple random sampling, sampling distribution & S.E., simple random sampling, stratified random sampling, systematic & cluster sampling.

3. **Test of Hypotheses and Confidence interval**: Statistical hypotheses, level of significance, one-tailed & two-tailed test, Properties of t-test & F-distribution, Tests concerning means (for small and large sample) variances and proportions, p-value.

4. **Test for Independence**: Chi-square distribution, Contingency tables, Yate's correction and Goodness-of-fit test (binomial, poison & normal distribution).

5. **Analysis of Variances**: One-way classification, one-way ANOVA, partitioning of sum of square and d.f. Two-way classification, two-way ANOVA, multiple comparison test.

6. **Experimental Design**: Basic principle of experimental designs, the completely randomized design, randomized complete block design and Latin-square design.

Books Recommended

1. Beth Dawson-Saunder. Basic and Clinical Biostatistics, 3rd Edition, A Lange Medical Book. London.
2. Biostatistics, A Foundation Analysis in the Health Sciences, Danniel, W.W., 4th edition Bernard Rosner (1987).
3. Fundamentals of Biostatistics, 4th Edition Wadsworth Publishing Company, USA (1995).
4. Introduction to Statistics, Ronalde Walpole, 3rd edition (1990).
5. Remington Practical of the Science and Pharmacy, Mack Publishing Company, Eston, Pennsylvania, USA.

PHC-823 Drug Design Cr. Hrs. 3

1. Structure activity relationship
2. Use of Computational chemistry in drug designing
3. Screening methods for new compounds
4. Development in Opium analgesics; structure and interaction with receptors. SAR studies of morphine analogues with reference to agonist and antagonist activities.

Books Recommended

1. Principles of Medicinal Chemistry William O. Foye, Thomas L. Lemke and David A. William, 6th edition, (2008).
2. Textbook of Organic Medicinal and Pharmaceutical Chemistry Wilson and Gisvold's. 10th edition, Lippincott-Raven Publisher (1998).
3. Burger's Medicinal Chemistry and Drug Discovery edited by E. Wolf, 6th edition, Wiley-Inter Science, New York (2003).
4. Introduction to Medicinal Chemistry Alex. Gringuaz., Wiley-Vch Inc. (1997).
5. The Organic Chemistry of Drug Design and Drug Action, Richard B. Silver. Academic Press, Pnen, Inc., USA (1992).

PHC-825 Spectrophotometric Analysis Cr. Hrs. 3

1. **Instrumentation**: Radiation sources, monochromators, detectors, signal processors, read-out devices, single and double-beam spectrophotometers.

2. **Ultraviolet and Visible Spectrophotometry**: Origin of molecular spectra, electronic transitions, solvent and steric effects, charge transfer spectra. Analysis of multicomponent systems, irrelevant absorption corrections.

3. **Difference, Derivative and Dual-Wavelength Spectrophotometry**: Applications in determination of molecular weight, rate constants and ionization constants; spectrophotometric titrations.

4. **Infrared Spectrophotometry**: Near infrared spectroscopy, Fourier transform infrared spectroscopy, Quantitative analysis.

5. **Fluorescence Spectrophotometry**: Factors affecting fluorescence, quantitative analysis of single and two-component systems, derivatization reactions, advantages of fluorimetric methods.

6. ***Transient Absorption Spectroscopy***: Flash spectroscopy, transient absorption spectra and life-time measurements of singlet, triplet and radical species.

7. **Analytical Development in Spectrophotometry**: Physical and chemical properties of medicinal and Pharmaceutical substances relevant to analytical development: colorimetric, enzymatic and photochemical reactions in spectrophotometric analysis, analytical problems in Multicomponent systems and formulated products, development of stability indicating assays.

Books Recommended

1. Instrumental Methods of Chemical Analysis, Golden W. Evings, McGraw Hill London 5th Edition 1985
2. Principle of Instrumental Analysis, Skoog Holter and Nieman 5th Edition 2000
3. Mass Spectroscopy, Instrumentation, Interpretation and Applications, edited Rog Ekman Jerzy Silbberring, Ann Westman-Brinkmalm Wiley Intersciences 2009
4. Modern Infra-Red Spectroscopy, Barbara Stuart Publisher ACOL John Wily and Sons 1996
5 Analytical Application of Spectroscopy Greaser C.S. and Davies A.M.C. Royal Society of Chemistry, London.1988

PHC-827 Drug Stability Cr. Hrs. 3

1. Introduction and objectives of drug stability studies
2. Stability as an essential quality attribute for pharmaceuticals
3. Significance of stability
4. Rationale for stability testing
5. Mode of degradation of drugs
6. Stability studies at the pre-formulation and formulation stages of drug
7. Physical factors affecting the stability of drugs
8. Chemical factors affecting the stability of drugs
9. Essential elements of a stability program.
10. Stability protocols
11. Kinetic principles in drug stability
12. Stability indicating assay methods
13. Accelerated stability testing methods
14. Regulatory aspects of stability testing
15. Examples of stability studies of some drug substances

Books Recommended

1 Stability of Drugs and Dosage Forms. Sumie Yoshioka and Valentino Stella, Kluwer Academic New York (2000).
2 Drug Stability Principles and Practices. 2nd ed., Carstansen J. T., Marcel Dekker, New York. (1995)
3 Stability Testing of Drug Substances and Drug Products, Draft Guide lines, Food and Drug Administration, USA (1998).
4 United States Pharmacopoeia, United States Pharmacopoeial Convention, Inc., Twinbrook Parkway S P, Rockville, MD (2005)
5 The British Pharmacopoeia, British Pharmacopoeia Commission, The Stationary Office London (2005).

PHC-829 Clinical Chemistry Cr. Hrs. 3

1. Introduction to methods of enzymatic analysis.
2. Biochemical specimens and normal values. Whole blood, serum plasma and other body fluids.
3. Electrolytic balance of serum.
   CSF and other body fluids (Na & K, chloride, physiological significance of electrolytes concentration in serum electrolytes in urine.
4. Liver function test
   Bilirubin, bromosulfaphthalein (BSP), bile pigments in urine, urobilinogen, porphyrins, porphobilinogen. Method for flocculation tests.
5. Kidney function tests and urine analysis
   Routine urine analysis. Total solutes, total protein, urinary calculi, creatinine clearance, glucose, urea, urinary calculi, creatinine clearance.
6. Testing of drugs and their metabolites
   Classes of the drugs and poisons, methodology of drugs and poison, blood alcohol. Barbiturates, bromide, salicylate, digoxin, carbon dioxide, lead, lithium.
7. Testing of blood gases, pH, bicarbonate, glucose and nitrogenous non-protein nitrogen (NPN).
8. Analysis of calcium, phosphorus, magnesium, iron, serum iron and iron binding capacity.
   Methods of enzymatic analysis. Use of auto-analyzer in clinical analysis.

Books Recommended

1 Clinical Chemistry, Annino J.S. and Giese R.W., Little, Brown and Co., Boston (1980).
2 Practical Clinical Chemistry, Toro G. and Ackermann P.G., Little, Brown and Co., Boston (1984).
3 Clinical Hematology, Estham R.D., 6th Edn., John Wright and Sons, Bristol (1985).
4 Principles of Internal Medicine, 12th Edn., Vol. 1 and 2, McGraw- Hill Inc., Health Professions Division, New York (1991).
5 Remington's Pharmaceutical Sciences, 17th Edn., Mack Publishing Co., Easton, Pennsylvania (1985).

PHC-831 Electroanalytical Technique Cr. Hrs. 3

1. Introduction to Electrochemical Methods

Classification of electrochemical methods, advantages and limitations of electrochemical methods, electrochemical terminology.

Principles of electrochemical cell, Nernst equation, potential generation across membranes, ion-selective electrodes, dropping mercury electrode, rotating platinum, gold and carbon electrodes.

2. Controlled-Potential Techniques

Chronoamperometry, chronocoulometry, D.C. polarography, cyclic voltammetry, rotating disc voltammetry, aerometric titrations.

3. Controlled-Current Techniques

Chronopotentiometry, cyclic chronopotentiometry.
Electrochemical sensors, photoelectrochemistry.
Electrochemical analysis of substances of pharmaceutical and biological interest.
Electrochemical study of the mechanism of organic reactions.

Books Recommended

1 Kissinger P.T. and Heineman W.R. Laboratory Techniques in Electroanalytical Chemistry, Marcel, New York (1984).
2. Bard A.J. and Faulkner L.R. Electrochemical Methods: Fundamentals and Applications, Wiley, New York (1980).
3 Bond A.M. Modern Polarographic Methods in Analytical Chemistry, Marcel Dekker, New York (1980).
4 Gurevich Y.Y., Pleskor Y.V. and Rotenberg Z.A. Photo-electrochemistry. Plenum, Press, New York (1978).
5 Skoog D.A. and West D.M. Principles of Instrumental Analysis 2nd Edn., Chapters 18-22. Holt-Saunders, Philadelphia (1980).

PHC-833 Solvent Extraction and Chromatographic Techniques Cr. Hrs. 3

1. Solvent Extraction

General principles, methods of extraction, experimental variables. Definition, classification (adsorption, partition, ion-exchange, molecular exclusion etc.).and basic principles of chromatographic processes.

2. Open-Bed Chromatography

Thin-layer chromatography: Theory types of stationary phases and solvents, visualization and identification qualitative and quantitative applications to the analysis of drugs and metabolites.

3. Adsorption Column Chromatography

Theory, stationary and mobile phase chromatography, application to the analysis of drugs and metabolites.

4. High Performance Liquid Chromatography

Theory, stationary and mobile phase, elutripic series, recent advances, applications to the analysis of drugs and metabolites.

5. Gas Chromatography

Theory, retention properties of stationary phases, derivatization techniques (methylation, acylation, silylation etc.) capillary GC, GC-mass spectrometry, application to the analysis of drug and metabolites.

6. Size Exclusion Chromatography

Theory, types of stationary phased, separation of high molecular weight organic compounds and biopolymers.

Books Recommended

1 Introduction to High-performance Liquid Chromatography. Hamiltion R.J. and Sewell P.A. 2nd Edn, Chapman and Hall, London (1977).
2 Practical High-Performance Liquid Chromatography Simpson C.F., Heydon and Sons London (1977).
3 Application of High Speed Liquid Chromatography, Done J.N., Konox I.H. and Lohear J. Wiley New York (1974).
4 Modern Practice of Gas Chromatography Grob R.L. (Ed.)., Wiley-Interscience, New York (1977).
5 Chromatographic System, Walker J.Q., Jakson M.T. Jr., and Maynard J.B., 2nd Edn Academic Press, New York (1977).

PHC-835 Medicinal Chemistry Cr. Hrs. 3

1. Introduction and Nomenclature
2. To study the sources, chemistry, classification, preparation, structure activity relationship and mechanism of action of the following
   a. Antiseptics Disinfectants
   b. Antimetabolites
   c. Anti Myco Bacterial Agents
   d. Antibiotics
   e. Antifungal Drugs
   f. Diagnostic Agents
   g. Steroidal Drugs
   h. Analeptics
   i. Vitamins

Books Recommended

1. Principles of Medicinal Chemistry William O. Foye, Thomas L. Lemke and David A. Williams., 6th edition (2008).
2. Text Book of Pharmaceutical Chemistry. Jayashree Ghosh. S. Chand and Company Ltd, India (1997).
3. Text Book of Pharmaceutical Organic Chemistry. Anil Bhandari. CBS Publishers and Distributors, India (2005).
4. Burger's Medicinal Chemistry and Drug Discovery, edited by E. Wolf, 6th edition, Wiley-Inter Science, New York (2003).
5. Text Book of Organic Medicinal and Pharmaceutical Chemistry. Wilson and Gisvold'sEdy., John H. Block and John M. Bcale, Lippincott Raven Publisher. (1998).

PHC-837 Polymer Chemistry Cr. Hrs. 3

1. Structure and physical aspects of organic, inorganic, natural and synthetic polymers
2. Synthetic Polymers, materials for the modern age
3. Nomenclature, properties and applications of polymer
4. Physical characteristics of polymer (glassy, crystalline and paracrystalline states v. including viscoelastic and relaxation behavior)
5. Thermodynamics and kinetics of transition phenomena
6. Organic chemistry of synthetic high polymers
7 Functionality and reactivity of monomers and polymers
8. Brief description of emulsion, polymerization, ionic polymerization and copolymerization in homogenous and heterogeneous media
9. An overview of polyether's, polyesters, polyamides and other polymeric materials and special application thereof
10. Polymer supported reagents useful in organic synthesis and macrobeads as polymeric micro reactors
11. Treatments of synthetic methodologies and of natural/synthetic biopolymers of special application in Pharmacy
12. Testing of Polymer materials

Books Recommended

1. Introduction to Physical Polymer Science. 3rd Edition, L.H. Sperling, Wiley (2001)
2. Organic Chemistry. 3rdEdn. John McMurry, Brooks/Cole Publishing Company, USA (1992)
3. Organic Chemistry, 4th. Edn. Ralph J. Fessenden and Joan S. Fessenden, Brooks/Cole publishing company, USA (1990)

SECOND SEMESTER

PHC-822 Computer Application in Pharmacy Cr. Hrs. 3

1. **Fundamental**: Basic concepts of hardware and software, Concept of operating systems & programming.

2. **Packages**: PC tools and utilities, any one of popular Word processor, Spread sheet, Graphics & presentation, data base, Statistical package, Chem. Draw and MM calculation.

3. **Use of Computer in Research**: Literature survey and use of information services via computer. Paper & dissertation composing by computer.

4. **Use of Computer in Hospital Pharmacy**: Exposure of students to computerization of different hospital systems including management, finances, patient history and profiles, drug utilization reports. Drug information systems of diagnostics. Computerization of drug distribution system, drug inventory control system.

5. **Use of Computer in Pharmaceutical Industry**: Exposure of students to use of computers in production, planning, budgeting, accounts, batch wise cost accounting, managing production and raw material. Quality assurance and quality control assessment. Sales and distribution control and evaluation**.**

Books Recommended

1. System Analysis and Design. Award E. M. Galgotia Publications, New Delhi (1989).
2. Inside the IBM PC. Nortorn P. Brady Computer Book, New York (1988)
3. MS-DOS. Jump D. N. Prentice Hall, New York (1987)
4. PC-DOS. Nortorn P. Prentice Hall, New York (1985)

PHC-824 Macromolecular Targets Cr. Hrs. 3

1. Carbohydrates, lipids, Proteins and nucleic acids as drug targets
2. Drug action at enzymes; introduction, role and function, mechanism, stimulation, inhibition and inactivation.
3. Drug action at receptors; introduction, structures, drug-receptor interaction, the design of agonist and antagonists

Books Recommended

1. Introduction to the Principle of Drug Design and Action. Smith and William, edited by H. John smith, 4th edition, R C Press, Taylor and Frances Group (2006)
2. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry edited by Jaime N. Lippincott Philadelphia (2004)
3. Foye's Principle of Medicinal Chemistry. David Lamke A. Williams, 6th edition, William and Wilkim, New York (2008)

4. Introduction to Medicinal Chemistry; How Drugs Act and Why, By Alex Gringauze Wiley VCH Inc., New York (1997)
5 Comprehensive Medicinal Chemistry Hansch C.M Sammes P.G. and Taylor J.B. and David J. Triggle, Pergmon Press Amsterdam (2007)

PHC-826 Carbohydrate Chemistry Cr. Hrs. 3

1. **Physico-Chemical Aspects**
   Open Chain and ring structure, isomerism, ascent and descent of series.

2. **Different Types of Sugar Reactions**
   Methylation, esterification, acetylation, periodate oxidation.

3. **Experimental Techniques**
   Chromatography in structural analysis, role of enzymes in structural analysis, use of periodate oxidation in structural analysis.

4. **Structural Study of the Following:**
   Cellobiose, xylobiose, cellulose, hemicellulose.

5. **Medicinal Uses of Carbohydrates**

Books Recommended

1. Structural Carbohydrate Chemistry Percival E.G.V. and Garnet J., Miller Ltd., London (1985).
2 Organic Chemistry Finar I.L., 6th Edn., Vol. 1 and 2 Longmans, Essex, England (1989).
3. Introduction to Biochemistry Suttie J.W., 2nd Edn. I, Holt-Saunders, Philadelphia (1977).
4. Carbohydrates Collins P.M., Chapman and Hall, London (1987).
5. Carbohydrate Chemistry, Vol. 1-22, Royal Society of Chemistry, London (1990)

PHC-828 Spectroscopic Techniques in Structural Elucidation Cr. Hrs. 3

1. Theory and application of spectrometry
2. Interpretation of molecular structure in spectral studies
   3. Analysis of Infrared, Mass and Nuclear magnetic resonance spectral data, obtained from literature and research work.

Books Recommended

1. Instrumental Methods of Chemical Analysis, Golden W. Evings, McGraw Hill London 5th Edition 1985
2. Principle of Instrumental Analysis, Skoog Holter and Nieman 5th Edition 2000
3. Mass Spectroscopy, Instrumentation, Interpretation and Applications, edited Rog Ekman Jerzy Silbberring, Ann Westman-Brinkmalm Wiley Intersciences 2009
4. Modern Infra-Red Spectroscopy, Barbara Stuart Publisher ACOL John Wily and Sons 1996.

5. Analytical Application of Spectroscopy Greaser C.S. and Davies A.M.C. Royal Society of Chemistry, London.1988

PHC-830 Physical Organic Chemistry Cr. Hrs. 3

1. Physical properties and molecular constitution
2. Valency and molecular structure
3. Electronic and molecular geometries, shapes of organic molecule
4. Electron effects and its manifestations
5. Molecular orbitals in chemical bonding and associated energies
6. Stereochemistry and conformational analysis
7. Fundamental classes of organic reactions and kinetics based upon molecular orbitals
8. Chemistry, mechanisms and types of some important reactive intermediates of
   i) Ionic reactions
   ii) Free radical reactions and
   iii) Excited atom reactions and strained molecules
   iv) Rearrangement, carbocation and carbanion
9. Linear free energy relationship
10. Solvent effects and isotope effects
11. Quantum biochemistry/mechanics and atomic structure

Books Recommended

1. Advanced Organic Chemistry: Reactions and Mechanisms Publisher: Bernard Miller (1998)
2. Advanced Organic Chemistry: Part B. Reactions and Synthesis. Carey, 4th edition Publisher: Kluwer, Academic Press (2001)
3. Physical Organic Chemistry. Owen-Wheeler. Elsevier Publishing Company Amsterdam-London-New York (1996)
   4. Principles of Modern Chemistry, A guide to advanced study by W.F. Forbes and W.J. Orville-Thomas
5. General Chemistry. PW Atkin and JA Beran. 2nd Edition Scientific American Books WH Freeman and Company (1989)

PHC-832 Quality Control and Quality Assurance Cr. Hrs. 3

1. Introduction
2. Concept of quality control and quality assurance
3. Basis of quality control and quality assurance
4. SOP writing
5. Layout of a pharmaceutical Industry with special reference to quality control and quality assurance departments.
6. Role and responsibilities of quality control and quality assurance departments
7. Regulatory bodies and their role
8. Quality standardization of pharmaceutical and formulated products
9. Purity consideration in Pharmaceutical
10. Sources of contaminants and their detection pharmaceuticals
11. Overview of methods for analysis
12. Qualification of equipment's and Validation methodology
13. Modern approaches of quality of pharmaceuticals

Books Recommended

1. Quality Assurance of Pharmaceuticals: A Compendium of Guidelines and Related Materials Manufacturing Practices and Inspection. World Health Organization (1999).
2. Good Manufacturing Practices for Pharmaceuticals. Sidney H. Willy, Marcel Dekker. Inc. (2001).
3. Impurities Evaluation of Pharmaceuticals. Ahuja, S. Marcel Dekker, New York, (1998).
4. Analytical Chemistry in a GMP Environment. Miller. J. M. and Crowther, J. B, Wiley, New York (2000).
5. Handbook of Pharmaceutical Analysis. Edt., Lena Ohannesian and Anthony Streeter, Marcel Dekker. Inc. New York (2005).

PHC-901 Research Methodology Cr. Hrs. 3

1. Initiation of Research, Nature and Significance of Research, Concepts and Objective of Research, Phases of Research, Classification of Research, Design of Research (Research problem/Proposal, Steps in preparing a research design, Background, Conditions etc.) Ethics of Research, Literature search, Data collection, Data Interpretation and Analysis, Research report.

2. Development of scientific thought and innovative approaches, Information sources in Pharmaceutical sciences, Fields of study in Pharmaceutical sciences, Pharmaceutical research as a basis for the development of new therapeutic agents, scientific presentations, research paper writing, treatment of scientific data.

Books Recommended

1. How to Research. Loraine Blaxter, Christian Higher Malcom Tight, 2nd edit, Open University Press, Buckingham, UK (2002).
2. http://www.thefreelibrary.com/Environmental+Health+Perspectives
3. Research Methodology. R. Cauvery, Rajedra Ravindra Printers, New Delhi, India (2005)
4. Research Methodology. R. Jayaprakash Reddy, AH Publishing Corporation, New Delhi (2004).

PHC-902 Kinetic Methods of Analysis Cr. Hrs. 3

1. Chemical Kinetics
   i. Molecularity of reaction
   ii. Kinetics of complex reactions
   iii. Theories of chemical reactions
   iv. Factors affecting chemical reactions
   v. Isotope effect in chemical reaction
   iv. Reactions in solutions

2. Enzyme Kinetics
   i. General principles of catalysis
   ii. Process and equations of kinetics
   iii. Multisubstrate systems
   iv Enzyme inhibition
   v. Allosteric interactions
   vi. pH effect on enzyme kinetics

Books Recommended

1. Analytical Aspects of Drug testing. Edt. Dale G Deutsch, John Wiley & Sons (1989).
2. Analytical Profiles of Drug Substances and excipients. Rosenstock, J, Academic Press, New York (1998).
3. Remington Practical of the Science and Pharmacy, Mack Publishing Company, Eston, Pennsylvania, USA.

PHC-903 Environmental Pharmacy Cr. Hrs. 3

1. **Introduction to the natural environment**

2. **Chemical principles of the source, fate and reactivity of chemical species in water, soil, air and living environments**

3. **Pharmaceutical Pollution:**
   i. Occurrence and fate of pharmaceuticals and other wastewater derived compounds
   ii. Pharmaceutical waste and its potential impact on the environment
   iii. The ecotoxicological effects of common pharmaceuticals and personal care products
   iv. Solution and methods for reducing pharmaceutical waste and Pharmaceutical management for disposal practices

Books Recommended

1. Environmental Health Perspectives (EHP): Journal published by the National Institute of Environmental Health Sciences (free content online)
2. Environmental Science: Ecology and Human Impact by Bernstein, Winkler and Zierdt-Warshaw; Addison-Wesley Publishing Company (1996)
3. Pharmaceuticals in the Environments: Sources, Fate, Effect and Risk. Klaus Kummerer; 2nd edition, Springer (2004)
4. Symbiosis: The Journal of Ecologically Sustainable Medicine (free content online)

PHC-904 Advance Medicinal Chemistry Cr. Hrs. 3

1. Recent advances; current trends in drug design

2. Neurotransmitters and their receptors
   i. Cholinergic
   ii. Adrenergic
   iii. G.A.B.A
   iv. Dopamine
   v. Serotonin
   vi. Histamine

3. Peptidergic receptors
   i. Opioids
   ii. Insulin
   iii. Glucagon
   iv. Angiotensin

Books Recommended

1. Burger's Medicinal Chemistry and drug discovery edited by Donald J. Abraham, John Wiley & Sons incorporated Philadelphia (2003).
2. Medicinal Chemistry. Thomas Nogrady, Donald F. Weaver 3rd Edition, Oxford University Press, New York (2005).

3. Smith and Williams' Introduction to the principles of drug design and drug action by H. John Smith 4th Edition, CRC Taylor and Francis New York (2006).
4. The organic chemistry of drug design and drug action by Richard B. Silverman 2nd Edition, Elsevier Academic Press, California (2004).
5. The Process of new Drug Discovery and Development. Charles G. Smith, CRC Press, Washington DC (1992).

PHC-905 Drug Development Cr. Hrs. 3

1. Objectives of drug development
2. Phases of drug development
3. Cost and time factor in drug development
4. Market potential of the drug
5. Screening of natural products
6. Identification of lead molecules
7. Structure based drug design
8. Analytical development
9. Stability studies
10. Preformulation and formulation studies
11. Bioavailability testing
12. Establishment of drug standards
13. Chemical and toxicological evaluation
14. Determination of safety and efficacy in animals and humans
15. Establishment of dosing limits
16. Understanding of drug interaction
17. Drug modifications

Books Recommended

1. Burger's Medicinal Chemistry and drug discovery edited by Donald J. Abraham, John Wiley & Sons incorporated Philadelphia (2003).
2. Medicinal Chemistry. Thomas Nogrady, Donald F. Weaver 3rd Edition, Oxford University Press, New York (2005).
3. Smith and Williams' Introduction to the principles of drug design and drug action by H. John Smith 4th Edition, CRC Taylor and Francis New York (2006).
4. The Organic Chemistry of drug design and drug action by Richard B. Silverman 2nd Edition, Elsevier Academic Press, California (2004).
5. The Process of new Drug Discovery and Development. Charles G. Smith, CRC Press, Washington DC (1992).

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

2-1 Correlation of Courses with Objectives

- Courses designed in M. Phil. and Ph.D. program related to the research areas students select for their thesis work.
- They get the chance to understand the subject and teacher approach for research work
- Teaching mode is class discussions assignments presentations and search projects which increase their confidence, knowledge and insight about topic and research process

2-2 Theory, Problem Analysis/ Solution and Design in Program

Theory, Problem Analysis

M.Phil. courses	PhD
Biostatistics	Research Methodology
Drug Design	Environmental Pharmacy
Spectrophotometric Analysis	Drug Development
Drug Stability	Kinetic Methods of Analysis
Clinical Chemistry	Advanced Medicinal Chemistry
Solvent Extraction and Chromatographic Techniques	
Medicinal Chemistry	
Polymer Chemistry	
Macromolecular Targets	
Carbohydrate Chemistry	
Spectroscopic Techniques	
Physical Organic Chemistry	
Quality Control and Quality Assurance	

Solution and Design

M.Phil	PhD
Biostatistics	Research Methodology
Electroanalytical Techniques	Research Seminars
Solvent Extraction and Chromatographic Techniques	Thesis and Manuscript Writing Skills
Computer Application in Pharmacy	Seminars on Current Advances in the Discipline
Spectroscopic Techniques In Structure Elucidation	Development of Research Proposal for Funding agenesis

Standard 2-3: The curriculum must satisfy the core requirements for the programme, as specified by the respective accreditation body. &
Standard 2-4: The curriculum must satisfy the major requirements for the programme, as specified by the respective accreditation body/council.

2-3 and 2-4 Major requirements as specified by Acceleration Body

The curriculum has been approved by Board of Studies of Department, Board of Faculty of Pharmacy, Academic Council and competent authority of University of Karachi.

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

Mentioned in 2-3 and 2-4

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

2-6- Information Technology Content Integration Throughout the Programme

For every course depending on content and teaching methodology students use computer facility (their own laptop) internet (their own USB device) or multimedia in the department

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

2-7 Communication Skills (oral and written)
Students attend seminars and conferences plus complete different tasks/assignments and project which improve their communication skills.

CRITERION-3

LABORATORY AND COMPUTING FACILITIES

CITERION-3: Laboratory and Computing Facilities

Standard 3-0 Laboratory and Computing Facilities

- In the department no separate class rooms are available for MPhil and PhD classes.
- Teachers conduct the class in their offices or whenever Pharm.D. lab is available
- No separate computer lab is available. Teachers and Students use their personal laptop
- Research labs available in Research institute of Pharmaceutical Sciences where synthesis, instrumental work and animal studies are carried out
- Mostly students visit different labs in HEJ, PMDC, PCSIR and other institutes to complete their research work

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

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

- Lab attendant is available on part time basis specially provided by the chairperson of department. Lab staff support is not sufficient. Supervisors employ a lab attendant personally for their lab. Students perform all the basic lab work by themselves

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

i) Computing Facilities

No computer lab is available for teachers and students

ii) Multimedia

2 multimedia systems are available in department

iii) Website

No separate website of department is working

iv) Internet

No internet facility is available to students

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

4-1 to 4-3

- Teachers are available in office timings for students
- Students seek advice and guidance for their future projects and research study
- No special professional advising and counseling is provided
- Class teaching is based upon discussions and presentations which provide the maximum chance for student teacher interaction
- Separate professional counseling is not available

CRITERION-5

PROCESS CONTROL

Criterion-5: Process Control

Standard 5-1: The process by which students are admitted to the programme must be based on quantitative and qualitative criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.
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.

5-1 and 5-2 Admission Process /Registration and Student

REQUIREMENT/ PROCEDURE FOR ADMISSION TO M. Phil. and Ph. D.

A. Eligibility Criteria (M.Phil.)

At least sixteen years of studies (B. Pharm or Pharm. D.).

B. Admission Procedure (M. Phil.)
1. Candidates required to submit the following documents along with the Entrance Test Application Form:
a) Photocopy of the consolidated transcript/marks certificate of the last degree examination
b) Photocopy of Computerized National Identity Card
c) Two recent passport size photographs
2. Candidates required to appear in the Entrance Test conducted by the relevant department/center/institute of the University of Karachi. This is mandatory for all the candidates.
3. a) The test shall comprise of the following sections:

Section-I English and Communication Skills	20%
Section-II Subject knowledge	80%

b) Candidates required to score at least 40% marks in Section-I and 50% marks in section-II separately to be eligible for consideration for provisional admission.

Note: Qualifying the admission test is no guarantee for admission.
4. All the students who qualify the test required to appear for an interview to be conducted by the respective Departmental Research Committee (DRC).

C. Provisional Admission (M. Phil.)
i. Applications for provisional admission considered on the basis of eligibility, merit, availability of seats and supervisors.
ii. Final admission list prepared by the DRC according to the following formula:
a. The marks obtained in the prerequisite degree examination given 50% weightage.
b. The marks secured in the Entrance test given 30% weightage.
c. The marks obtained in the interview given 20% weightage.

D. Submission of Forms for Provisional Admission

Candidates selected for provisional admission required to submit the following documents along with the completed admission forms duly signed by the Chairperson/Director of the Department/Institute/Center and the Dean of the Faculty concerned:

a) Two recent passport size photographs, duly attested by the Chairperson/Director of the Departments/Institute/ Centers concerned.

b) Attested photocopies of certificates/ degrees from S.S.C. to Masters or the prerequisite exam.

c) Degree holders of other Universities must submit Migration Certificate.

d) An attested photocopy of Computerized National Identity Card.

e) A letter of leave for two years from the employer, if the candidate is in service or a certificate of non-employment stating that during research no employment shall be undertaken, executed on a stamp paper worth Rs. 20/- (attested by Notary Public/ Oath Commissioner).

f) Teachers and employees of organizations where research work is conducted are exempted from leave. However, a no objection certificate from the employer will be required as per rule.

g) In case of foreign students, NOC from the Ministry of Education, Economic Affairs Division and Ministry of Foreign Affairs, Government of Pakistan, Islamabad and an attested copy of valid visa and passport.

h) Certificate from the Equivalence Committee, University of Karachi, in case the accreditation status of the prerequisite degrees is not clear.

i) The Admission & Tuition fee. (Please see fee structure)

E. Course Work (M. Phil.)

a) All selected candidates required to complete 8 courses of 24 credit hours in two semesters.

b) Candidates are required to attend at least 75% classes of each course.

c) Students must clear the course work with CGPA at least 3.0. In case a student fails to get the desired CGPA, he/ she will be allowed to improve the grade. Only one chance for improvement of each course studied will be given in the subsequent year.

F. Confirmation of Admission (M. Phil.)

a) After passing the course work with CGPA 3.0 or more, the student will be required to apply through proper channel for confirmation of admission and approval of research proposal.

b) The student will submit a synopsis along with research topic, bibliography, name of the Research Supervisor and a copy of the marks certificate issued by the Semester Examination Section duly forwarded by the Supervisor, Chairperson and Dean concerned.

A. Eligibility Criteria (Ph.D.)

Master's degree in relevant field (M. Pharm. or M.Phil.) basic degree should be B. Pharm./ Pharm. D.

B. Admission Procedure (Ph.D.)

1. Candidates required to submit the following documents along with the Entrance Test Application Form:

a) Photocopy of the consolidated transcript/marks certificate of the last degree examination
b) Photocopy of Computerized National Identity Card
c) Two recent passport size photographs

2. Candidates required to appear in the Entrance Test conducted by the relevant department/center/institute of the University of Karachi. This is mandatory for all the candidates.

3. a) The test comprise of the following sections:

Section-I English and Communication Skills	20%
Section-II Subject knowledge	80%

b) Candidates required to score at least 40% marks in Section-I and 50% marks in section-II separately to be eligible for consideration for provisional admission.

Note: Qualifying the admission test is no guarantee for admission.

4. All the students who qualify the test required to appear for an interview to be conducted by the respective Departmental Research Committee (DRC).

C. Provisional Admission (PhD))

i. Applications for provisional admission considered on the basis of eligibility, merit, availability of seats and supervisors.

ii. Final admission list prepared by the DRC according to the following formula:

a. The marks obtained in the prerequisite degree examination given 50% weightage.
b. The marks secured in the Entrance test given 30% weightage.
c. The marks obtained in the interview given 20% weightage.

D. Submission of Forms for Provisional Admission

Candidates selected for provisional admission will be required to submit the following documents along with the completed admission forms duly signed by the Chairperson/Director of the Department/Institute/Center and the Dean of the Faculty concerned:

a) Two recent passport size photographs, duly attested by the Chairperson/Director of the Departments/Institute/ Centers concerned.
b) Attested photocopies of certificates/ degrees from S.S.C. to Masters or the prerequisite exam.
c) Degree holders of other Universities must submit Migration Certificate.
d) An attested photocopy of Computerized National Identity Card.
e) A letter of leave for two years from the employer, if the candidate is in service or a certificate of non-employment stating that during research no employment shall be undertaken, executed on a stamp paper worth Rs. 20/- (attested by Notary Public/ Oath Commissioner).

f) Teachers and employees of organizations where research work is conducted are exempted from leave. However, a no objection certificate from the employer will be required as per rule.
g) In case of foreign students, NOC from the Ministry of Education, Economic Affairs Division and Ministry of Foreign Affairs, Government of Pakistan, Islamabad and an attested copy of valid visa and passport.
h) Certificate from the Equivalence Committee, University of Karachi, in case the accreditation status of the prerequisite degrees is not clear.
i) The Admission & Tuition fee. (Please see fee structure)

E. Course Work (PhD)
a) All selected candidates will be required to complete 18 credit hours in two semesters plus research dissertation
b) Candidates are required to attend at least 75% classes of each course.
e) Students must clear the course work with CGPA at least 3.0. In case a student fails to get the desired CGPA, he/ she will be allowed to improve the grade. Only one chance for improvement of each course studied will be given in the subsequent year.

Standard 5-3: The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with institutional mission statement. These processes must be periodically evaluated to ensure that it is meeting with its objectives.

Faculty Recruitment / Retaining Policy
Appointments / Promotions Procedure:

5-3 Faculty Recruitment and Retention Process

- Posts are advertised in the national newspapers,
- Applications received scrutinized by the Registrar, Dean and chairperson
- After establishing eligibility on the basis of experience, qualification, publications letters are issued to the candidates
- Qualification test is conducted for the post of lecturer, assistant professor
- Short listed candidates are interviewed by the University Selection Board.
- Selection of candidates is approved by the syndicate of University of Karachi
- Faculty members are retained because they have confirmed job and open environment. Pay scale is good and chances for higher studies and promotions are good

a. Lecturer (BPS- 18):
Minimum Qualification
Pharm D./M.Pharm/M.Phil

b. Assistant Professor (BPS- 19):
Minimum Qualification
M.Pharm./M.Phil with four years' experience or PhD

c. Associate Professor (BPS- 20)
Minimum Qualification
PhD
Experience
10 years
Minimum Number of Publications
Minimum 10 publications in reputable journals

d. Professor (BPS-21)
Minimum Qualification
PhD
Experience
15 years
Minimum Number of Publications
Minimum 15 publications in reputable 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.

Covered in criteria 3 and 4

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.

5-5 Programme requirements completion process

The duration of M. Phil. will be minimum two (02) and maximum five (05) years from the date of provisional admission.

The duration of PhD will be minimum two (02) and maximum five (05) years from the date of provisional admission

Evaluation & Award of M. Phil. Degree
Thesis is to be evaluated by two external examiners (outside province) appointed by the BASR. The M. Phil degree shall be awarded by the BASR subject to positive reports of the supervisor, the two external examiners and a successful oral defense of the thesis by the candidate.

Evaluation & Award of PhD Degree
The thesis is to be evaluated by two external examiners (outside country, preferably European countries or USA) appointed by the BASR. The PhD degree shall be awarded by the BASR subject to positive reports of the supervisor, the two external examiners and a successful oral defense of the thesis by the candidate.

CRITERION-6

FACULTY

Criterion-6 Faculty

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

Department of Pharmaceutical Chemistry

S. No.	Name	Designation	Detail of Qualification	Teaching Experience (years)
1	Dr. Shamim Akhtar	Professor and Chairperson	B. Pharm., M. Pharm., Ph. D (Kar)	18
2	Dr. Faiyaz Vaid	Professor	B. Pharm., M. Pharm., Ph. D (Kar)	18
3	Dr. Mansoor Ahmed	Associate Professor	M. Sc., Ph. D (Kar)	14
4	Dr. Nousheen Mushtaq	Associate Professor	B. Pharm., M. Phil., Ph. D (Kar)	17
5	Dr. Afaq Ahmed Siddiqui	Assistant Professor	M. Sc., Ph. D (Kar)	23
6	Dr. Sohail Hassan	Assistant Professor	B. Pharm., M. Phil., Ph. D (Kar)	14
7	Mr. Amir Hassan	Assistant Professor	B. Pharm., M. Pharm.	19
8	Dr. Asia Naz	Assistant Professor	B. Pharm., Ph. D (Kar) Postdoc (USA)	10
9	Dr. Shazia Haider	Assistant Professor	B. Pharm., M. Phil. Ph. D (Kar)	05
10	Ms. Urooj Nazim	Lecturer	Pharm. D., M. Phil.	11
11	Ms. Rubina Muzaffer	Lecturer	B. Pharm., M. Phil.	07

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.

6-2 Current Faculty, Scholarly activities and development

All teaching faculty is involved in research either doing PhD or supervising research students for M. Phil and PhD degree. Two members attended and organized faculty development program. More expected to get trained in future

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

6-3 Faculty motivation and Job satisfaction

Faculty motivation for conducting research activities are to get promotions and for better prospect in professional field. In University of Karachi every faculty member is satisfied with job because of permanent position and good pay scale. For research activities still lot is required to provide like basic infrastructure and facilities (mentioned earlier)

CRITERION-7

INSTITUTIONAL FACILITIES

Criterion-7 Institutional Facilities

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

a) Departmental library and Internet Facility

- Faculty has its own seminar library with latest editions of related subject books
- Departmental need for books on different research topics is fulfilled by this library.
- Computers are available in library but not even sufficient for graduate students

b) Main Library

No need to go main library as subjects books are available in seminar library

c) Offices

More offices are required as 2 or 4 teachers sharing single office

d) Class Rooms

No separate class rooms are available for research 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.

Yes, library has up to date books collection, separate staff to deal with for research students is required

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

Mentioned earlier

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.

Dean's grant is the only financial source university provides for research activity

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

Degree Programme	Years		
	2012	2013	2014
M.Phil	1:10	1:10	1:10
Ph.D.	1:2 or 1:3	1:2 or1:3	1:2 or 1:3

Student/Faculty Ratio (for the last three years)

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

Mentioned earlier in criterion 7

Faculty CVs

Survey's Results

Teacher's and Course Evaluation Survey

Department of Pharmaceutical Chemistry

M.Phil

Name of Teacher: Dr. Arif

S. NO.	Teacher's Evaluation	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Unanswered	Total
1	The teacher provides lesson plan in the first week of the semester.	50.00%	25.00%	25.00%	0.00%	0.00%	0.00%	100%
2	The teacher is punctual in the class.	25.00%	25.00%	37.50%	12.50%	0.00%	0.00%	100%
3	The teacher comes prepared for each lecture/ practical (where applicable)	37.50%	25.00%	25.00%	12.50%	0.00%	0.00%	100%
4	The teacher demonstrates and communicate knowledge of the subject in easy language.	50.00%	25.00%	12.50%	12.50%	0.00%	0.00%	100%
5	The teacher suggests additional reading material apart from the text book.	25.00%	37.50%	12.50%	0.00%	25.00%	0.00%	100%
6	The teacher creates an interactive environment for class discussion.	25.00%	37.50%	37.50%	0.00%	0.00%	0.00%	100%
7	The teacher has covered the course.	25.00%	37.50%	25.00%	0.00%	12.50%	0.00%	100%
8	The teacher is fair in evaluation.	37.50%	50.00%	0.00%	0.00%	12.50%	0.00%	100%
9	The teacher submits the result within the specified time period.	12.50%	0.00%	37.50%	25.00%	25.00%	0.00%	100%
10	The teacher remains available for consultation during the specified office hours	62.50%	12.50%	12.50%	12.50%	0.00%	0.00%	100%
11	The teacher follows moral and ethical norms with the students.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
	Course Evaluation:							
12	The course is well organized.	25.00%	37.50%	37.50%	0.00%	0.00%	0.00%	100%
13	The syllabus clearly states course objectives requirements, procedures and grading criteria	25.00%	62.50%	0.00%	12.50%	0.00%	0.00%	100%
14	The course integrates theoretical course concepts with real-world applications	50.00%	25.00%	25.00%	0.00%	0.00%	0.00%	100%
15	The assignments and exams covered the materials presented in the course	62.50%	0.00%	25.00%	12.50%	0.00%	0.00%	100%
16	The course material is updated	50.00%	25.00%	12.50%	0.00%	12.50%	0.00%	100%
17	The contents presented in the course has increased my knowledge of the subject.	62.50%	12.50%	25.00%	0.00%	0.00%	0.00%	100%
18	The course content has stimulated my intellectual curiosity.	37.50%	37.50%	25.00%	0.00%	0.00%	0.00%	100%

Teacher's and Course Evaluation Survey

Department of Pharmaceutical Chemistry

M.Phil

Name of Teacher: Dr. Mansoor

S. NO.	Teacher's Evaluation	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Unanswered	Total
1	The teacher provides lesson plan in the first week of the semester.	62.50%	0.00%	12.50%	12.50%	12.50%	0.00%	100%
2	The teacher is punctual in the class.	37.50%	12.50%	12.50%	25.00%	12.50%	0.00%	100%
3	The teacher comes prepared for each lecture/ practical (where applicable)	50.00%	12.50%	25.00%	0.00%	12.50%	0.00%	100%
4	The teacher demonstrates and communicate knowledge of the subject in easy language.	62.50%	12.50%	12.50%	0.00%	12.50%	0.00%	100%
5	The teacher suggests additional reading material apart from the text book.	62.50%	0.00%	12.50%	12.50%	12.50%	0.00%	100%
6	The teacher creates an interactive environment for class discussion.	50.00%	12.50%	12.50%	0.00%	25.00%	0.00%	100%
7	The teacher has covered the course.	62.50%	0.00%	0.00%	12.50%	25.00%	0.00%	100%
8	The teacher is fair in evaluation.	62.50%	25.00%	12.50%	0.00%	0.00%	0.00%	100%
9	The teacher submits the result within the specified time period.	75.00%	0.00%	12.50%	12.50%	0.00%	0.00%	100%
10	The teacher remains available for consultation during the specified office hours	37.50%	12.50%	25.00%	12.50%	0.00%	12.50%	100%
11	The teacher follows moral and ethical norms with the students.	62.50%	0.00%	12.50%	12.50%	0.00%	12.50%	100%
	Course Evaluation:							
12	The course is well organized.	62.50%	0.00%	0.00%	12.50%	25.00%	0.00%	100%
13	The syllabus clearly states course objectives requirements, procedures and grading criteria	50.00%	12.50%	12.50%	25.00%	0.00%	0.00%	100%
14	The course integrates theoretical course concepts with real-world applications	62.50%	12.50%	25.00%	0.00%	0.00%	0.00%	100%
15	The assignments and exams covered the materials presented in the course	62.50%	0.00%	0.00%	37.50%	0.00%	0.00%	100%
16	The course material is updated	62.50%	0.00%	12.50%	25.00%	0.00%	0.00%	100%
17	The contents presented in the course has increased my knowledge of the subject.	62.50%	12.50%	25.00%	0.00%	0.00%	0.00%	100%
18	The course content has stimulated my intellectual curiosity.	62.50%	25.00%	0.00%	12.50%	0.00%	0.00%	100%

Teacher's and Course Evaluation Survey

Department of Pharmaceutical Chemistry

M.Phil

Name of Teacher: Dr. Nousheen

S. NO.	Teacher's Evaluation	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Unanswered	Total
1	The teacher provides lesson plan in the first week of the semester.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
2	The teacher is punctual in the class.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
3	The teacher comes prepared for each lecture/ practical (where applicable)	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
4	The teacher demonstrates and communicate knowledge of the subject in easy language.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
5	The teacher suggests additional reading material apart from the text book.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
6	The teacher creates an interactive environment for class discussion.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
7	The teacher has covered the course.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
8	The teacher is fair in evaluation.	75.00%	25.00%	0.00%	0.00%	0.00%	0.00%	100%
9	The teacher submits the result within the specified time period.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
10	The teacher remains available for consultation during the specified office hours	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
11	The teacher follows moral and ethical norms with the students.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
	Course Evaluation:							
12	The course is well organized.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
13	The syllabus clearly states course objectives requirements, procedures and grading criteria	75.00%	25.00%	0.00%	0.00%	0.00%	0.00%	100%
14	The course integrates theoretical course concepts with real-world applications	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
15	The assignments and exams covered the materials presented in the course	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
16	The course material is updated	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
17	The contents presented in the course has increased my knowledge of the subject.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
18	The course content has stimulated my intellectual curiosity.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%

Teacher's and Course Evaluation Survey

Department of Pharmaceutical Chemistry

M.Phil

Name of Teacher: Dr. Shamim

S. NO.	Teacher's Evaluation	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Unanswered	Total
1	The teacher provides lesson plan in the first week of the semester.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
2	The teacher is punctual in the class.	75.00%	25.00%	0.00%	0.00%	0.00%	0.00%	100%
3	The teacher comes prepared for each lecture/ practical (where applicable)	75.00%	0.00%	12.50%	0.00%	12.50%	0.00%	100%
4	The teacher demonstrates and communicate knowledge of the subject in easy language.	75.00%	12.50%	0.00%	12.50%	0.00%	0.00%	100%
5	The teacher suggests additional reading material apart from the text book.	75.00%	12.50%	0.00%	0.00%	12.50%	0.00%	100%
6	The teacher creates an interactive environment for class discussion.	87.50%	0.00%	0.00%	0.00%	12.50%	0.00%	100%
7	The teacher has covered the course.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
8	The teacher is fair in evaluation.	87.50%	0.00%	0.00%	0.00%	12.50%	0.00%	100%
9	The teacher submits the result within the specified time period.	87.50%	0.00%	0.00%	0.00%	12.50%	0.00%	100%
10	The teacher remains available for consultation during the specified office hours	87.50%	0.00%	12.50%	0.00%	0.00%	0.00%	100%
11	The teacher follows moral and ethical norms with the students.	87.50%	0.00%	12.50%	0.00%	0.00%	0.00%	100%
	Course Evaluation:							
12	The course is well organized.	87.50%	0.00%	12.50%	0.00%	0.00%	0.00%	100%
13	The syllabus clearly states course objectives requirements, procedures and grading criteria	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
14	The course integrates theoretical course concepts with real-world applications	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
15	The assignments and exams covered the materials presented in the course	87.50%	0.00%	12.50%	0.00%	0.00%	0.00%	100%
16	The course material is updated	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
17	The contents presented in the course has increased my knowledge of the subject.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
18	The course content has stimulated my intellectual curiosity.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%

Teacher's and Course Evaluation Survey

Department of Pharmaceutical Chemistry

M.Phil

Name of Teacher: Dr. Afaq

S. NO.	Teacher's Evaluation	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Unanswered	Total
1	The teacher provides lesson plan in the first week of the semester.	75.00%	0.00%	12.50%	12.50%	0.00%	0.00%	100%
2	The teacher is punctual in the class.	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
3	The teacher comes prepared for each lecture/ practical (where applicable)	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
4	The teacher demonstrates and communicate knowledge of the subject in easy language.	62.50%	25.00%	12.50%	0.00%	0.00%	0.00%	100%
5	The teacher suggests additional reading material apart from the text book.	25.00%	0.00%	25.00%	12.50%	37.50%	0.00%	100%
6	The teacher creates an interactive environment for class discussion.	12.50%	37.50%	25.00%	12.50%	12.50%	0.00%	100%
7	The teacher has covered the course.	75.00%	25.00%	0.00%	0.00%	0.00%	0.00%	100%
8	The teacher is fair in evaluation.	75.00%	12.50%	12.50%	0.00%	0.00%	0.00%	100%
9	The teacher submits the result within the specified time period.	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100%
10	The teacher remains available for consultation during the specified office hours	12.50%	50.00%	12.50%	25.00%	0.00%	0.00%	100%
11	The teacher follows moral and ethical norms with the students.	62.50%	12.50%	0.00%	25.00%	0.00%	0.00%	100%
	Course Evaluation:							
12	The course is well organized.	62.50%	0.00%	0.00%	25.00%	12.50%	0.00%	100%
13	The syllabus clearly states course objectives requirements, procedures and grading criteria	62.50%	0.00%	12.50%	25.00%	0.00%	0.00%	100%
14	The course integrates theoretical course concepts with real-world applications	50.00%	0.00%	12.50%	25.00%	12.50%	0.00%	100%
15	The assignments and exams covered the materials presented in the course	50.00%	25.00%	12.50%	0.00%	12.50%	0.00%	100%
16	The course material is updated	25.00%	25.00%	12.50%	0.00%	37.50%	0.00%	100%
17	The contents presented in the course has increased my knowledge of the subject.	37.50%	0.00%	50.00%	0.00%	12.50%	0.00%	100%
18	The course content has stimulated my intellectual curiosity.	37.50%	12.50%	25.00%	12.50%	12.50%	0.00%	100%