

**RIPHAH INTERNATIONAL UNIVERSITY**  
**ISLAMABAD**



**SELF ASSESSMENT REPORT**

**Doctor of Pharmacy (Pharm D)**

**Riphah Institute of Pharmaceutical Sciences (RIPS)**

**15<sup>th</sup> December 2011**

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## **1.0 Executive Summary**

This report is being prepared almost at the end of the assessment cycle for 3 selected faculties of Riphah International University (RIU), as per requirements of Higher Education Commission (HEC). Quality Enhancement Cell (QEC) was formed in RIU in Oct 2009. Program Team Members of all three faculties, notified by University, worked with Dir QEC to pursue the application of Self Assessment Manual in their respective departments. From each faculty one program was selected.

In Riphah Institute of Pharmaceutical Sciences (RIPS), Pharmacy program was selected for self assessment, evaluation and improvements. A strong commitment of Respected Vice Chancellor to support QEC made the difference and resultantly, a cycle of assessment is about to complete.

### **1.1 Objectives**

Following are the two main objectives of the self assessment report:-

- a To implement Self Assessment Manual in selected program with a view to improve quality in higher education.
- b To identify the areas requiring improvements in order to achieve objectives through desired outcomes.

### **1.2 Execution**

A soft copy of self assessment manual was given to all faculty members. Quality Awareness Lectures and Workshops on preparation of Self Assessment Report (SAR) were arranged for the Deans/In-charge Programs and Program Team (PT) Members of the selected program. Hard copies of HEC issued 10 proformas, 8 criterion and 31 standards were provided to PT members to evaluate their respected program against defined standards. The PT members with an intimate support and follow up of QEC, completed the SAR and forwarded to QEC in given time frame.

After reviewing SAR, QEC arranged visit of Assessment Team to the selected program on 29 Nov 2011. Dir QEC accompanied the AT Team and participated in discussions with In-charge Program / Program Team members and available faculty members. Date for exit presentation was fixed as 2<sup>nd</sup> Dec 2011, as per availability of respected VC. Dean, In-charge Program, PT and AT members were invited. Prior to Chairman AT's presentation, Dir QEC gave 15 minutes presentation on "Why QEC in Higher Education"? The salient points of Dir QEC's presentation giving the advantages of joining QEC network are as under:-

- a. Eligibility for HEC funding proportionate to our ranking
- b. Preference for HEC scholarships for students and faculty
- c. Eligibility for evaluation by external evaluators
- d. Better ranking on website of HEC is a marketing tool for RIU
- e. Internal improvements (sense of achievements and satisfaction)

The Chairman AT during his presentation, indicated salient points of the SAR, account of his discussions with the faculty members, improvements required in the infrastructure, syllabi and training of the faculty and support staff (Annex-J).

The implementation plan (Annex-K) basing on the discussions in exit meeting of 2<sup>nd</sup> Dec 2011 have been made by In-charge Programs. They prepared it under following headings:-

- a. AT findings
- b. Corrective Actions required
- c. Implementation Dates
- d. Responsible Body
- e. Resources Needed

The implementation plan indicates the resources required to improve the infrastructure, environment in the classes and E-Learning. The recommended target dates to complete the tasks observed by Assessment Team, presented in exit meeting on 2<sup>nd</sup> Dec, 2011 and approved by Vice Chancellor have been indicated in the implementation plan. The tasks will be carried out by the Registrar's Office.

At the completion of Self Assessment cycle, QEC is going to submit the hard and soft copy of SAR to HEC on 15<sup>th</sup> December 2011.

Director  
Quality Enhancement Cell

# Self Assessment Report

## 2.0 Introduction

Riphah International University (RIU) is a private university, chartered by the Federal Government of Pakistan in 2002. The university was established with a view to produce professionals with Islamic moral and ethical values. The Riphah International University is committed to promote and impart quality education with character building of the new generation in the light of Islamic principles and values. Riphah International University is committed to a value based integrated educational philosophy. It is running 10 faculties in 3 different campuses.

### 2.1 University Mission Statement

Establishment of state of the art educational institutions with a focus on inculcation of Islamic ethical values.

### 2.2 Riphah Institute of Pharmaceutical Sciences (RIPS)

Riphah Institute of Pharmaceutical Sciences (RIPS) is running following programs:

- a. Doctor of Pharmacy (Pharm – D)
- b. Master of Philosophy (MPhil) Pharmaceutical Chemistry
- c. Master of Philosophy (MPhil) Pharmacology

### 2.3 Program Selected

Riphah International University has selected the **Doctor of Pharmacy (Pharm-D)** as third model program for Self Assessment Report (SAR) for the year 2011-12 under the directives of HEC.

The selected program is accredited by Pharmacy Council of the Pakistan (PCP). The program has got inbuilt mechanism for the revision of syllabi,



has competent faculty and adequate infrastructure. New and modern tools have been introduced in the program to conduct research and quality teaching.

#### **2.4 Program Evaluation**

The program is being evaluated based on 8 criterion and 31 standards as given in the Self Assessment Manual provided by Higher Education Commission (HEC).

### **3.0 Criterion 1: Program Mission, Objectives and Outcomes**

#### **3.1 Standard 1-1**

**The program must have documented measurable objectives that support institution mission statements.**

##### **3.1.1 Program Mission Statement**

Pharm-D program aims to impart theoretical and practical pharmaceutical skills and ethical values to students.

##### **3.1.2 Program Objectives**

The Pharm-D program aims to accomplish following objectives:

1. To provide basic education to prepare the students to pursue higher education.
2. To educate the students with pharmaceutical and team work skills.
3. To enable the students to pursue career in the field of interest.
4. To groom students to implement optimum research techniques.
5. To prepare students to work within ethical values and betterment of the society at large.

##### **3.1.3 Alignment of Program Objectives with Program & University Mission Statements**

Pharm-D program objectives are defined in the light of program and university mission statements that require the output to be inclusive of ethical values and industrial skills. This is done by imparting pharmaceutical related skills and sense of ethics in students through defined set of courses and training.

### 3.1.4 Main Elements of Strategic Plan

Strategic plan for Pharm-D defines the overall layout of the areas/elements that are included in the program to educate students to bachelor's level. These elements prepare students through theory and practical work. These elements are Program Contents, Program Delivery Methodology and Program Output Evaluation.

#### 3.1.4.1 Program Contents

Pharm-D program is comprised of 197 credit hours. 158 credit hours are for theoretical subjects, whereas, 39 credit hours are for practical work.

#### 3.1.4.2 Program Delivery Methodology

Program delivery methodology includes lectures, practical work, tutorials, assignments, industrial visits and internship.

#### 3.1.4.3 Program Output Evaluation

Program output is measured through regular examinations, assignment's results and final project's results.

### 3.1.5 Program Objectives Assessment

Objective	How Measured	When Measured	Improvement Identified	Improvement Made
1	Alumni Survey	September 2011	Need to have more case studies	Under Review in Board of Faculties
2	Employer Survey	October 2011	Laboratory Skills	Under Review in Board of Faculties
3	Alumni Survey, Employer Survey	September 2011 October 2011	Emphasis on research skills	Under Review in Board of Faculties
4	Alumni Survey, Employer Survey	September 2011 October 2011	More emphasis on confidence building and research aptitude building	Under Review in Board of Faculties
5	Employer Survey	October 2011	Not Applicable	Not Applicable

**Table 1: Program Objectives Assessment**

Annexure A shows the cumulative results of Alumni Survey while Annexure B shows the cumulative results of Employer Surveys in different feedback categories.

### **3.2 Standard 1-2**

**The program must have documented outcomes for graduating students. It must be demonstrated that the outcome support the program objectives and that graduating students are capable of performing these outcomes.**

#### **3.2.1 Program Outcomes**

The Pharm-D program is designed to produce following outcomes:

1. Students shall be able to go for higher education (M.Sc/M.Phil/Ph.D).
2. Students shall be able to lead, motivate and manage teams.
3. Students shall be able to demonstrate specific knowledge, attitudes, skills and behavior for the welfare of the patients.
4. Students shall be able to display the capability of objective advice on medicines and their use to the public and provide technical advice to other health professional, drug regulatory bodies, health planners and policy makers.
5. Students will be able to perform jobs in related field.
6. Students shall be able to perform research in related field.
7. Students shall be able to perform tasks individually as well as in teams.
8. Students shall be able to execute tasks in positive and constructive manner.

### 3.2.2 Program Objectives and Outcomes Matching

Program Objectives	Program Outcomes							
	1	2	3	4	5	6	7	8
1	x							X
2		X	X	X	X		X	
3			X	X	X			
4			X			X		
5			X					X

**Table 2: Outcomes versus Objectives**

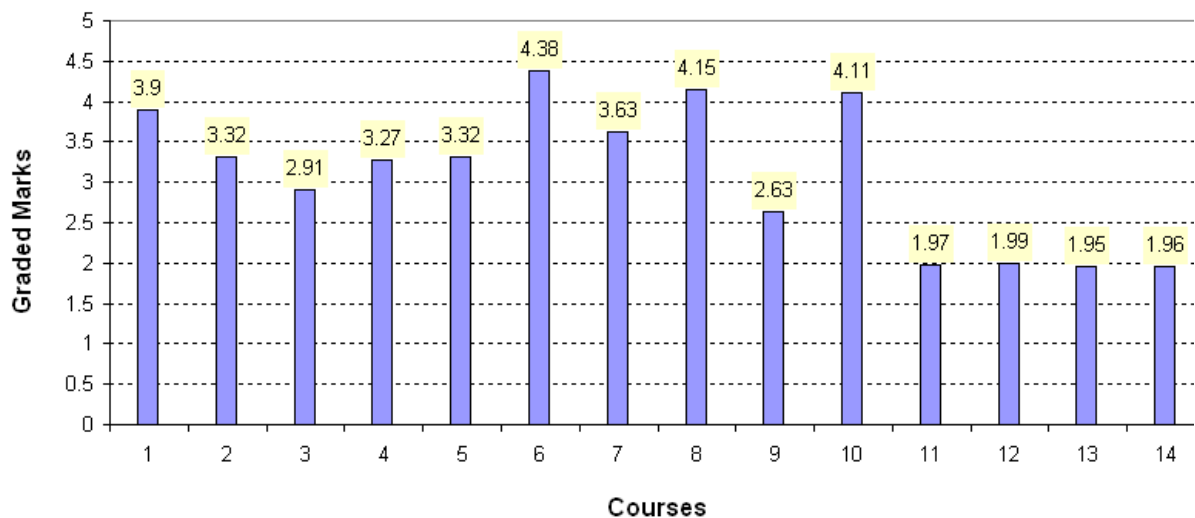
### 3.3 Standard 1-3

**The results of Program’s assessment and the extent to which they are used to improve the program must be documented.**

The result of the program assessment is shown below in graphical charts for courses evaluation and teachers’ evaluations.

#### 3.3.1 Course Evaluation

Courses evaluation is shown in the following graphical chart:



**Figure 1: Course Evaluation Bar Chart**

Students have graded the courses against the course structure, teaching methodology, learning objectives and outcomes and practical implementation of theory. The total graded marks are 5.

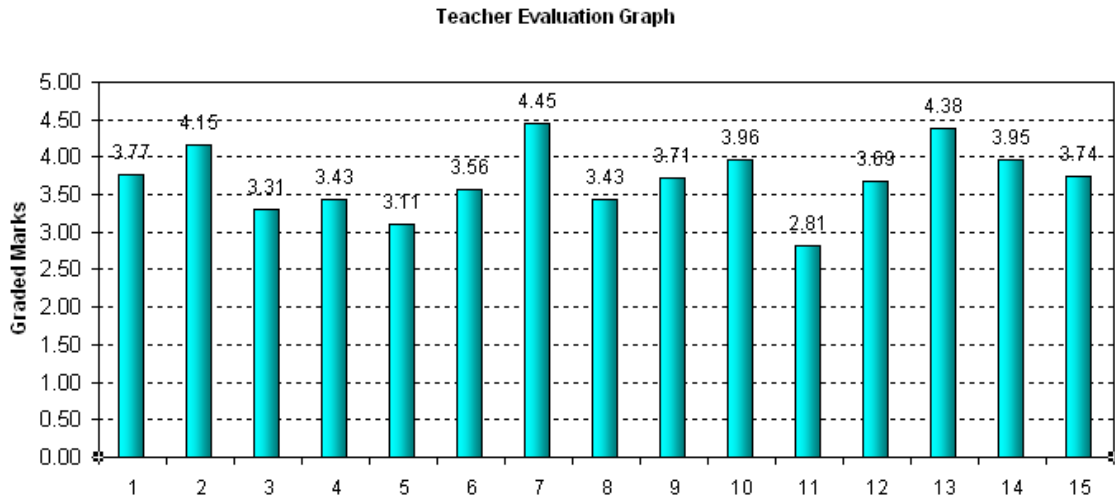
See Annexure C (Course Evaluation Survey) for sample course evaluation results. The sample shows the results for one course only while same has been done for all courses listed below. The results of all other courses have been kept in a separate file for record purposes.

Following is the list of 14 courses out of 59 that have been evaluated by the students along with their course code and graded scores.

<b>Sr. #</b>	<b>Course Name</b>	<b>Course Code</b>	<b>Graded Marks</b>
1	Pharmaceutical Chemistry - I	PH-301	3.9
2	Pharmaceutical Biochemistry - II	PH-306	3.32
3	Pharmaceutical Microbiology-I	PH-413	2.91
4	Pharmaceutics-IV	PH-402	3.27
5	Pathology-I	PH-501	3.32
6	Pharmacology & Therapeutics-IV	PH-506	4.38
7	Hospital Pharmacy I	PH-601	3.63
8	Clinical Pharmacy II	PH-604	4.15
9	Forensic Pharmacy I	PH-713	2.63
10	Life and Living IX	PH-717	4.11
11	Pharmaceutical marketing	PH-718	1.97
12	Pharmaceutical Technology II	PH-710	1.99
13	Medicinal Chemistry II	PH-702	1.95
14	Industrial Pharmacy	PH-608	1.96

### 3.3.2 Teachers Evaluation

Teacher's evaluation is shown in the following graphical chart:



**Figure 2: Teachers Evaluation Graph**

Students have graded the teachers against their lecture preparation, punctuality, general behavior, subject knowledge and teaching methodology. The total graded marks are 5.

See Annexure D (Teachers Evaluation Survey) for sample teacher evaluation results. The sample shows the results for one teacher only while same has been done for all teachers listed below. The results of all other teachers have been kept in a separate file for record purposes.

Following is the list of teachers that are being evaluated by the students along with the serial number and graded scores.

<b>Sr. #</b>	<b>Teachers Name</b>	<b>Graded Marks</b>
Teacher 1	Ms. Lubna	3.77
Teacher 2	Mr. Sohail	4.15
Teacher 3	Ms. Farah	3.31
Teacher 4	Mr. Khurram Afzal	3.43
Teacher 5	Ms. Humaira Nadeem	3.11
Teacher 6	Ms. Aroob	3.56
Teacher 7	Ms. Mehreen	4.45
Teacher 8	Ms. Sadia	3.43
Teacher 9	Mr. Tanveer	3.71
Teacher 10	Mr. Mohsin	3.96
Teacher 11	Mr. Shahid	2.81
Teacher 12	Mr. Naeem	3.69
Teacher 13	Mr. Aun Muhammad	4.38
Teacher 14	Mr. Atif	3.95
Teacher 15	Mr. Zia ullah Shah	3.74

QEC staff carried out course and teacher evaluation survey in order to ensure the unbiased feedback from students. The gathered data was analyzed by QEC and results were provided to department officials for further actions.

Dean of the Riphah Institute of Pharmaceutical Sciences reviewed the output and decided to put up the results in Board of Studies and Board of Faculty for further discussion and actions. Initially the results will be put up in Board of Studies, who may decide to move results to further level for



discussion and decisions if required. This meeting is planned to be held during the summer vacations.

### **3.4 Pharm-D Program Strong and Weak Points**

Pharm-D program is designed to educate students to meet the challenges of the modern world and present market needs. During the execution of the program several observations were made that can be categorized as strong and weak points of the program. These points are listed below:

Pharm-D Program Strong Points:

- Curriculum Design, development and organization are based upon set, well defined and approved criteria
- Pre-requisites fully observed
- Examinations on schedule
- Academic Schemes fully prepared in advance
- The number of courses along with their titles and credit hours for each semester, course contents for degree program are fully planned
- Transparent admission, registration and recruiting policy
- Pakistan Pharmacy Council & HEC rules fully followed
- Excellent Students-Teacher Ratio

Pharm-D program Weak Points:

- Inadequate space for students
- New & State of the art equipments for Labs
- Refreshal Courses for Teachers
- Need Improve research culture in students
- Need to improve Canteen facility for faculty and students

### **3.5 Significant Future Development Plans**

Significant future development plan for the program includes rectification of weaknesses and improvement in overall performance of the program. As per agreed views, lack of learning resources will be rectified by the induction of more learning material including books, CDs and related magazines in the library. While, classroom facilities will be improved over a period of time during the next financial year. On the basis of self assessment, faculty management has decided to look into the improvement areas for course syllabi in the light of observations listed in section 3.1.5, that would help achieve program objectives more efficiently.

### **3.6 Standard 1-4**

**The department must assess its overall performance periodically using quantifiable measures.**

#### **3.6.1 Graduates/Undergraduates enrolled in last three years**

300 Pharm-D students were enrolled during the sessions 2009-11 (three years).

#### **3.6.2 Student Faculty Ratio:**

RIPS has 15-1 ratio.

#### **3.6.3 Average GPA per semester:**

The average GPA is 2.83

#### **3.6.4 Average Completion time**

The Pharm-D program has average completion time of 5 years. The attrition rate in the program is around 10%.

#### **3.6.5 Employer Satisfaction**

The employer survey was conducted by institute with the help of QEC which resulted in 91.5% satisfaction level. See Annexure B for details.

#### **3.6.6 Students Course Evaluation Rate**

Student's course evaluation rate for all courses is 9.43

### **3.6.7 Students Faculty Evaluation**

QEC staff conducted the teachers' evaluation to ensure unbiased feedback. The results showed that 10 out of 15 teachers (66%) scored more than 70% marks as graded by students while, rest of the faculty scored plus minus 60%.

### **3.6.8 Research**

The program faculty published 15 research papers in different journals. List attached in Annexure E.

### **3.6.9 Community Service**

The Riphah Institute of Pharmaceutical Sciences launched a campaign to provide books to needy students in a nearby school. Faculty members and students were assigned different tasks regarding this campaign. Students were responsible to advertise and market the campaign in all campuses while faculty member were responsible to gather books and donations.

### **3.6.10 Students/Teachers Satisfaction**

As per HEC defined standard, a ratio of 4:1 for the academic and administrative non-technical staff is maintained by the faculty of Pharmaceutical Sciences.

Students and teachers satisfaction is judged in different ways. For students this is done by faculty as well as QEC staff by conducting in-class discussions to know students views and through feedback provided by them on HEC Performa number 1 & 10. While, teachers satisfaction is judged using the HEC defined Performa number 5 and their views during in-person discussion with QEC staff.

## 4.0 Criterion 2: Curriculum Design and Organization

### 4.1 Title of Degree Program

Doctor of Pharmacy (Pharm-D)

### 4.2 Definition of credit hour:

1 credit hour is 1 hour of theory lecture or 3 hours of laboratory work in a week.

### 4.3 Degree plan

Following is the list of core courses taught in the selected program. Section 4.5 shows the details about these courses.

#### First Professional Year

##### 1st Semester

**Course Code**    **Course Name**

##### **THEORY**

PH-301	Pharmaceutical Chemistry-I (Organic-I)
PH-305	Pharmaceutical Biochemistry-I
PH-309	Pharmaceutics-I (Physical Pharmacy-I)
PH-313	Physiology & Histology-I
PH-317	Anatomy
PH-321	Life & Living-I

##### **PRACTICALS**

PH-303	Pharmaceutical Chemistry-I (Organic-I)
PH-307	Pharmaceutical Biochemistry-I
PH-311	Pharmaceutics-I (Physical Pharmacy-I)
PH-315	Physiology & Histology-I

##### 2nd Semester

##### **THEORY**

PH-302	Pharmaceutical Chemistry-II (Organic-II)
PH-306	Pharmaceutical Biochemistry-II
PH-310	Pharmaceutics-II (Physical Pharmacy-II)
PH-314	Physiology & Histology-II
PH-323	Life & Living-II
PH-319	Pharmaceutical Mathematics

##### **PRACTICALS**

PH-304	Pharmaceutical Chemistry-II (Organic-II)
PH-308	Pharmaceutical Biochemistry-II
PH-312	Pharmaceutics-II (Physical Pharmacy-II)
PH-316	Physiology & Histology-II

## Second Professional Year

### 3rd Semester

#### THEORY

PH-401	Pharmaceutics-III (Pharmaceutical Preparations)
PH-405	Pharmacology & Therapeutics-I
PH-409	Pharmacognosy-I
PH-413	Pharmaceutical Microbiology-I
Ph-422	Life & Living-III
PH-318	Biostatistics

#### PRACTICALS

PH-403	Pharmaceutics-III (Pharmaceutical Preparations)
PH-407	Pharmacology & Therapeutics-I
PH-411	Pharmacognosy-I
PH-415	Pharmaceutical Microbiology-I

### 4th Semester

#### THEORY

PH-402	Pharmaceutics-IV (Pharmaceutical preparations)
PH-406	Pharmacology & Therapeutics-II
PH-410	Pharmacognosy-II
PH-414	Pharmaceutical Microbiology-II
PH-418	Life & Living-IV
PH-502	Computer & its applications in Pharmacy (Theory)

#### PRACTICALS

PH-404	Pharmaceutics-IV (Pharmaceutical preparations)
PH-408	Pharmacology & Therapeutics-II
PH-412	Pharmacognosy-II
PH-416	Pharmaceutical Microbiology-II
PH-504	Computer & its applications in Pharmacy (Lab)

## Third Professional Year

### 5th Semester

#### THEORY

PH-501	Pathology-I
PH-505	Pharmacology & Therapeutics-III
PH-509	Pharmacognosy-III
PH-513	Pharmaceutical Chemistry-V (Instrumentation)
PH-517	Pharmaceutics-V (Dispensing-I)
PH-520	Life & Living-V

## **PRACTICALS**

PH-503	Pathology-I
PH-507	Pharmacology & Therapeutics-III
PH-511	Pharmacognosy-III
PH-515	Pharmaceutical Chemistry-V (Instrumentation)
PH-519	Pharmaceutics-V (Dispensing-I)

## **6th Semester**

### **THEORY**

PH-506	Pharmacology & Therapeutics-IV
PH-510	Pharmacognosy + Herbal Drugs IV
PH-514	Pharmaceutical Chemistry-VI (Instrumentation)
PH-518	Pharmaceutics-VI (Community Pharmacy)
PH-521	Life & Living-VI

### **PRACTICALS**

PH-508	Pharmacology & Therapeutics-IV
PH-512	Pharmacognosy + Herbal Drugs IV
PH-516	Pharmaceutical Chemistry-VI (Instrumentation)

## **Fourth Professional Year**

## **7th Semester**

### **THEORY**

PH-601	Pharmaceutics-VII (Hospital Pharmacy-I)
PH-603	Pharmaceutics-VIII (Clinical Pharmacy-I)
PH-607	Pharmaceutics-IX (Industrial Pharmacy-I)
PH-611	Pharmaceutics-X (Bio pharmaceutics-I)
PH-615	Pharmaceutics-XI (Pharmaceutical Quality Control-I)
PH-619	Life & Living-VII

### **PRACTICALS**

PH-605	Pharmaceutics-VIII (Clinical Pharmacy-I)
PH-609	Pharmaceutics-IX (Industrial Pharmacy-I)
PH-613	Pharmaceutics-X (Bio pharmaceutics-I)
PH-617	Pharmaceutics-XI (Pharmaceutical Quality Control-I)

## **8th Semester**

### **THEORY**

PH-602	Pharmaceutics-VII (Hospital Pharmacy-II)
PH-604	Pharmaceutics-VIII (Clinical Pharmacy-II)
PH-608	Pharmaceutics-IX (Industrial Pharmacy-II)
PH-612	Pharmaceutics-X (Bio pharmaceutics-II)
PH-616	Pharmaceutics-XI (Pharmaceutical Quality Control-II)
PH-620	Life & Living-VIII

## **PRACTICALS**

PH-606	Pharmaceutics-VIII (Clinical Pharmacy-II)
PH-610	Pharmaceutics-IX (Industrial Pharmacy-II)
PH-614	Pharmaceutics-X (Bio pharmaceutics-II)
PH-618	Pharmaceutics-XI (Pharmaceutical Quality Control-II)

## **Final Professional Year**

### **9th Semester**

#### **THEORY**

PH-701	Pharmaceutical Chemistry-VII (Medicinal Chemistry-I)
PH-705	Pharmaceutics-XVII (Clinical Pharmacy-III)
PH-709	Pharmaceutical Technology-I
PH-713	Forensic Pharmacy-I
PH-715	Pharmaceutics-XX (Pharmaceutical Management & Marketing-I)
PH-717	Life & Living-IX

#### **PRACTICALS**

PH-703	Pharmaceutical Chemistry-VII (Medicinal Chemistry-I) Pharmaceutics-XVII (Clinical Pharmacy-III) (Projects related to)
PH-707	Clinical Pharmacy
PH-711	Pharmaceutical Technology-I

### **10th Semester**

#### **THEORY**

PH-702	Pharmaceutical Chemistry-VII (Medicinal Chemistry-II)
PH-706	Pharmaceutics-XVII (Clinical Pharmacy-IV)
PH-710	Pharmaceutical Technology-II
PH-714	Forensic Pharmacy-II
PH-716	Pharmaceutical Marketing-I
PH-718	Life & Living-X

#### **PRACTICALS**

	Pharmaceutical Chemistry-VII (Medicinal Chemistry-II),
PH-704	"Research Project"
PH-708	Pharmaceutics-XVII (Clinical Pharmacy-IV)
PH-712	Pharmaceutical Technology-II

#### 4.4 Curriculum Breakdown

Semester	Course Number	Category (Credit Hours)				
		Math and Basic Science		Core Courses	Humanities and Social Sciences	Technical Electives / Others
		Math	Basic Science			
1	PH-301 PH-305 PH-309 PH-313 PH-317 PH-321 PH-303 PH-307 PH-311 PH-315			15+4	1	
2	PH-302 PH-306 PH-310 PH-314 PH-323 PH-319 PH-304 PH-308 PH-312 PH-316			14+4	2	
3	PH-401 PH-405 PH-409 PH-413 Ph-422 PH-318 PH-403 PH-407 PH-411 PH-415			16+4	1	
4	PH-402 PH-406 PH-410 PH-414 PH-418 PH-502 PH-404 PH-408 PH-412 PH-416 PH-504			15+5	1	



5	PH-501 PH-505 PH-509 PH-513 PH-517 PH-520 PH-503 PH-507 PH-511 PH-515 PH-519			14+5	1	
6	PH-506 PH-510 PH-514 PH-518 PH-521 PH-508 PH-512 PH-516			13+3	1	
7	PH-601 PH-603 PH-607 PH-611 PH-615 PH-619 PH-605 PH-609 PH-613 PH-617			15+4	1	
8	PH-602 PH-604 PH-608 PH-612 PH-616 PH-620 PH-606 PH-610 PH-614 PH-618			15+4	1	
9	PH-701 PH-705 PH-709 PH-713 PH-715 PH-717 PH-703 PH-707 PH-711			15+3	1	

10	PH-702 PH-706 PH-710 PH-714 PH-716 PH-718 PH-704 PH-708 PH-712			15+3	1	
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**Table 3: Curriculum Course Requirements (table 4.3)**

## 4.5 Courses Information

### 4.5.1 PHARMACEUTICAL CHEMISTRY (ORGANIC) (PH-301, PH-302, PH-303, PH-304)

#### 4.5.1.1 Objective

By studying this subject, the students will understand different organic reactions and their mechanisms. Knowledge about different organic molecules, their use in pharmacy and basic terms and techniques in organic chemistry will be highlighted.

#### 4.5.1.2 Recommended Books

1. Peter Sykes, **A Guide Book to Mechanism in Organic Chemistry**, Longman, New York, 1st Ed., 1991.
2. E L Eliel, **Stereochemistry of Carbon Compounds**, Tata MacGraw- Hill, New Delhi, 1992.
3. Rehman and M Younis, **Organic Chemistry for B.Sc. students**, Ilmi Kitab Khana, Lahore, 1997.
4. L Finar, **Organic Chemistry** Vol I, Person Education Asia, 6th Ed., New Delhi, 2001.
5. Raj K Bansel, **Organic Reaction Mechanism**, Tata MacGraw-Hill, New Delhi, 1992.
6. Furaiss Brian, **Practical Organic Chemistry**, 5th Ed., ELBS, London.
7. Sykes A P, **Guide Book to Mechanism in Organic Chemistry**, 5th Ed., Lonsmen Co, UK, 1970.
8. Roberts J D and Caserio M C, **Basic Principles of Organic Chemistry**, 1990.
9. Naser-ud-Din, **Introduction to Stereochemistry**, Ghafoor Stationary Mart, Peshwar, 1994.
10. Bhal B S, **Text Book of Organic Chemistry**, S Chand & Co. New Delhi, 14th Ed., 1995.

## 4.5.2 PHARMACEUTICAL BIOCHEMISTRY (Theory & Laboratory) (PH 305, PH306, PH 307, PH 308)

### 4.5.2.1 Objective

Students shall be taught those areas of biochemistry which are important for the understanding of metabolic disorders relevant to common disturbances of body functions, gene structure and functions. General introduction and basic biochemistry of proteins, carbohydrates, bioenergetics, lipids, etc., including biochemistry of enzymes and metabolic fate of nitrogen shall also be taught. The syllabus also includes replication and expression of genetic information. Metabolic basis of biochemistry in relation to human metabolism, digestion and intestinal absorption shall, also be taught. Experimental work in biochemistry shall highlight the important clinical applications of biochemical tests. The use of modern equipment for biochemical analysis shall be demonstrated to the students.

### 4.5.2.2 Recommended Books

1. M N Chaterjea, **Medical Biochemistry**, Jaypee Brothers Medical Publishers, New Delhi, 2003.
2. Roberk Murray, Daryl K, Granner, Peter A Mayes, Victor W Rodwell **Harper's Biochemistry**, Appleton and Lange, Lange Medical Publications, NewYork, 2000.
3. Albert L Lehninger **Principles of Biochemistry**, CBS Publisher, Delhi, 1993.
4. Lubert Stryer, **Biochemistry**, W H Freeman and Company, 2002.
5. Pamela C Champe, Richard A Harvey, **Illustrated Biochemistry**, J Lippincot Company, 1994.
6. **Harper's Biochemistry**, Print-Hall, New Jersey, 1996.
7. M Rafiq, **Biochemistry**, The Carvan Book House, Lahore, 1st Ed.
8. Montogomary, **Clinical Chemistry**, The C V Mosby Company, 5th Ed.
9. Conn and Stumpf, **Outlines of Biochemistry**, John Willey & Sons, New York, 5th Ed., 1999.
10. Lehninger, **Biochemistry**, Worth Publishers Co, New York.
11. Ahmed M **Essentials of Medical Biochemistry**, Merit Pub, Fasilabad, 1991
12. West E S, Todd R W and Van Bruggen T J, Text Book of Biochemistry, The MacMillan Co, 1996.

### **4.5.3 PHARMACEUTICS-I (PHYSICAL PHARMACY) (Theory & Laboratory) (PH 309, PH 310, PH 311, PH 312)**

#### **4.5.3.1 Objective**

This is required to give the students an exposure about the basic terminologies used in pharmacy, basic techniques used in the field of pharmacy, knowledge about history and origin of pharmacy, different types of properties of pharmaceuticals and knowledge about physical processes used in pharmacy.

#### **4.5.3.2 Recommended Books**

1. Martin, **Physical Pharmacy**, B I Waverly PVT, Delhi, 4th Ed., 1994.
2. Cooper and Gunns, **Tutorial Pharmacy**, CBS Publishers & Distributors, New Delhi, 1986.
3. **Bentley's Pharmaceuticals**, All India Traveler Book Seller, New Delhi, 1996.
4. Martin P, Bustamante P and Chun, **Physical & Chemical Principles of Pharmaceutical Science**, AHC, 4th Ed., (1999), New York.
5. Martin AMN, Banker G S and Chun AHC **Advances in Pharmaceutical Sciences**. Academic Press, London, 1985.
6. Mill C C Casson, N, **Rehology of dispense systems**. Pergamon Press, New York, 1975.
7. Rienger M and Scott-Blair G W, **Rehology**. Academic Press, London, 1990.
8. Barry B W **Advances in Pharmaceutical Sciences**, Academic Press, London, 1990.
9. Sherman P, **Emulsion Science**, Academic Press, London, 1972.

### **4.5.4 PHYSIOLOGY & HISTOLOGY (Theory & Laboratory) (PH 313, PH 314, PH 315, PH 316)**

#### **4.5.4.1 Objective**

The subject of pathology shall enable the students regarding  
(i) awareness of different diseases; (ii) condition of diseases; (iii) physiological variation in different diseases; and (iv) hormonal changes in different diseases.

#### **4.5.4.2 Recommended Books**

##### ***Physiology***

1. Arthur C Guyton, M D, **Text Books of Medical Physiology**, W B Saunders Company, 9th Ed., 1996.

2. William F Ganong, **Review of Medical Physiology**, Prentice Hgall international Inc, 17th Ed., 1995.
3. Chandi Charan Chatterjee, **Human Physiology**, Medical allied agency, 1994.
4. Samson Wright's Applied Physiology. Revised by Cyril A Keele and Eric Neil.
5. Spence A P and Mason E B, **Human Anatomy and Physiology**, Beajamin/Cumming Publishing Inc Clifornia, 3rd Ed.
6. Snell R S, Clinical Anatomy for Medical Students, Litle Brown & Co Inc USA, 1992.

### ***Histology***

1. Bradbury S, Hewer's Text Book of Histology, ELBS, London, 1984.
2. Reference Book: Tissues of the body by Legros Clerks. Publisher Oxford at the Clarendon Press, London.
3. Cormack H D, **Essential Histology**, J B Lippincott Co Philadelphia, 1993.
4. Hammersen F, **Histology; color Atlas Of Microscopic Anatomy**, Lee & Febijer Co, Pennsylvania, 1985.

#### **4.5.5 ANATOMY (Theory) (PH 317)**

##### **4.5.5.1 Objective**

In this subject emphasis shall be given to anatomy of different organs of human body. The students will be familiarized with basic structures, location of different organs which play a role in the normal function of human body and applied aspects of developmental, gross and microscopic anatomy without burdening the students with unnecessary details of basic anatomy. Efforts shall be made to 'demonstrate anatomical facts of practical importance through models, prospected parts, films and slides. It is desirable that the teaching of developmental, gross and microscopic anatomy be taught concurrently.

##### **4.5.5.2 Recommended Books**

1. Romanes, G J, **Cunningham's Manual of Practical Anatomy**. Humphary Kalfom, Oxford, Oxford University Press, London, 3 volumes, 1996.
2. Gray's Anatomy, **Descriptive and Applied**. Longman's Green and Co, London, 1996.
3. J G Romanes, London, **Cunningham's Textbook of Anatomy**. Oxford University Press, 1996.
4. Snell, R.S. **Clinical Anatomy**, Boston, Little, Brown and Company, 1996.

6. Keith L More and TVN Persaud, Philadelphia, **Clinically Oriented Human Anatomy**. W B Saunders, 1996.
7. B Grant, **A Method of Anatomy**, Bailliere Tinal and Co, Ltd, London.
8. W J Hamilton, **A textbook of Anatomy**, Macmillan and Co, London.
9. R J Last, **Anatomy, Regional and Applied**, J and A Churchill Ltd,

#### **4.5.6 PHARMACEUTICAL MATHEMATICS (Theory) (PH 319)**

##### **4.5.6.1 Objective**

Mathematics is the language of science. The study of mathematics is important as all the equations used in pharmacokinetics and pharmacodynamics are in the mathematical forms and studies of such results are in logarithmic and integration forms.

##### **4.5.6.2 Recommended Books**

1. C H Edvards Jr and David E Penney, **Calculus and Analytic Geometry**, Prentice-Hall, Inc, A division of Sinon & Schustor Englewood Gliffs, New Jersey 07632, USA, 1995.
2. Ahmed B and Khan M, **Mathmactics for Pharmacists**, Arsalan Paper Mart, Multan, 1993.

#### **4.5.7 BIOSTATISTICS (Theory) (PH 318)**

##### **4.5.7.1 Objective**

In pharmacy the statistical approach plays a key role in various aspects of research on drugs. The bioassay in drug development is to measure the potency of some new compounds relative to some standard drugs in terms of the magnitude of heir effects. Statistics is used to test as many assumptions involved in the assay. Statistics is also required to design the clinical trials to obtain pharmaceutical information of any drug. The statistical approach is also used to estimate parameters. Statistics also helps in documenting the results of a study. The statistical approach is required for screening of compounds for clinically active drugs. The knowledge of statistics is also required for the study of the dose response relationship.

##### **4.5.7.2 Recommended Books**

1. Daniel W W, **Bio-Statistics, Foundation for Analysis in Health Science**. 3rd Ed., 1983.
2. Zar J H, **Bio-Statistical analysis**, Francis Hall, N J, USA.

3. Nilton J S, and Tsokos J D, **Statistical Methods in Biological and Health Sciences**, McGraw-Hill. 1983.
4. Chaudhry S A and Kamal S, **Introduction to Statistical Theory**, Part-I and Part-II, Ilmi Kitab Khana, Urdu Bazar, Lahore, 1996.
5. Samuels M, **Statistics for the life sciences**, Dellen Pub Co, S F, USA, 1991.
6. Walpole R E, **Introduction to Statistics**, Macmillan Pub Co, N Y, 1982.

#### **4.5.8 PHARMACEUTICS-III (Pharmaceutical Preparations) (Theory & Laboratory) (PH 410, PH 402, PH 403, PH 404)**

##### **4.5.8.1 Objective**

The objective to teach pharmaceutical preparations is to give the students knowledge about different dosage forms used in pharmacy; their small and large scale preparation, formulation of different dosage forms, and their role in the practice of community pharmacy.

##### **4.5.8.2 Recommended Books**

1. Michel E Aulton, **Pharmaceutics**, ELBS/Churchill Livingstone, London, 1998.
2. **Bentley's Book of Pharmaceutics**, CBS Publishers & Distributors, New Delhi, 1986.
3. **Pharmaceutics, the Science of Dosage Form Design**. 2nd Ed., HawCourt Publisher, 2002.
4. E A Rawlins, Berdley's **Textbook of Pharmaceutics**, edited by 8th (or recent edition) 1977. Macmillan Publishing Co Inc, New York.
5. Sprowl's (Dittert L W, Eds.), **American Pharmacy**, 7th Ed, J B Lippincott Co, 1990.

#### **4.5.9 PHARMACOLOGY & THERAPEUTICS (Theory & Laboratory) (PH 405, PH 406, PH 407, PH 408, PH 505, PH 506, PH 507, PH 508)**

##### **4.5.9.1 Objective**

The teaching of Pharmacology shall be aimed at different aspects of drugs and Pharmaceuticals used in different diseases. The therapeutic/ pharmacological groups of drugs will be taught according to the classification of World Health Organization. The Students should know the relationship between drug concentration and biological response, drug action overtime, factors affecting absorption, distribution, binding, metabolism and elimination of chemicals, structure activity relationship, biological changes that result from repeated drug use, 'tolerance, addiction and adverse effects. Process of drug interaction with cellular

macromolecules to alter physiological function and site of action including knowledge about proper selection of drugs has also to be covered.

#### **4.5.9.2 Recommended Books**

1. Goodman Gillman, **Pharmacological basis of therapeutics**. McGraw-Hill Book Company, New York, 1996.
2. Winguard and Brody, **Human Pharmacology**, Mosby Year Book, Boston, 1991.
3. James M Ritter and Lionel De Levis, **A Text book of Clinical Pharmacology**, Oxford University Press, New York, 1995.
4. R S Satorkar and S D Bhandarkar, **Pharmacology and Pharmacotherapeutics**, Popular Prakashan, Bomby, 1993.
5. J D Tripathy, **Essential of Medical Pharmacology**, Japees Brother, New Delhi, 4th Ed., 2000.
6. D R Laurance, **Clinical Pharmacology**, ELBS, London, 6th Ed., 1987.
7. Katzung B G, **Basic and Clinical Pharmacology**, McGraw-Hill Medical Publishers, New York, 8th Ed., 2001
8. Lipponcott, **Pharmacology**, Lippincot William & Willkin, USA, 2001.
9. Manuchair Edabi, **Pharmacology**, Little Brown & Company, London, 1993.
10. Qayum A, **Fundamentals of Experimental Pharmacology**. Ghandhara University, Peshawar.
11. Bertram G K, **Basic and Clinical Pharmacology**, Paramount Publishing Business & Professional Group, USA, 6th Ed., 1995.
12. William F, Ganong W F, **Review of Medical physiology**, Prentice Hall International Inc, New Jersey.

#### **4.5.10 PHARMACOGNOSY (Theory & Laboratory) (PH 409, PH 410, PH 411, PH 412, PH 509, PH 510, PH 511, PH 512)**

##### **4.5.10.1 Objective**

The study of Pharmacognosy is to give knowledge about crude drugs, their cultivation, evaluation and use etc. Different methods used for extraction and purification of crude drugs from different plant and animal source. The study shall include medicinal plants of Pakistan, their habitat, collection and biological source of the drug. Allergens and allergenic preparations, enzymes, plant growth hormones as well as pesticides and poisonous plants with special reference to Pakistan shall also be included. Separation and isolation of plant constituents by special techniques like chromatography, ion exchange, electrophoresis and high performance liquid chromatography (HPLC) shall be introduced. Detailed study of carbohydrates and related products, alkaloids, volatile oils, fixed oils, tannins, glycosides, etc., shall be included. The students should know the



Unani system of medicine, phyto-pharmacology, Traditional Medicine and Alternative System of Medicine.

#### **4.5.10.2 Recommended Books**

1. V E Tyler, L R Brady and J E Robbers, **Pharmacognosy**, 9th Ed., Lea and Febiger, Philadelphia, 1988.
2. G E Trease and W C Evans, **Pharmacognosy**, W B Saunders, Philadelphia, Toronto, 2002.
3. K Usmanghani, **Topics in Pharmacognosy**, University Grants Commission Monograph Series, Islamabad, pp74, 1985.
4. T E Wellis, **Text book of Pharmacognosy**, CBS Publishers & Distributors, New Delhi, 1986.
5. Varro E Taylor, **Pharmacognosy**, Lee Febiger Philadelphia, 9th Ed.
6. Mohammad Ali, **Introduction to Pharmacognosy**, CBS Publishers & Distributors, New Delhi, 1986.
7. K Usmanghani, **Chemical Pharmacognosy**, University Grants Commission, Islamabad, 1985.
8. Youngkin H W, **Text Book of Pharmacognosy**, The Blakiston Co, Toronto, 6th Ed., 1948.

#### **4.5.11 PHARMACEUTICAL MICROBIOLOGY (Theory & practical) (PH 413, PH 414, PH 415, PH 416)**

##### **4.5.11.1 Objective**

Students shall be taught the principles of Microbiology with special reference to Pharmaceutical Microbiology including environmental Microbiology and other relevant aspects. The modern concepts of microbiological application shall be taught to students. The staining of slides and preparation of culture media, etc., including microbiological assays of pharmaceuticals shall be taught. Sensitivity test and other necessary pharmaceutical tests shall also be included. The students have to be trained about sterilization, disinfection and fermentation with reference to their use and application in the pharmaceutical industry. Knowledge of immune system is also required to be imparted.

##### **4.5.11.2 Recommended Books**

1. Jawetiz, **Meical Microbiology and Immunology**, 5th Ed., Churchill Livingstone, London, 1998.
2. W B Hugo & A D Russell, **Pharmaceutical Microbiology**, Black Well Science Ltd, London, 6th Ed., 1998.
3. Lippincot. **Microbiology by Lippincott**. William & Willkin, USA, 2001.

4. Alcamo. **Introduction to Microbiology**. John Bartlett Publishers, 6th Ed., 2003.
5. Collin and Lynes, **Microbiological Methods**, Vutterworth Heineman, Oxford, 1995.
6. M Mekallee, **Microbiology: Essentials and Application**, McGraw-Hill Inc, 2nd Ed.
7. Singleton and Sainsbury, **Dictionary of Microbiology and Molecular biology**, John Willey & Sons, New York, 2000.
8. Pelczar, **Microbiology**, McGraw-Hill Inc, 1996.
9. Prescott, Harley, **Microbiology**, 2nd Ed., Klein Wm C Brown Publishers, 2001.

#### **4.5.12 PAKISTAN STUDIES (Theory) & ISLAMIYAT (Theory) (PH 417, PH 418)**

##### **4.5.12.1 Objective**

The applied aspects of the Islamic principles and Pakistan Studies are important. The time allotted for these subjects shall be utilized by inviting eminent scholars to speak on selected topics, conducting seminars and group discussions on moral values and practice in relation to medical and pharmaceutical sciences in the light of Islamic principles. The purpose is to bring positive behavioral changes in the students.

#### **4.5.13 PATHOLOGY (Theory & Laboratory) (PH 501, PH 503)**

##### **4.5.13.1 Objective**

The subject of pathology shall enable the students regarding  
(i) Awareness of different diseases; (ii) condition of diseases; (iii) physiological variation in different diseases; and (iv) hormonal changes in different diseases.

##### **4.5.13.2 Recommended Books**

1. Kumar Cotran Robins, **Basic Pathology**, 6th Ed., W B Saunders Company, Philadelphia (1992).
2. Walters and Israel, **General Pathology**, Churchill Livingstone, London (1998).
3. Peter S Macfarlane, Robin Reid, Robin Collander, **Pathology Illustrated**, Churchill Livingstone, London (1998).
4. **Robbins Pathology**, W B Saunders Co, London, 2nd Ed., 1962.
5. Walter G B, **General Pathology**, Churchill Livingstone, New York, 1996.

#### **4.5.14 PHARMACEUTICAL CHEMISTRY-III (Instrumentation) (Theory & Laboratory) (PH 513, PH 514, PH 515, PH 516)**

##### **4.5.14.1 Objective**

Study of this subject shall give knowledge about different techniques used for the estimation of drugs. Students will also give the basic knowledge regarding the components of these techniques. They will also learn the analysis of drugs by using latest techniques including theory and instrumentation of atomic absorption and emission spectroscopy, flame photometry, TR., Mass, NMR, UV/Visible spectroscopy. It will also include the study of column, thin layer, gas-liquid chromatography, HPLC and GC-MS. Potentiometry, polarography, radiochemical techniques and differential scanning calorimetry.

##### **4.5.14.2 Recommended Books**

1. Lough W J, **High Performance Liquid Chromatography**, Blacki Academic Press, New York, 1996.
2. William Kemp, **Organic Spectroscopy**, Ellsi Horwood, London, 1990.
3. M Aminuddin & Javed Iqbal, **Theory and Practice of Chromatography**, University Grants Commission, Islamabad-Pakistan (2000).
4. A H Beckett and J B Stennlake, **Practical Pharmaceutical Chemistry**, Part I and II, the Aulton Press, London.
5. A M Knevel and F E Digangi, **Jenkins's quantitative Pharmaceutical Chemistry**, McGraw-Hill Book Company, New York.
6. Braithwaite and F J Smith, **Chromatographic Methods**, Chapman and Hall, London.
7. E Heftmann, **Chromatography**, Von Nostrond Reinheld Co, New York, 1975.
8. Pryde and M J Gilbert, **Applications of High Performance Liquid Chromatography**, Chapman & Hall, London, 1979.
9. E Stahl, **Thin Layer Chromatography**, Springer-Verlag, Berlin, 1969.
10. R Hamilton, **Introduction to HPLC**, P A Sewell, Chapman & Hall, London, 1982.

#### **4.5.15 PHARMACEUTICS-V (Dispensing Pharmacy) (Theory & Laboratory) (PH 517, PH 519)**

##### **4.5.15.1 Objective**

It is essential for a pharmacist to know while working in a pharmacy as how to prepare and supply medicines: This requires the knowledge of stability of medicines and their ingredients, principle of compounding, dosage, chemical, physical and therapeutic incompatibility, packaging

methods, labelling procedures, legal requirements affecting drug storage, supply and records, Containers and labelling of substances and misuse of drugs.

#### **4.5.15.2 Recommended Books**

1. Cooper and Guns, **Dispensing**, CBS Publishers & Distributors, New Delhi, 1986.
2. **Hussa's Dispensing.**
3. **Remington's Pharmaceutical Sciences**, Mack Publishing Company, USA, 2001.
4. Martindale's **Extra Pharmacopoeia.**

#### **4.5.16 COMPUTER AND ITS APPLICATIONS IN PHARMACY (Theory & Laboratory) (PH 502, PH 504)**

##### **4.5.16.1 Objective**

The students are required to learn basic introduction of computer with reference to their application in pharmacy.

##### **4.5.16.2 Recommended Books**

1. Elias M **System Analysis**. Award Galgotia Publications, New Delhi, 1989.
2. Peter Norton, **Inside IBM PC**. Brady Computer Books, New York, 1988.
3. Dennis N, **MS-DOS**. Jump Practice Hall Press, New York, 1987.
4. Peter Norton, **PC-DOS**. Brady Computer Books, New York, 1985.

#### **4.5.17 PHARMACEUTICS-IV (Community Pharmacy) (Theory) (PH 518)**

##### **4.5.17.1 Objective**

The subject of community pharmacy is required for giving the basic knowledge of different definitions and background of community pharmacy, importance of communication with patients, imparting knowledge about different methods used to control drug-abuse and misuse and for identifying the role of pharmacist as public health educator in the community for drug monitoring and information.

##### **4.5.17.2 Recommended Books**

1. Roy Robertson, **Management of Drug Users in the Community: A Practical Handbook.**

2. **Remington's Pharmaceutical Sciences**, Mack Publishing Company, USA, 2001.
3. Martindale's **Extra Pharmacopoeia**.

#### **4.5.18 PHARMACEUTICS-VII (Hospital Pharmacy) (Theory) (PH 601, PH 602)**

##### **4.5.18.1 Objective**

The objective is to educate the students about the real role of a pharmacist in hospital along with the roles that he/she is required to play in the distribution, storage and purchase of drugs in the hospital: The role of Pharmacy and Therapeutic Committee and the advantages of small scale manufacturing in hospital need to be highlighted.

##### **4.5.18.2 Recommended Books**

1. William Hassan, **Hospital Pharmacy**, Lee & Febiger, Washington, 5<sup>th</sup> Ed., 1986.
2. N I Bukhari, **Hospital Pharmacy**, Aziz Book Depot, Lahore-Pakistan, 2000.
3. Martin Stephen, **Hospital Pharmacy**, Pharmaceutical Press, London, 2003.

#### **4.5.19 PHARMACEUTICS-VIII (Clinical Pharmacy) (Theory & Laboratory) (PH 603, PH 604, PH 605, PH 606, PH 705, PH 706, PH 707, PH 708)**

##### **4.5.19.1 Objective**

Clinical pharmacy is the practice of pharmacy in clinical setting especially in a "hospital: The concept of clinical pharmacy and the role that the pharmacists are playing internationally is to be introduced: Study of clinical pharmacy is important in therapeutic drug monitoring, determining toxicities, drug interactions, adverse drug reactions and dosage regimen establishment. It helps in proper selection of drugs, administration route, as well as guiding patients, about the drug therapy. The students need to learn the concept of rational use of drugs, essential drugs and their advantages, drug utilization evaluation and review, practical pharmacokinetics and the role of pharmacist in pharmaceutical care, its scope, management and application.

##### **4.5.19.2 Recommended Books**

1. Roger Walker, **Clinical Pharmacy & Therapeutics**, Churchill Livingstone, London, 3rd Ed., 2003.

2. Guard Paul, **A Behavioral Approach to Pharmacy Practice**, Black Well, USA, 2000.
3. Herfindal Gourley, **Clinical Pharmacy & Therapeutics**, William & Willkins, London, 1992.
4. A J Winfield, **Pharmaceutical Practice**, Churchill Livingstone, London, 2nd Ed., 1998.
5. Kavin Taylor, **Pharmacy Practice**, Taylor & Francis, New York, 1998.
6. Deborah Rosenbaun, **Clinical Research Coordinator Hand Book**, 2<sup>nd</sup> Ed., Sarrison, Inc, North Carolina, USA.
7. Simon Cook, **Clinical Studies Management, a Practical Guide to Success**, Sue Horwood Publishing limited, West Sussex, UK.
8. Joseph. T. Dipiro, **Encyclopedia of Clinical Pharmacy**. Marcel Dekker Publishing. 2003
9. Joseph T Dipiro, **Encyclopedia of Pharmacy**. Marcel Dekker Publishing 2002.
10. Mellainie J Rantucci, **Pharmacist Talking with Patients**. 1997
11. Smith GDG and Aronson J K, **Oxford Text Book of Clinical Pharmacology and Drug Therapy**, Oxford Universotu Press, UK, 1990.
12. Hansten P and Horn J, **Drug interactions**. Lee & Febiger, Philadelphia, USA, 1989.

#### **4.5.20 PHARMACEUTICS-IX (Industrial Pharmacy) (Theory & Laboratory) (PH 607, PH 608, PH 609, PH 610)**

##### **4.5.20.1 Objective**

By studying this subject, the students are required to understand as to how different dosage forms at large scale are manufactured. Study of techniques for preparation of these dosage forms, latest advances in product formulation, techniques and technology for their production, is important for understanding the industrial pharmacy.

##### **4.5.20.2 Recommended Books**

1. Lackman, **Theory and Practice of Industrial Pharmacy**, Verghese Publishing House, Bombay, 1987.
2. Cooper and Gunn's, **Tutorial Pharmacy**, CBS Publishers & Distributors, New Delhi, 1986.
3. **Bentley's Pharmaceutical Text Book**, CBS Publishers & Distributors, New Delhi, 1986.
4. **Remington's Pharmaceutical Sciences**, Mack Publishing Company, USA, 2001.
5. John Sharp, **Good Pharmaceutical Manufacturing Practice**, Rational and Compliance.

#### **4.5.21 PHARMACEUTICS-X (Biopharmaceutics) (Theory & Laboratory) (PH 611, PH 612, PH 613, PH 614)**

##### **4.5.21.1 Objective**

The concepts of bioavailability and administration, absorption, distribution, metabolism and excretion of drugs are required to study the drug pharmacokinetic parameters, dosage regime design, therapeutic drug monitoring, invivo evaluation of drugs and bioavailability studies. This also required for population pharmacokinetics, determination of frequency, duration and quantity of drugs given for particular disease and schedule of drugs in various ailments and in different age groups.

##### **4.5.21.2 Recommended Books**

1. Leon Shargel, **Applied Pharmacokinetics and Biopharmaceutics**, Appleton & Lange, New York, 4th Ed., 1999.
2. Malcolm Rouland, Thomous N Tozer, **Clinical Pharmacokinetics**, William & Willkins, London, 1995.
3. Milo Gibaldi, **Biopharmaceutics and Clinical Pharmacokinetics**, Marchel & Dakker Inc, New York, 1982.
4. Gibbson and Skett, **Introduction to Drug Metabolism**, Champ & Hall, London, 1986.
5. Robert E Notari, **Biopharmaceutics and Clinical Pharmacokinetics**, Marchel & Dakker Inc, New York, 1988.
6. Stephen H Curry, **Drug disposition and pharmacokinetics**, Black Well Scientific Publishing, Oxford, 1977.
7. Avraham Yacobi, **Toxicokinetics and New Drug Development**, Paramount Press, New York, 1989.
8. Sarfraz Niazi, **Text Book of Biopharmaceutics and Clinical Pharmacokinetics**. Appleton-Century-Crofts, New York, 1985.
9. P Macheras, C Reppas and J B Dressman, **Biopharmaceutics of orally administered drugs**, Ellis Horwood Limited, London (1995).
10. Albert P Li, **Invitro approaches for evaluation of drug efficacy and toxicity**, CRC Press LLC, USA, 2004.
11. Ronald D Schoenwald, **Pharmacokinetics in drug discovery and Development**, CRC Press, LLC, USA, 2002.

#### **4.5.22 PHARMACEUTICS-XI (Pharmaceutical Quality Management) (Theory & Laboratory) (PH 615, PH 616, PH 617, PH 618)**

##### **4.5.22.1 Objective**

The concept of quality control and quality assurances is very important. The purpose is to educate the students about the understanding of the

testing, quality control and methods adopted in a pharmaceutical industry for the dosage form control, process control, testing program and methods which include physical, chemical and biological tests and specifications and statistical quality control.

#### **4.5.22.2 Recommended Books**

1. A H Beckett and J B Stennlake, **Practical Pharmaceutical Chemistry**, Part-I and II, The Alton Press, London.
2. M Knevel and F E Digangi, **Jenkin's Quantitative Pharmaceutical Chemistry**, McGraw-Hill Book Company, New York.
3. K A Connors, **A Text Book of Pharmaceutical Analysis**, John — Wiley and Sons, New York.
4. Braithwaite and F J Smith, **Chromatographic Methods**, Chapman and Hall, London.
5. G D Christian, **Analytical Chemistry**, John Wiley and Sons, New York.
6. Karamt A Javaid, **Pharmaceutical Quality Assurance in Class, Industry and Market**, Aziz Publishers, Lahore-Pakistan (1993).
7. Gil Bismuth and Shosh Neumann, **Cleaning Validation, A practical approach**. CRC Press, LLC, USA, 2003.
8. J T Carstensen and C T Rhodes, **Drug Stability: Principles and Practices**, 3rd Ed. (revised and expanded), Mercel Dekker, New York. 2000.
9. Sydney H Willig, **Good Manufacturing Practices for Pharmaceuticals**, Marcel Dekker Publishing.
10. Bryant R, **The pharmaceutical Quality Control Hand Book**, Aster Publishing Corporation, Eugene, 1989.
11. Braun R E, **Introduction to Instrumental Analysis**, McGraw-Hill Book Co, NY, 1987.

#### **4.5.23 PHARMACEUTICAL CHEMISTRY-V (Medicinal Chemistry) (Theory & Laboratory) (PH 701, PH 702, PH 703, PH 704)**

##### **4.5.23.1 Objective**

Study of this subject shall cover the theory of drug action, stereochemistry and drug action, alkaloids, vitamins and relation of structure and biological activity of organic medicinal agents. Protein and steroidal hormones, antibiotics, and synthetic drugs of different pharmacological activity shall be included.

##### **4.5.23.2 Recommended Books**

1. Martin and Cook, **Remington Practice of Pharmaceutical Science**, Mack Publishing Company, USA, 2001



2. Foye W O, **Principles of Medicinal Chemistry**, Verghese Publishing House, Bombay, 1995.
3. Tyagi, **Text Book of Synthetic Drugs**, Anmol Publications, Delhi, 1990.
4. Alferd Burger, **Medicinal Chemistry**, Jhon Willey & Sons, New York, 1996.
4. Block, Roche, Soine and Wilson, **Inorganic and Medicinal Pharmaceutical Chemistry**, Verghese Publishing House, Bombay, 1986.
5. Block, Roche, Soine and Wilson. **Inorganic and Medicinal Pharmaceutical Chemistry**, Lee & Febiger, Philadelphia, USA, 1983.

#### **4.5.24 PHARMACEUTICS-XVIII (Pharmaceutical Technology) (Theory & Laboratory) (PH 709, PH 710, PH 711, PH 712)**

##### **4.5.24.1 Objective**

The students need to learn the techniques and methods of formulation development especially with reference to advanced formulation techniques, novel drug delivery system. Introduction of pharmaceutical bio-technology and role of pharmacist in the development of different useful biotechnological products is also important.

##### **4.5.24.2 Recommended Books**

1. Anya M Hellery, **Drug delivery and targeting**, Taylor & Francis, London, 2001.
2. Joseph R **Robinson Controlled drug delivery**, Marcel & Dakker Inc, New York, 2nd Ed., 1987.
3. T V Ramabhadran, **Pharmaceutical design and development**, Ellis Horwood, New York, 1994.
4. M E Aulton, **Pharmaceutics: Science of Dosage Forms Design**, ELBS/Churchill Livingstone, London, 1998.
5. Banker, **Modern pharmaceuticals**, Marchell Dakker Inc, New York, 1990.
6. John A Bontempo, **Development of biopharmaceutical parenteral dosage forms**, Marchell Dakker Inc, New York, 1997.
7. N K Jain, **Controlled and Novel drug delivery**, CBS Publishers & Distributers, New Dehi, 1997.
8. Ansel, **Pharmaceutical Dosage Form in Drug Delivery System**, Lee & Febiger, London, 1990.
9. Attaurahman and M I Chaudry, **Bioassay techniques for drug development**, CRC Press, LLC, USA, 2001.
10. Pramod K Gupta, **Inject able drug development**, CRC Press, LLC, USA, 1999.
- 11.H John Smith, **Introduction to the principals of drug design and action**, CRC Press, LLC, USA, 1998.

12. Rong Liu, **Water Insoluble Drug Formulations**, CRC Press, LLC, USA, 2000.
13. Peter Blaisdell, **Twenty First Century Pharmaceutical Development**. CRC Press, LLC, USA, 2000.
14. Lachman L, **Theory and Practice of Industrial Pharmacy**, Lee & Febiger, Philadelphia, 3rd Ed., 1986.

#### **4.5.25 PHARMACEUTICS-XIX (Forensic Pharmacy)(Theory) (PH 713, PH 714)**

##### **4.5.25.1 Objective**

Study of this subject shall enable the students to become aware about the regulatory control of manufacturing and sale of drugs in Pakistan. The students should know about the laws and procedures regarding registration and sale of drugs, establishment of retail, wholesale and distribution set ups. Knowledge of Rules and legislation about controlled, poisonous and dangerous drugs has also to be given.

##### **4.5.25.2 Recommended Books**

1. R Z Hussain. **The Manual of Drug Laws in Pakistan**, Irfan Law Book House, Lahore-Pakistan, 2003.
2. The Pharmacy Act, 1967.
3. The Poisons Act, 1919.
4. The Dangerous Drugs Act 1930.
5. The Factory Law 1934.
6. Shop and Establishment Ordinance 1969.
7. Control of Narcotics Substances Act 1997.

#### **4.5.26 PHARMACEUTICS-XX (Pharmaceutical Management & Marketing) (Theory) (PH 716, PH 718)**

##### **4.5.26.1 Objective**

Pharmaceutical marketing and management enables the students to learn about different principles of management and marketing. This prepares the students as how to manage different tasks, planning of objectives, how to manage long term and short term targets in industry, marketing and retail setups, strategies to accomplish different goals and management of different tasks within a specified period of time.

##### **4.5.26.2 Recommended Books**

1. M Ahmad & N I Bukhari, **Pharmaceutical Management and Marketing**, Tariq Academy, Faisalabad-Pakistan (2002).
2. Patrick Tharp & Pedro J Lecca, **Pharmacy Management** for students

4. and practitioners, The C V Mosby Company, St. Louis, Toronto, London
5. (1979).
6. Harry A Smith, **Principles & Methods of Pharmacy Management**, Lea
7. & Febiger, Philadelphia, 1986.

#### 4.6 Standard 2-1

**The curriculum must be consistent and supports the program's documented objectives.**

##### 4.6.1 Group 1: Pharmaceutics

###### Theory

PH-309	Pharmaceutics-I (Physical Pharmacy-I)
PH-310	Pharmaceutics-II (Physical Pharmacy-II)
PH-401	Pharmaceutics-III (Pharmaceutical Preparations)
PH-402	Pharmaceutics-IV (Pharmaceutical preparations)
PH-517	Pharmaceutics-V (Dispensing-I)
PH-518	Pharmaceutics-VI (Community Pharmacy)
PH-601	Pharmaceutics-VII (Hospital Pharmacy-I)
PH-603	Pharmaceutics-VIII (Clinical Pharmacy-I)
PH-607	Pharmaceutics-IX (Industrial Pharmacy-I)
PH-611	Pharmaceutics-X (Bio pharmaceutics-I)
PH-615	Pharmaceutics-XI (Pharmaceutical Quality Control-I)
PH-602	Pharmaceutics-VII (Hospital Pharmacy-II)
PH-604	Pharmaceutics-VIII (Clinical Pharmacy-II)
PH-608	Pharmaceutics-IX (Industrial Pharmacy-II)
PH-612	Pharmaceutics-X (Bio pharmaceutics-II)
PH-616	Pharmaceutics-XI (Pharmaceutical Quality Control-II)
PH-705	Pharmaceutics-XVII (Clinical Pharmacy-III)
PH-709	Pharmaceutical Technology-I
PH-713	Forensic Pharmacy-I
PH-706	Pharmaceutics-XVII (Clinical Pharmacy-IV)
PH-710	Pharmaceutical Technology-II
PH-714	Forensic Pharmacy-II

###### Practical

PH-311	Pharmaceutics-I (Physical Pharmacy-I)
PH-312	Pharmaceutics-II (Physical Pharmacy-II)
PH-403	Pharmaceutics-III (Pharmaceutical Preparations)
PH-404	Pharmaceutics-IV (Pharmaceutical preparations)
PH-519	Pharmaceutics-V (Dispensing-I)
PH-605	Pharmaceutics-VIII (Clinical Pharmacy-I)
PH-609	Pharmaceutics-IX (Industrial Pharmacy-I)

PH-613	Pharmaceutics-X (Bio pharmaceutics-I)
PH-617	Pharmaceutics-XI (Pharmaceutical Quality Control-I)
PH-606	Pharmaceutics-VIII (Clinical Pharmacy-II)
PH-610	Pharmaceutics-IX (Industrial Pharmacy-II)
PH-614	Pharmaceutics-X (Bio pharmaceutics-II)
PH-618	Pharmaceutics-XI (Pharmaceutical Quality Control-II)
PH-707	Pharmaceutics-XVII (Clinical Pharmacy-III) (Projects related to Clinical Pharmacy)
PH-711	Pharmaceutical Technology-I
PH-708	Pharmaceutics-XVII (Clinical Pharmacy-IV)
PH-712	Pharmaceutical Technology-II

#### 4.6.2 Group 2: Pharmaceutical Chemistry

##### Theory

PH-301	Pharmaceutical Chemistry-I (Organic-I)
PH-302	Pharmaceutical Chemistry-II (Organic-II)
PH-513	Pharmaceutical Chemistry-V (Instrumentation)
PH-514	Pharmaceutical Chemistry-VI (Instrumentation)
PH-701	Pharmaceutical Chemistry-VII (Medicinal Chemistry-I)
PH-702	Pharmaceutical Chemistry-VII (Medicinal Chemistry-II)

##### Practical

PH-303	Pharmaceutical Chemistry-I (Organic-I)
PH-304	Pharmaceutical Chemistry-II (Organic-II)
PH-515	Pharmaceutical Chemistry-V (Instrumentation)
PH-516	Pharmaceutical Chemistry-VI (Instrumentation)
PH-703	Pharmaceutical Chemistry-VII (Medicinal Chemistry-I)

#### 4.6.3 Group 3: Pharmacology & Therapeutics

##### Theory

PH-405	Pharmacology & Therapeutics-I
PH-406	Pharmacology & Therapeutics-II
PH-505	Pharmacology & Therapeutics-III
PH-506	Pharmacology & Therapeutics-IV

##### Practical

PH-407	Pharmacology & Therapeutics-I
PH-408	Pharmacology & Therapeutics-II

PH-507	Pharmacology & Therapeutics-III
PH-508	Pharmacology & Therapeutics-IV

#### 4.6.4 Group 4: Pharmacognosy

##### Theory

PH-409	Pharmacognosy-I
PH-410	Pharmacognosy-II
PH-511	Pharmacognosy-III
PH-510	Pharmacognosy + Herbal Drugs IV

##### Practical

PH-411	Pharmacognosy-I
PH-412	Pharmacognosy-II
PH-511	Pharmacognosy-III
PH-512	Pharmacognosy + Herbal Drugs IV

#### 4.6.5 Group 5: Basic & Applied

##### 4.6.5.1 Biological Sciences

##### Theory

PH-313	Physiology & Histology-I
PH-317	Anatomy
PH-305	Pharmaceutical Biochemistry-I
PH-306	Pharmaceutical Biochemistry-II
PH-314	Physiology & Histology-II
PH-501	Pathology-I
PH-413	Pharmaceutical Microbiology-I
PH-414	Pharmaceutical Microbiology-II

##### Practical

PH-307	Pharmaceutical Biochemistry-I
PH-306	Pharmaceutical Biochemistry-II
PH-315	Physiology & Histology-I
PH-316	Physiology & Histology-II
PH-503	Pathology-I
PH-415	Pharmaceutical Microbiology-I
PH-416	Pharmaceutical Microbiology-II
PH-407	Pharmacology & Therapeutics-I
PH-408	Pharmacology & Therapeutics-II
PH-507	Pharmacology & Therapeutics-III
PH-508	Pharmacology & Therapeutics-IV

- 4.6.5.2 Mathematics**  
 PH-319 Pharmaceutical Mathematics  
 PH-318 Biostatistics

**4.6.5.3 Computers**

**Theory**

PH-502 Computer & its applications in Pharmacy (Theory)

**Practical**

PH-504 Computer & its applications in Pharmacy (Lab)

**4.6.5.4 Life & Living**

**Theory**

- PH-321 Life & Living-I  
 PH-323 Life & Living-II  
 Ph-422 Life & Living-III  
 PH-418 Life & Living-IV  
 PH-520 Life & Living-V  
 PH-521 Life & Living-VI  
 PH-619 Life & Living-VII  
 PH-620 Life & Living-VIII  
 PH-717 Life & Living-IX  
 PH-718 Life & Living-X

**4.6.6 Course Groups and Program Objectives**

Courses Groups	Objectives				
	1	2	3	4	5
1	x				
2		x	x		
3			x		
4		x	x		
5	x			x	x

Table 4: Courses versus Program Objectives (table 4.4)

#### 4.7 Standard 2-2

Theoretical backgrounds, problem analysis and solution design must be stressed within the program's core material.

Elements	Courses
Theoretical Background	PH-313, PH-317, PH-305, PH-306, PH-314, PH-501, PH-413, PH-414, PH-307, PH-306, PH-315, PH-316, PH-503, PH-415, PH-416, PH-407, PH-408, PH-507, PH-508, PH-405, PH-406, PH-505, PH-506, PH-409, PH-410, PH-511, PH-510
Problem Analysis	PH-605, PH-609, PH-613, PH-617, PH-606, PH-610, PH-614, PH-618, PH-707, PH-711, PH-708, PH-712, PH-301, PH-302, PH-513, PH-514, PH-701, PH-702, PH-405, PH-406, PH-505, PH-506, PH-409, PH-410, PH-511, PH-510
Solution Design	PH-614, PH-618, PH-707, PH-711, PH-708, PH-712, PH-303, PH-304, PH-515, PH-516, PH-703, PH-407, PH-408, PH-507, PH-508, PH-411, PH-412, PH-511, PH-512

**Table 5: Standard 2-2 Requirement (table 4.5)**

#### 4.8 Standard 2-3

The Curriculum must satisfy the core requirements for the program as specified by the respective accreditation body.

Doctor of Pharmacy (Pharm-D) is recognized by Higher Education Commission (HEC) and accredited by the Pharmacy Council of the Pakistan (PCP). Minimum Requirements for each program (Program Semester Credit Hours):

Program	Maths & Basic Sciences	Science Topics	General Education (Humanities & Management Sciences)	Others (Technology)	Electives
Doctor of Pharmacy		147+39	11		

**Table 6: Program Credit Hours (appendix A table)**

#### **4.9 Standard 2-4**

**The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body.**

Same as Standard 2-3.

#### **4.10 Standard 2-5**

**The curriculum must satisfy general education, arts and professional and other discipline requirements for the program as specified by the respective accreditation body.**

Same as standard 2-3 and Standard 2-1 (table 4.4) as defined above.

#### **4.11 Standard 2-6**

**Information technology component of the curriculum must be integrated throughout the program**

Not applicable

#### **4.12 Standard 2-7**

**Oral and written communication skills of the student must be developed and applied in the program.**

Students go through course of Life and Living (III & IV) in 3<sup>rd</sup> and 4<sup>th</sup> semesters, which develop the oral and written communication skills of the students. These are 1 credit hour courses which are given due weightage.



## 5.0 Criterion 3: Laboratories and Computing Facilities

RIU has established multiple laboratories for students to practice their learning outcomes. Following is the list of available laboratories available to Pharm-D students:

Sr. No	Department	Laboratory Name
1	Pharmaceutics	Industrial
		Pharmaceutics
2	Chemistry	Organic Chemistry
		Phytochemistry
		Instrumental Chemistry
3	Pharmacology	Pharmacology
4	Pharmacognosy	Pharmacognosy
5	Computer Sciences	Information Technology Lab.
5	Basic Medical Sciences	Physiology
		Histology
		Biochemistry
		Microbiology

The details about these laboratories are provided as follows:

<b>Laboratory Title</b>	<b>Industrial Pharmaceutics</b>	<b>Pharmaceutics</b>
<b>Location &amp; Area</b>	Room # 408	Room # 411
<b>Objectives</b>	Provide students with the facility to understand and practice the procedures and protocols for the manufacturing of different drug dosage forms	Provide students with the facility to understand the basis of Pharmaceutical Sciences
<b>Adequacy for Instruction</b>	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.
<b>Courses Taught</b>	Industrial Pharmaceutics-I Industrial Pharmaceutics-II Pharmaceutical Technology-I Pharmaceutical technology-II	Physical Pharmacy-I Physical Pharmacy-II Pharmaceutical Preparation-I Pharmaceutical Preparation-II Pharmaceutical Dispensing
<b>Major Apparatus / Equipment</b>	Ointment, Ampoule, Syrup filling and sealing machine ,Tableting machine etc.	Rotary Evaporator, Drying oven, Water bath, Magnetic Stirrer, Hot Plate, etc.
<b>Safety Regulations</b>	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.

<b>Laboratory Title</b>	<b>Organic Chemistry Laboratory</b>	<b>Quality Control &amp; Instrumental laboratory</b>
<b>Location &amp; Area</b>	Room # 413	Room # 405
<b>Objectives</b>	Provide students with the facility to understand the basic and applied aspects of Organic Chemistry with special reference to medicines	Provide students with the facility to understand and use various instruments used for quality testing of medicine
<b>Adequacy for Instruction</b>	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.
<b>Courses Taught</b>	Organic Chemistry-I Organic Chemistry-II Medicinal Chemistry-I Medicinal Chemistry-II	Quality Control-I Quality Control-II Instrumental Chemistry-I Instrumental Chemistry-II
<b>Major Apparatus / Equipment</b>	Rotary Evaporator, Melting Point Apparatus, Heating Mantle, etc.	UV-Spectrophotometer, Flame Photometer, Polarimeter, Refractrometer, Viscometer, Colorimeter, etc.
<b>Safety Regulations</b>	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.

<b>Laboratory Title</b>	<b>Phyto-Chemistry Laboratory</b>	<b>In Organic Laboratory</b>
<b>Location &amp; Area</b>	Room # 406	Room # 414
<b>Objectives</b>	Provide students with the facility to understand the basis and experiment on chemical aspects of plants	Provide students with the facility to understand the basis of in Organic chemistry with reference to medicines
<b>Adequacy for Instruction</b>	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.
<b>Courses Taught</b>	Research laboratory	No courses
<b>Major Apparatus / Equipment</b>	Rotary Evaporator, Melting Point Apparatus, Heating Mantle, UV-Spectrophotometer, pH meter, etc.	Weighing balance, Dessicator, Melting Point Apparatus, Water Bath, etc.
<b>Safety Regulations</b>	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.

<b>Laboratory Title</b>	Physiology Laboratory	Bio-Chemistry Laboratory
<b>Location &amp; Area</b>	Room # 311	Room # 301
<b>Objectives</b>	Provide students with the facility to understand the basis of normal body function	Provide students with the facility to understand the basis of Biochemistry with reference to medicines
<b>Adequacy for Instruction</b>	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.
<b>Courses Taught</b>	Physiology & Histology-I Physiology & Histology-II	Bio-chemistry-I Bio-chemistry-II
<b>Major Apparatus / Equipment</b>	BP Apparatus, Microscopes, Weighing Machine, Exerciser etc.	Colorimeter, Protein kit, Carbohydrate kit, Lipid kit, etc.
<b>Safety Regulations</b>	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.

<b>Laboratory Title</b>	<b>Pharmacology &amp; Therapeutics</b>	<b>Pharmacognosy</b>
<b>Location &amp; Area</b>	Room # 302	Room # 303
<b>Objectives</b>	Provide students with the facility to understand the basic principles of pharmacology through experimentation	Provide students with the facility to understand the basis of Pharmacognosy through experimentation
<b>Adequacy for Instruction</b>	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.
<b>Courses Taught</b>	Pharmacology & therapeutics-I Pharmacology & therapeutics-II Pharmacology & therapeutics-III Pharmacology & therapeutics-IV	Pharmacognosy-I Pharmacognosy-II Pharmacognosy-III Pharmacognosy-IV
<b>Major Apparatus / Equipment</b>	Organ bath, Kymograph, Water Bath, Dissection kit, etc.	Rotary Evaporator, Drying oven, Water bath, Magnetic Stirrer, Soxhlet, etc.
<b>Safety Regulations</b>	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.

<b>Laboratory Title</b>	<b>Pharmaceutical Microbiology</b>	<b>Anatomy Laboratory</b>
<b>Location &amp; Area</b>	Room # 201	Room # 203
<b>Objectives</b>	Provide students with the facility to understand the basic principles of Pharmaceutical Microbiology through experimentation	Provide students with the facility to understand the basis of Anatomy and histology through experimentation, visual devices and models
<b>Adequacy for Instruction</b>	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.
<b>Courses Taught</b>	Pharmaceutical Microbiology-I Pharmaceutical Microbiology-II	Anatomy-I
<b>Major Apparatus / Equipment</b>	Autoclave, Incubator, Microscope, etc.	Microscope, Histology Slides etc.
<b>Safety Regulations</b>	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.

<b>Laboratory Title</b>	<b>Computer Laboratory-I</b>	<b>Computer laboratory-II</b>
<b>Location &amp; Area</b>	Room #	Room #
<b>Objectives</b>	Provide students with the facility to understand the basis of computers and its application in the field of Pharmacy	Provide students with the facility to understand the basis of computers and its application in the field of Pharmacy
<b>Adequacy for Instruction</b>	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions are displayed in the lab at appropriate places for use by faculty, students and support staff.
<b>Courses Taught</b>	Computer and its Application in Pharmacy	Computer and its Application in Pharmacy
<b>Major Apparatus / Equipment</b>	Computers, multimedia projector, etc.	Computers, multimedia projector, etc.
<b>Safety Regulations</b>	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.	Safety regulations are being strictly followed. See Annexure I for details of Laboratory Precautions.

**Table 8: Laboratories Details**

### **5.1 Standard 3-1**

**Laboratory manuals/documentation/instructions for experiments must be available and easily accessible to faculty and students.**

Laboratory In-charge is the custodian of all the manuals and instructions concerning his laboratory. Its copies are also available with the Program Coordinator to be used by the faculty and students. These manuals and



instructions are issued to desired entity through a defined process and proper record is maintained. The laboratory in-charge keeps the manuals and instructions in laboratory for immediate access to students and faculty members during the laboratory work.

Laboratory equipment and facilities in Riphah Institute of Pharmaceutics (RIPS) are equally good and comparable to any high reputed university of the country.

## **5.2 Standard 3-2**

**There must be support personal for instruction and maintaining the laboratories.**

Each laboratory is authorized two staff members, Laboratory In-Charge and Laboratory Attendant. Laboratory in-charge is responsible for overall maintenance of laboratory and also maintains the manuals and instructions while laboratory Attendant is responsible to maintain the laboratory equipment and general duties within the lab.

## **5.3 Standard 3-3**

**The University computing infrastructure and facilities must be adequate to support program's objectives.**

The computing facilities in RIPS are adequate with latest computers & software that support students to fulfill their education requirements. The facilities can be compared with any high reputed university of the country.

RIU is running a comprehensive Campus Management System. It facilitates the faculty members in maintaining the attendance record, examination schedules, time tables and student's data.

## **6.0 Criterion 4: Student Support and Advising**

Since the launch of RIU in year 2002, all its programs have started and finished on schedule. The culture in RIU is that teachers and students have facility of frequent interaction, even after classes, for any professional and academic advice. This aspect is even highlighted and indicated by the students in the feedback on HEC Performa number 10, taken by the Quality Enhancement Cell (QEC) in the university.

### **6.1 Standard 4-1**

**Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner.**

The courses are offered in a logical sequence that grooms the students to obtain the program's defined objectives and outcomes.

### **6.2 Standard 4-2**

**Courses in the major area of study must be structured to ensure effective interaction between students, faculty and teaching assistants.**

All courses in the program are taught by the single faculty member. Courses are structured in the board of studies before commencement of each semester. Faculty members interact frequently among themselves and with students. Students are encouraged to participate in providing feedback and their views about course contents during and after the classes.

### **6.3 Standard 4-3**

**Guidance on how to complete the program must be available to all students and access to qualified advising must be available to make course decisions and career choices.**

Students are informed about the program requirements at the start of the session during orientation week by in-charge program and QEC staff. In-

Charge Program acts as advisor to guide students to choose appropriate courses and also provide guidance on different issues. He also maintains a list of guidance points provided to students during the semester and program, which is being evaluated at the end of the program to take necessary improvement.

In-charge student's affair provides professional counseling to students when needed. Students can get in touch directly with him/her for any advice.

In charge Industrial Liaison arranges industrial tours for students to improve their subject vision and technical know-how. He/She also invites professionals from different business entities to conduct interactive sessions with students for advice on professional matters/future career planning.

Program coordinator maintains a list of professional societies and technical bodies, that is provided to students on demand and students can get membership of such organizations on individual basis.

## **7.0 Criterion 5: Process Control**

### **7.1 Standard 5-1**

**The process by which students are admitted to the program must be based on quantitative and qualitative criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.**

The program has a well defined admission criterion, which include evaluation of student's marks at different levels and admission test results. The admission is done once a year, in fall semester.

Students who have completed the 12 years of education are eligible to appear in the admission test of the program. Admission is granted strictly on the basis of academic record, admission test and interview.

Students from accredited universities are eligible to transfer their credits to RIU. Students have to submit complete course curriculum and internal evaluation certificate of each subject from his/her previous institution duly signed by head of department/principal. Student's applications in this regard are dealt on case to case basis. Such applications are discussed in Board of Studies to evaluate them and make decision. Dean of the faculty is the final authority to make decision regarding credit transfers.

This admission criterion is evaluated every 2 years by the board of faculties and academic council in the light of instructions issued by HEC. Minor internal adjustments regarding admission test result weightages or test contents are made.

## **7.2 Standard 5-2**

**The process by which students are registered in the program and monitoring of students' progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives.**

The student's name, after completion of the admission process, is forwarded to the Registrar office for registration in the specific program and the registration number is issued.

Students are evaluated through assignments, sessionals, mid-term tests and final examinations at the end of each semester. The laboratory work is done on regular basis as per schedule and contributes significantly towards the student's evaluation for relevant course. Only qualified students in each semester are allowed to join the next semester.

## **7.3 Standard 5-3**

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

Vacant and newly created positions are advertised in the national newspapers, applications are received by the Registrar office, scrutinized by the respective Deans, and call letters are issued to the short-listed candidates on the basis of experience, qualification, publications and other qualities/activities as determined by the University in the light of HEC guidelines.

The candidates are interviewed by the University Selection Board. Selection of candidates is approved by the BOG. Induction of new candidates depends upon the number of approved vacancies. HEC also helps RIU in enrolling the foreign faculty.

Faculty members are retained by giving them good remuneration, favorable teaching environment, research facilities and management support.

On yearly basis faculty performance is evaluated basing on HEC Performa number 10 by the students, Deans recommendations and with the counter signature of vice chancellor and pro chancellor. The annual increment is based on the recommendations of the Dean and the vice chancellor.

#### **7.4 Standard 5-4**

**The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives.**

Students are the recipient of the delivery of course material, through their teachers. The program is actively evaluated by Dean, In Charge program and QEC. The feedback of the taught is best instrument to measure that the course learning outcomes are met. The students give feedback on Performa number 1 regarding course contents and how it was delivered. Through Performa number 10, students evaluate and comment on teacher's efforts, put in to deliver the course contents, his general conduct in the class, the environment, he, maintains and extra efforts, he makes to satisfy students, thirst for knowledge.

Faculty feedback is also taken on HEC Performa number 2 (Faculty Course Review Report – (Annexure L)) and Performa number 5 (Faculty Survey –

(Annexure-G)) which is a very useful activity to evaluate the course contents, learning and teaching environments and overall teachers satisfaction level. Course evaluation by teachers also indicates what percentage of desired outcome has been achieved by the course contents and what needs to be improved or changed.

This exercise is done once a year. The feedback is discussed with Dean and In-charge program, who focus on making improvements in the weak areas, identified by the students. Teacher's evaluation performs are fed to the computer and bar charts are made. Each teacher is graded out of 5 marks. The comparative bar charts indicate level of performance of teachers, as visualized by the students. QEC formally submits these bar charts to Dean and Vice Chancellor for their information and taking of necessary corrective actions.

#### **7.5 Standard 5-5**

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

The program is run on semester basis and at the end of each semester examinations are held to evaluate the students progress in that semester. Qualified students are allowed to join next semester and this cycle continues till the end of 10<sup>th</sup> semester which is the final semester. At the end of 10<sup>th</sup> semester all students are required to submit their respective projects. Student's final results are announced on the basis of projects results and examination results.

Requirements of this standard are met through 3 Performas issued by HEC. The feedback is documented and its evaluation indicates degree of satisfaction of the graduates. Three forms (Performa 3, Survey of Graduating Students (Annexure-F), Performs 7, Alumni Survey (Annexure-A) and Performa 8, Employer Survey (Annexure-B)) are extremely good instruments to measure the program outcomes.

The feedback is taken on yearly basis. The suggestions given by the graduating students and graduates working in the industry are given due weightage. For example a few graduates through Alumni survey indicated that communication and proposal writing skills, in program, may be increased. The proposal is being evaluated by Board of Riphah Institute of Pharmaceutical Sciences and recommendations are being made to Academic Council to grant approval for change in syllabi.

The feedback of employers has been achieved. Generally, they are satisfied; however, they have recommended that graduates be given more practice in business communication and proposal writing skills. This is also being processed to make changes in syllabi.



## 8.0 Criterion 6: Faculty

### 8.1 Standard 6-1

There must be enough full time faculties who are committed to the program to provide adequate coverage of the program areas/courses with continuity and stability. The interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D. in the discipline.

Program Area of Specialization	Courses in the area and average number of sections per year	Number of faculty members in each area	Number of faculty with Ph.D Degree
Pharmaceutics	PH-309, PH-310, PH-401, PH-402, PH-517, PH-518, PH-601, PH-603, PH-607, PH-611, PH-615, PH-602, PH-604, PH-608, PH-612, PH-616, PH-705, PH-709, PH-713, PH-706, PH-710, PH-714, PH-311, PH-312, PH-403, PH-404, PH-519, PH-605, PH-609, PH-613, PH-617, PH-606, PH-610, PH-614, PH-618, PH-707, PH-711, PH-708, PH-712	16	3
Pharmaceutical Chemistry	PH-301, PH-302, PH-513, PH-514, PH-701, PH-702, PH-303, PH-304, PH-515, PH-516, PH-703	5	3

Pharmacology & Therapeutics	PH-405, PH-406, PH-505, PH-506, PH-407, PH-408, PH-507, PH-508	3	1
Pharmacognosy	PH-409, PH-410, PH-511, PH-510, PH-411, PH-412, PH-511, PH-512	3	1
<b>Total</b>		<b>27</b>	<b>8</b>

**Table 11: Faculty Distribution by Program Area**

## **8.2 Standard 6-2**

**All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place. Effective Programs for Faculty Development**

Faculty concurrency in the discipline is determined based on the criterion set by the University in the light of HEC guidelines. All faculty members submit their professional resumes on HEC Performa number 9 (Faculty Resume, Annexure-H) once a year. This information is compared with the existing criterion set by university for the concurrency of the post.

All full time faculty members are allocated teaching hours as per HEC defined limit which enables the faculty to have enough spare time to perform scholarly activities and improve their knowledge and skills.

Faculty members are provided with adequate resources for research and academic activities. Every faculty members has been provided with computer system and access to internet. Faculty members have also access to library materials for academic and research activities.

Professional training is also provided to faculty if required to enhance their capabilities.

University has defined the development programs for faculty members under the arrangement of RARE (Riphah Academy of Research and Education). RARE holds frequent interactive sessions of junior and senior faculty to discuss teaching methodology with a view to train the young faculty members. This practice is done on yearly basis during the summer vacations. After every 2 year the development program is analyzed in Deans Council for its effectiveness and necessary improvements.

The university encourages the faculty to participate in research activities by providing them sufficient financial support within or outside university.

### **8.3 Standard 6-3**

**All faculty members should be motivated and have job satisfaction to excel in their profession.**

Faculty members are motivated through public appreciation and documented appreciation (annual performance evaluation report) by the In-Charge Program and Dean on regular basis.

The faculty survey of the program using HEC Performa number 5 indicates the mix reactions of the faculty, which indicates that teaching load be distributed evenly and more relaxed environment be generated. Cumulative results of faculty surveys are attached in Annexure G.

## **9.0 Criterion 7: Institutional Facilities**

### **9.1 Standard 7-1**

**The institution must have the infrastructure to support new trends in learning such as e-learning.**

The university has provided e-learning facilities to faculty members and students. Each faculty member has a computer system with access to internet and e-learning library section.

Students have been provided a number of computer systems in the library to access e-learning section. Every student has been provided with user ID to access the e-learning resources from within the university library. The university library is linked with foreign universities libraries through internet.

The support staff to look after the e-learning resources is sufficient in number, trained and responsive. The university has provided enough funding to support the e-learning.

### **9.2 Standard 7-2**

**The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel.**

The university library has enough program related technical books in hard copies to support the program learning. The internet access to the external universities libraries provides opportunities to the students and faculty to obtain knowledge from their technical resources.

The library is staffed with more than 8 professionals to help students and faculty members to get access to required book or learning material efficiently.

### **9.3 Standard 7-3**

**Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.**

Enough class rooms are available to run the program as per desired schedule. In few class rooms, there is a need of up-gradation of multimedia and other resources. The work orders have been initiated and procurement process is in progress.

## **10.0 Criterion 8: Institutional Support**

### **10.1 Standard 8-1**

**There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars.**

University allocates enough financial resources each year to hire competent faculty as required.

As already listed in standard 5-3, Faculty members are retained by giving them good remuneration, favorable teaching environment, research facilities and management support.

As listed in standard 6-2, Faculty members are provided with adequate resources for research and academic activities to maintain their competence. Every faculty members has been provided with computer system and access to internet. Faculty members have also access to library materials for academic and research activities. Professional training is also provided to faculty if required to enhance their capabilities.

### **10.2 Standard 8-2**

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

The university follows the guidelines of HEC for admission in this program. The number of graduate students during the last three years is 300 with no research assistants and Ph.D student in the faculty.

Faculty to graduate student's ratio for the last three years remained in the range of 14:1 to 18:1.

### **10.3 Standard 8-3**

**Financial resources must be provided to acquire and maintain Library holdings, laboratories and computing facilities.**

Library at RIU holds more than 50000 books for all programs. Sufficient number of computers are available to be used by the students. Library is organized to accommodate 50 students (male, female) in research cubicles as well as in the common places. Separate common rooms for male and female students are available with internet facility.

Laboratories at RIU holds adequate equipment to be used by the students to carry out desired experiments and laboratory work. Each year a handful of budget is allocated for laboratories to maintain and upgrade the equipment and other facilities.

Computing facilities at RIU provide excellent platform to students to enhance their learning capabilities. There are 2 computer laboratories in Faculty of computing, which are accessible to all students for their use.

## 11.0 Conclusion

The self assessment report of the Riphah Institute of Pharmaceutical Sciences (RIPS), Riphah International University, I-14 Campus Islamabad is an important document, which gives strengths and weaknesses of the program. The management is striving hard to improve infrastructure for establishment of conducive environments for studies. The faculty is focused on imparting quality education, introduction of new and innovative techniques and conduct of quality research to produce competent pharmacists. The report has been prepared after evaluating the program in the light of 8 criterion and 31 standards given in HEC's Self Assessment Manual. The program mission objectives and outcomes are assessed and strategic plans are presented to achieve the goal, which are again measurable through definite standards. Teachers' evaluation revealed satisfactory standards, the score of 15 teachers of the program ranged from 2.81 to 4.45. Students' course evaluation score ranged between 1.95 and 4.38 with a mean of 3.10 points in 0-5 scale. Alumni surveys revealed variable results with regards to knowledge, interpersonal skills, management and leadership skill. Weaknesses are identified which are related to space, laboratories and equipment. Improvements in curriculum design and infrastructure are suggested which are based upon set, well defined and approved criteria. Examinations are held on schedules, academic schemes are prepared well in advance, transparent admission, registration and recruiting policy, excellent student teacher ratio are some of the strong areas of this program. The number of courses along with titles and credit hours for each semester, course contents for degree program, are thoroughly planned. Their efficacy was measured through different standards and it was found to be satisfactory.

The facilities and shortcomings in the laboratory have been discussed. It was concluded that laboratory facilities and class rooms need further



improvement. The need of refreshal courses for the fresh faculty on method of teaching cannot be over emphasized.

Proper steps are taken to guide the students for program requirements, communication, meetings, tutorial system, tours, students-teacher interaction etc. Some improvements have been suggested. As regards the process control covering admission, registration, recruiting policy, courses and delivery of material, academic requirements, performance and grading, university, PCP as well as Higher Education Commission have set forth proper rules, which are properly followed. At present amongst a total of 21, there are 15 faculty members who are highly qualified in their fields. However, faculty members need motivation for advanced knowledge, research and external training.

Institutional facilities were measured through Criterion 3; infrastructure, library, class room and faculty offices and in each case, short comings and limitation are highlighted. Institutional facilities need to be strengthened. Accordingly, institutional support will greatly promote and strengthen academic, research, management and leadership capabilities.

In conclusion, the strong and weak areas of the program are as under:-

### **11.1 Strong Areas**

- Curriculum Design, development and organization are based upon set, well defined and approved criteria
- Pre-requisites fully observed
- Examinations on schedule.
- Academic Schemes fully prepared in advance
- The number of courses along with their titles and credit hours for each semester, course contents for degree program are fully planned
- Transparent admission, registration and recruiting policy

- A very powerful and expanded international library
- PCP & HEC rules fully followed
- Excellent Students-Teacher Ratio

### **11.2 Weaknesses**

- Class rooms improvements
- New & State of the art equipments for Labs
- Refreshal Courses for Teachers.

Salient recommendations of Chairman AT's presentations are:-

### **11.3 Class Room Improvements**

- Inadequate seating capacities in some class rooms
- Problem of light and echo in some class rooms due to their shape
- Multimedia projector and overhead projector requirement in a few classes
- Additional Lights, Fans and ACs especially in summer in some class rooms
- Whiteboard should be dispersive
- Suitable sound system for bigger class rooms
- All big rooms should be reserved for classes only.

### **11.4 Laboratory Equipment**

- Laboratory Equipments Up-gradation

### **11.5 Regular Teacher Training**

- Excellent communication skills are required
- Training of Young Faculty
- Improve the Teaching Methodology
- Preparation and delivery of lectures
- Evaluation of students

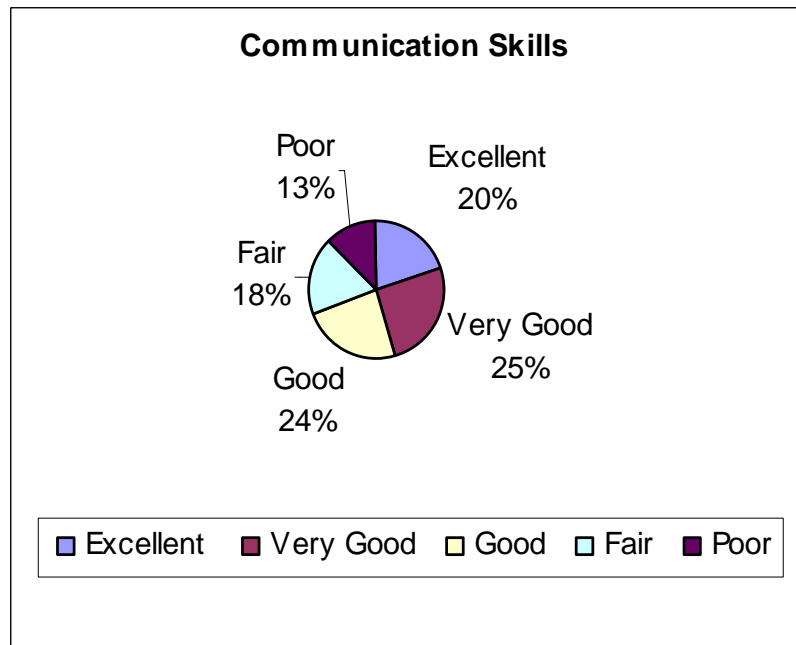
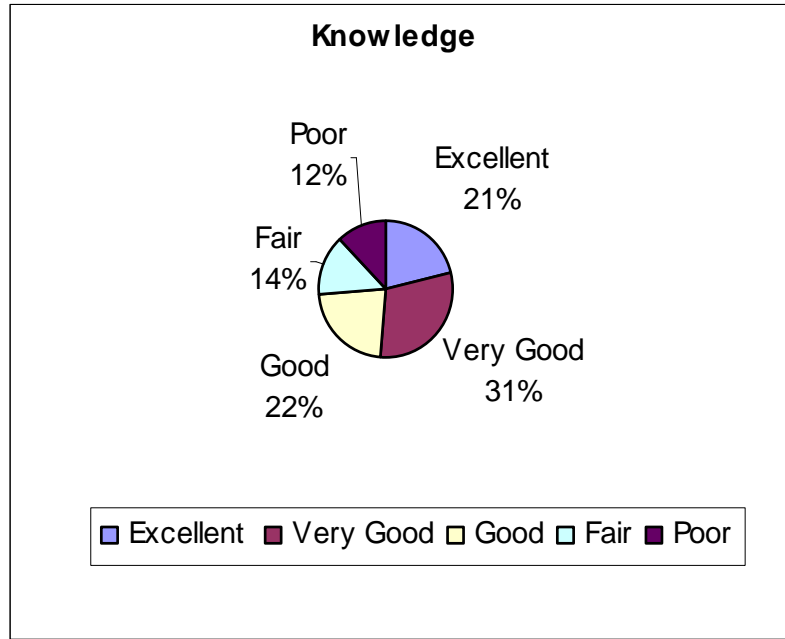
### **11.6 Facilities for Students**

- n. Common Room for Male students
- o. Ample sitting facilities in verandas and canteens (Male/Female)
- p. Sport facilities –(Badminton, Table tennis)
- q. Industrial and Educational tours

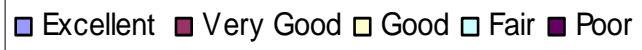
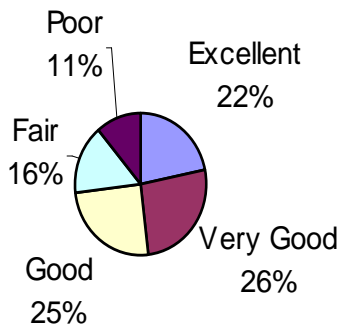
### **11.7 Faculty Development**

- r. Indigenous Plans for faculty development
- s. Practical skills should be enhanced
- t. Research facilities and funds
- u. Balance of teaching workload and research activities
- v. Student teacher ratio should be adequate
- w. Technical training regarding handling of Laboratory and Class room equipment (Handling of ACs, Handling of Multimedia Projectors, Handling of PCs, Handling of laboratory equipments)

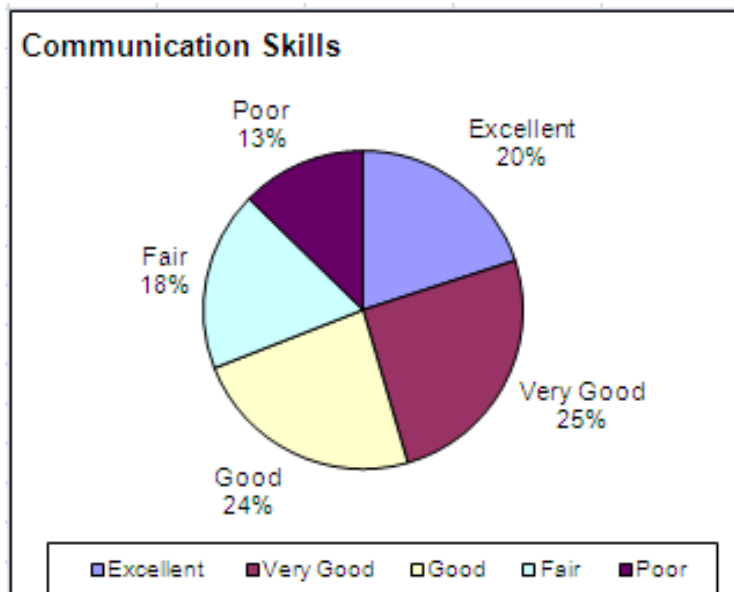
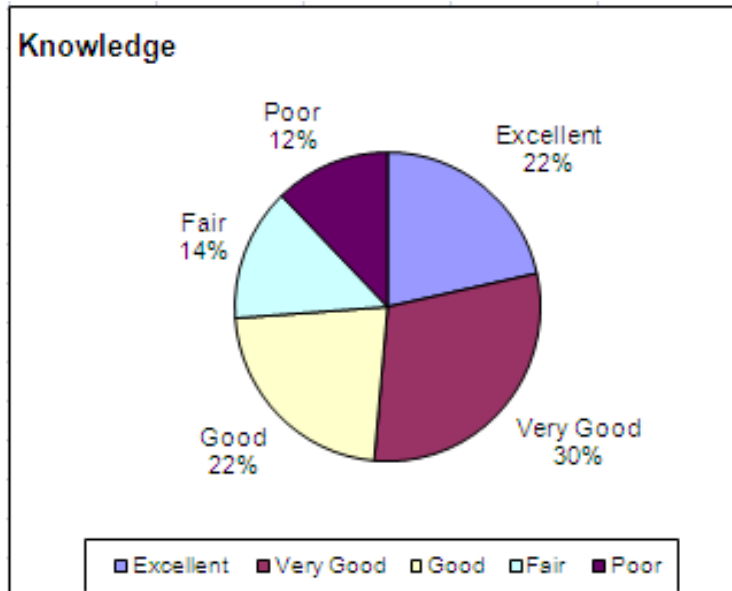
## Annexure – A: Alumni Survey Results



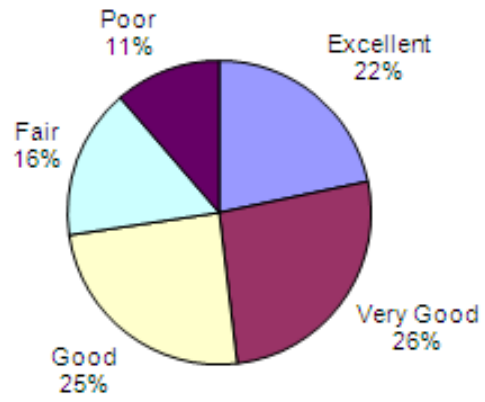
### Interpersonal Skills



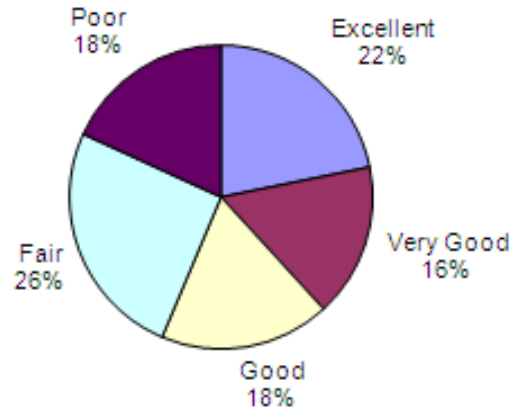
## Annexure – B: Employer Survey Results



### Interpersonal Skills



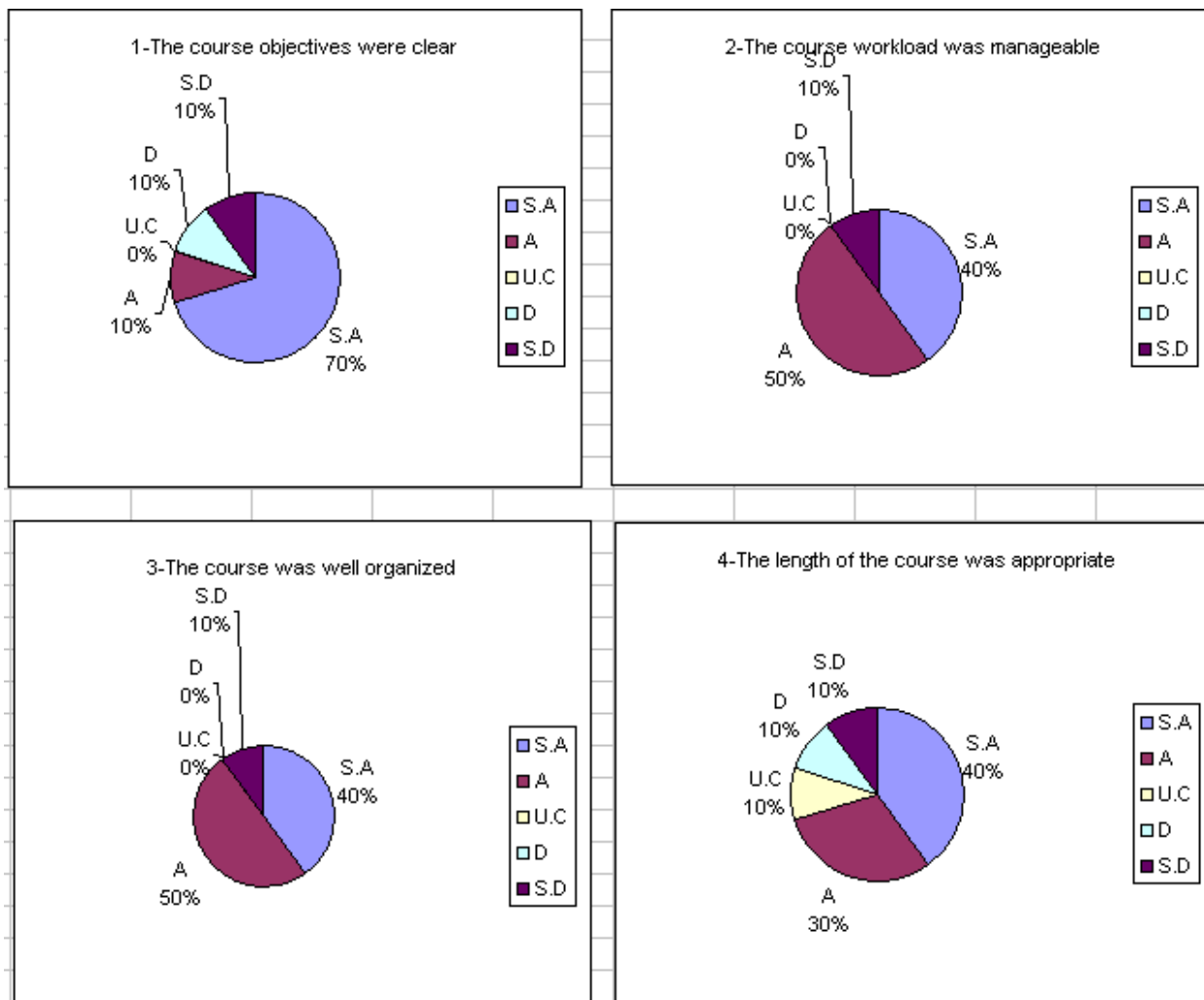
### Work Skills



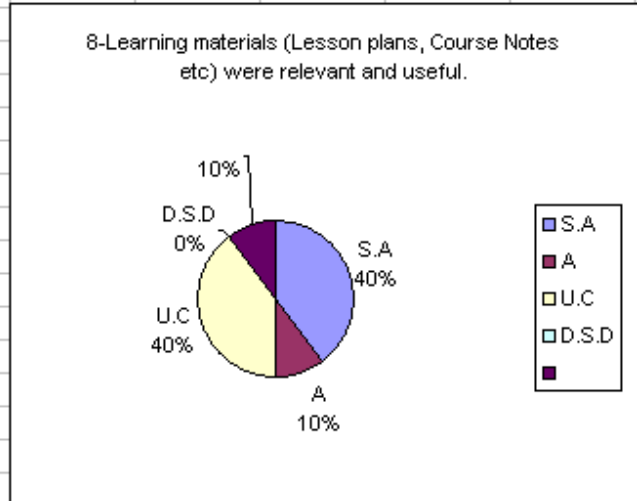
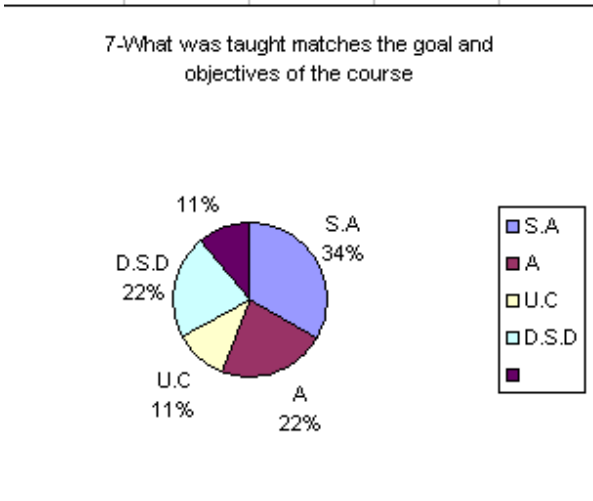
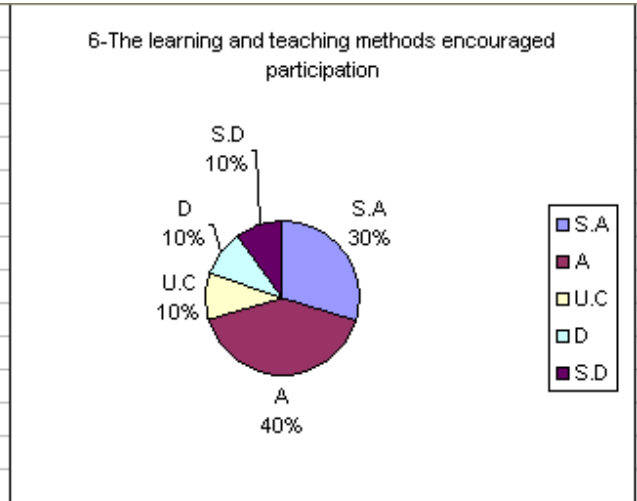
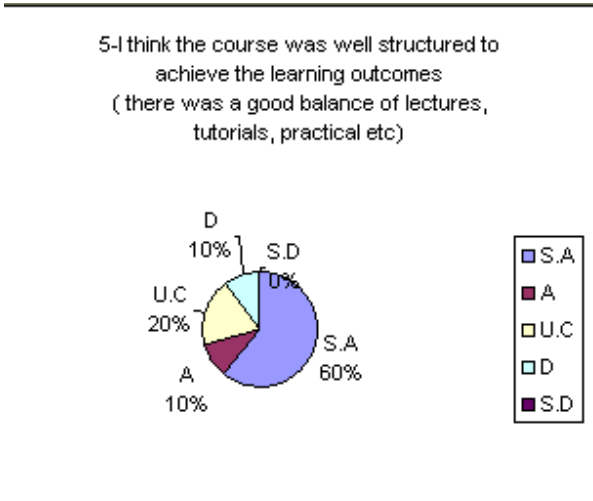
## Annexure – C Students Course Evaluation Sample

### Course: Pharmaceutical Chemistry I

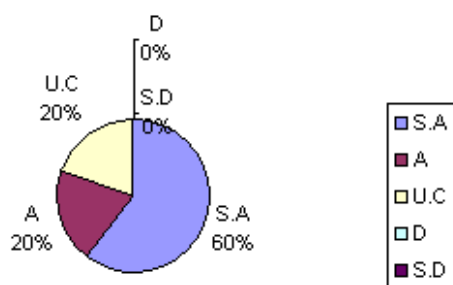
Following is the graphical representation of course evaluation for Pharmaceutical Chemistry I course which is attached herewith as sample to show the actual results. Same has been done for all courses listed in section 3.3.1. These charts show students response for all questions against the listed course.



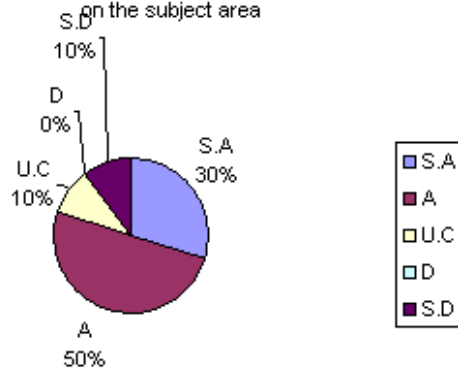




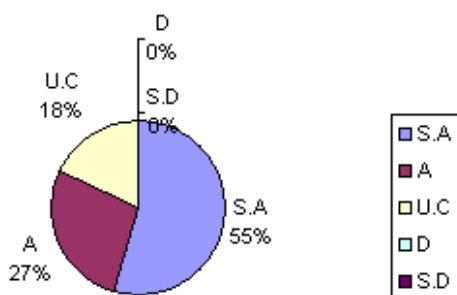
9-Recommended reading books etc were relevant and appropriate



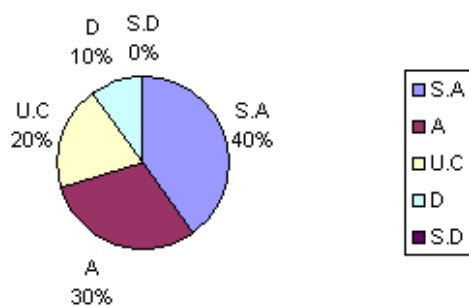
10-The Course stimulated my interest and thought on the subject area



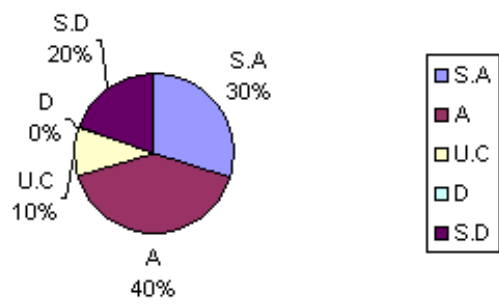
11-I understood the lectures



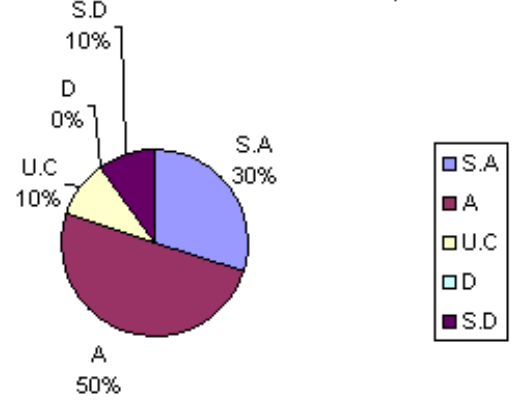
12-The pace of the Course was appropriate



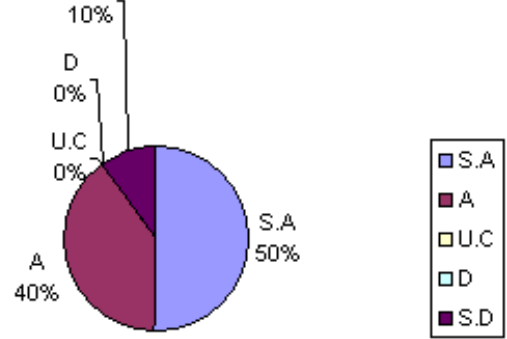
13-The methods of assessments were reasonable



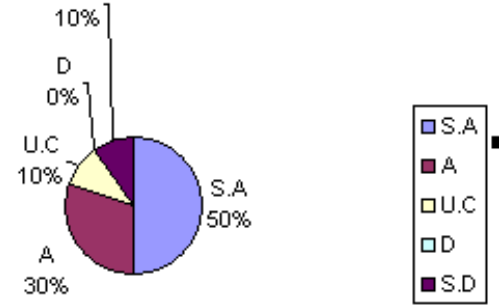
14-Feedback of assessments was timely

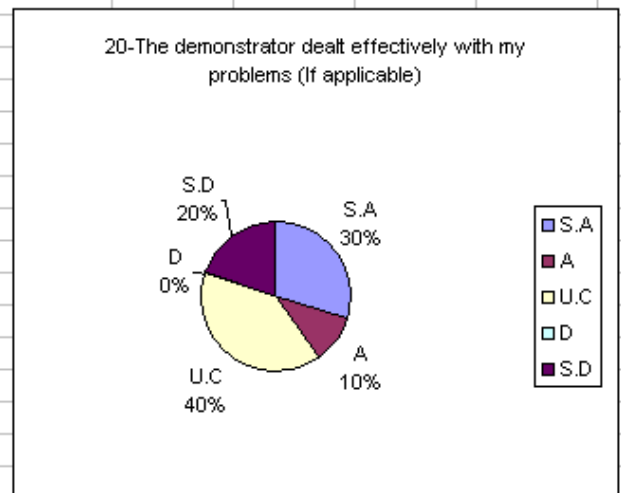
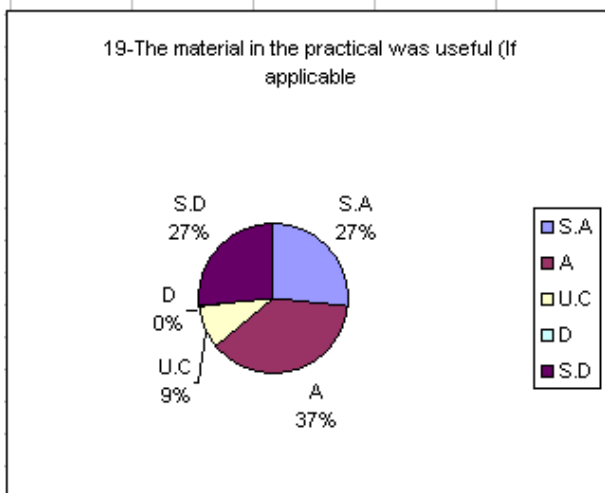
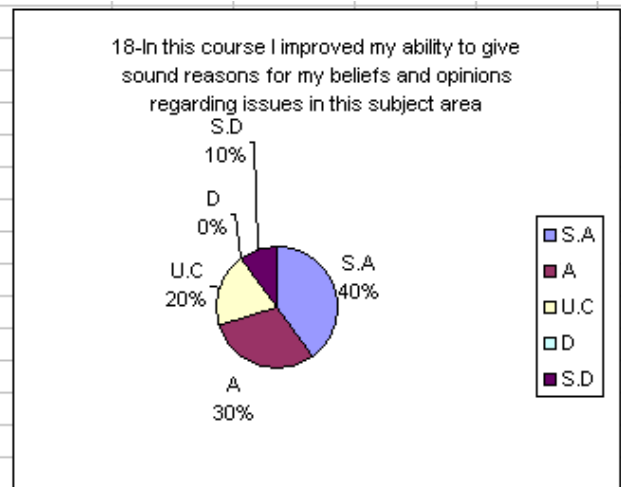
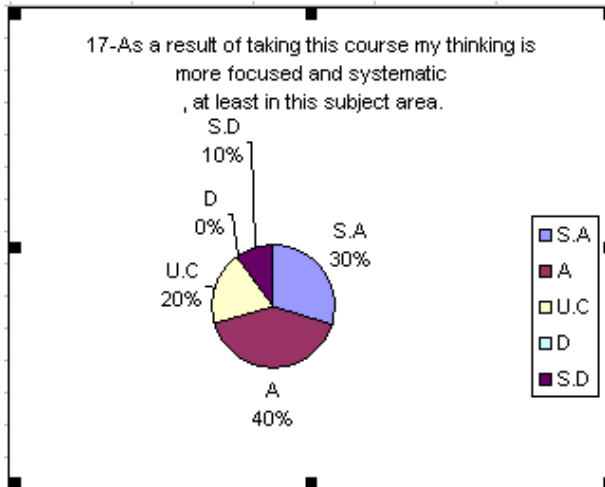


15-Feedback on assessments was helpful

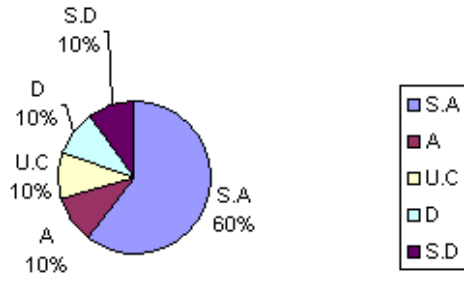


16-As a result of taking this course my interest and curiosity about the issues and questions in this subjects area has grown

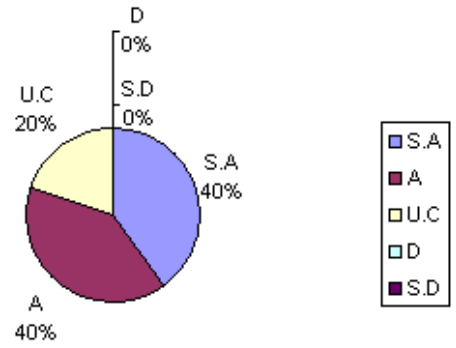




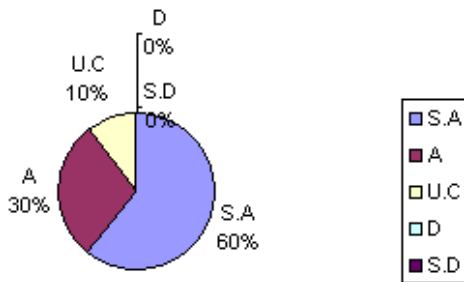
21-Approximate level of my own attendance during the whole Course



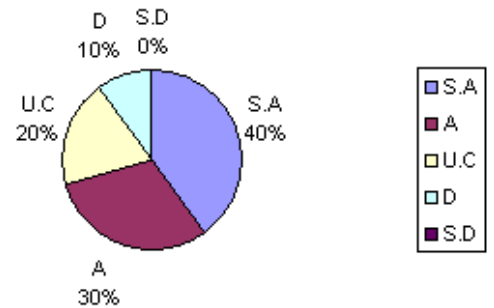
22-The amount of effort I put into this course was



23-My involvement in this course ( doing assignments, attending classes, etc.) was:



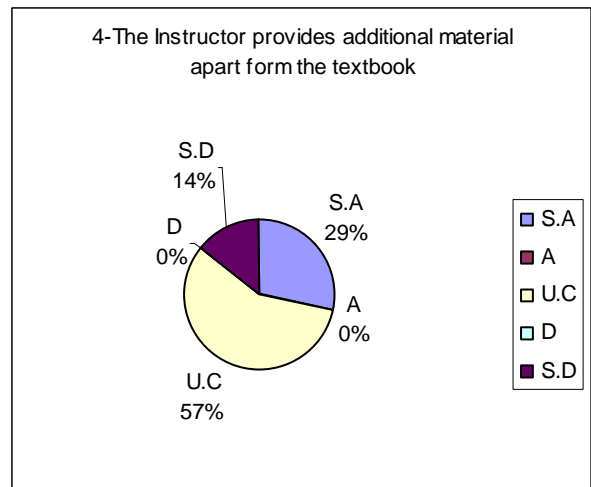
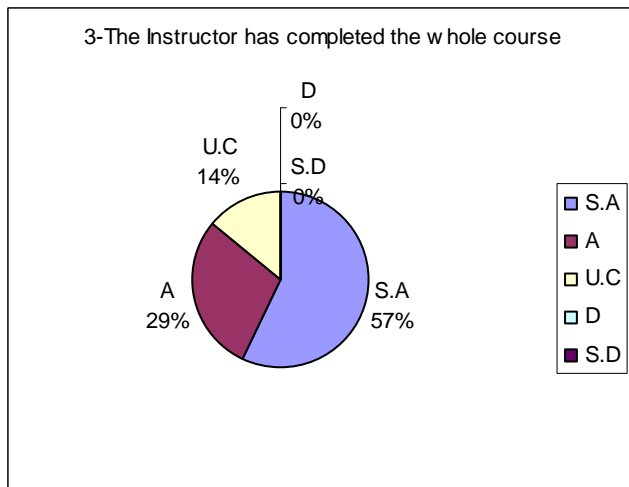
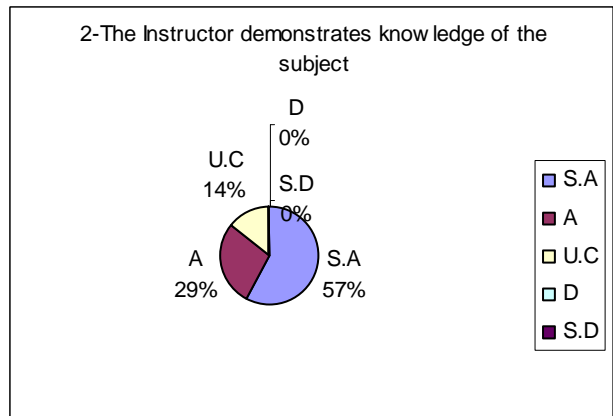
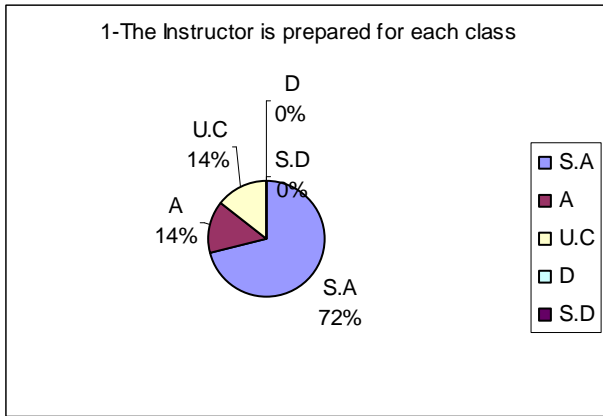
24-I think I have made progress in this Course



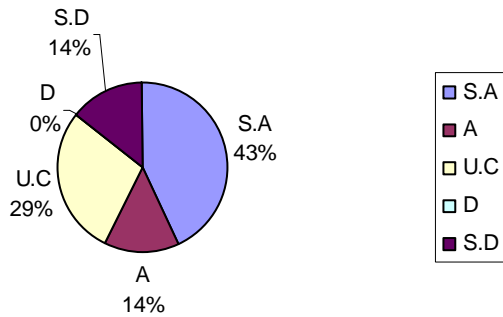
## Annexure – D: Teachers Evaluation Feedback Sample

**Teacher: Muhammad Shahid**

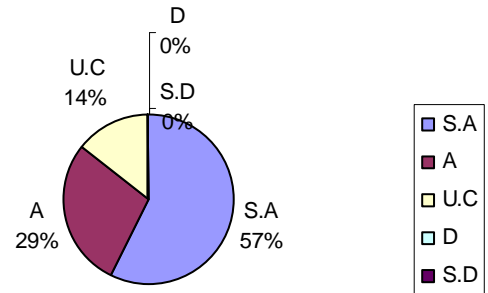
The graphical representation of teacher evaluation feedback is shown below as sample for one teacher only. Same has been done for all the teachers listed in section 3.3.2.



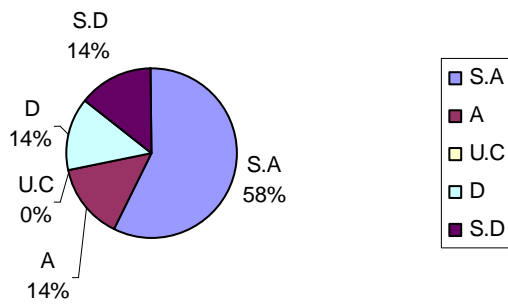
5-The Instructor gives citations regarding current situations with reference to Pakistan context



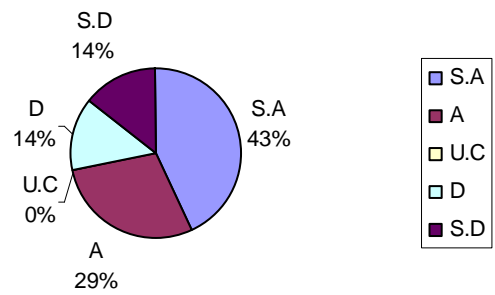
6-The Instructor communicates the subject matter effectively



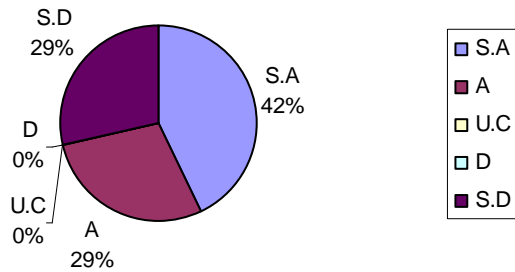
7-The Instructor shows respect towards student and encourages class participation



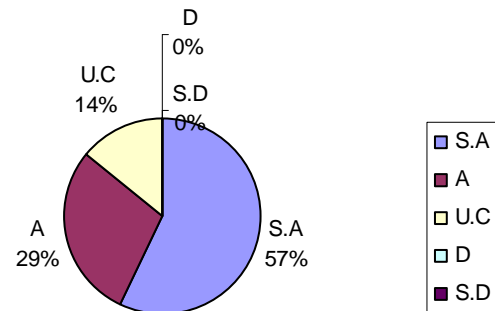
8-The Instructor maintains an environment that is conducive



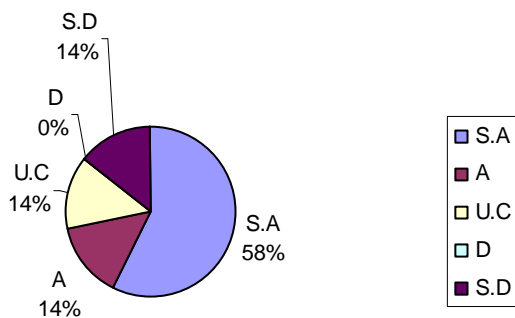
9-The Instructor arrives on time



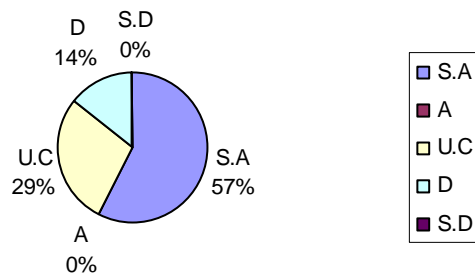
10-The Instructor leaves on time



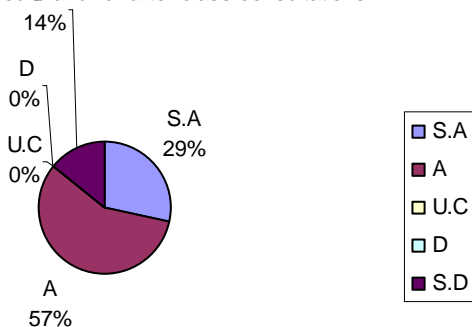
11-The Instructor is fair in examination



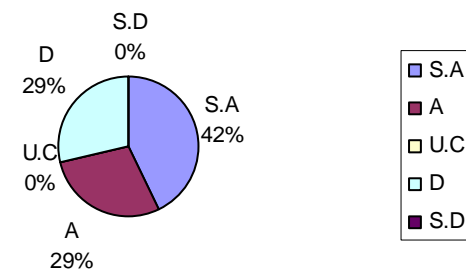
12-The Instructor returns the graded scripts etc. in a resonable amount of time



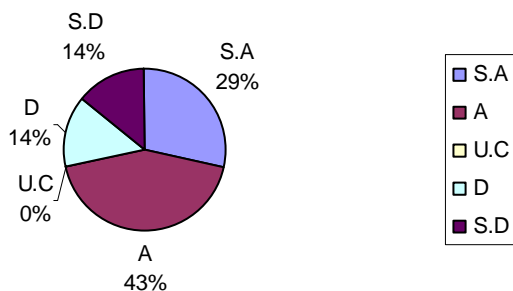
13-The Instructor was available during the specified office hours and for after class consultations



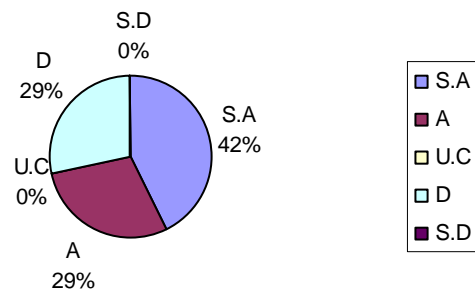
14-The Instructor communicates effectively in terms of voice eye contact, professional use of English or target language



15-The Instructor plans creative and innovative activities appropriate to objectives, including the use of technology

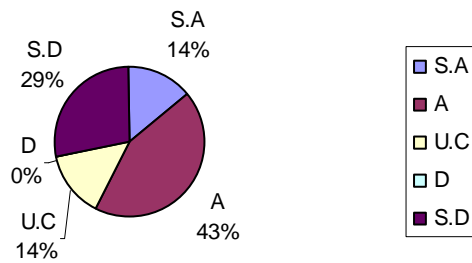


16-The Instructor relates current lessorn content to previous and future lesson content (Khurram Shahzad-Principles of Management-MBA 1

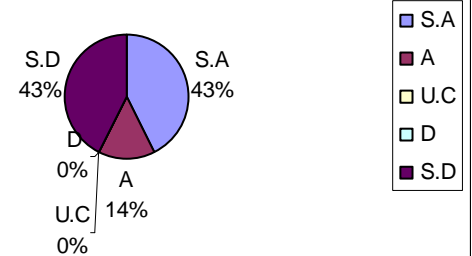




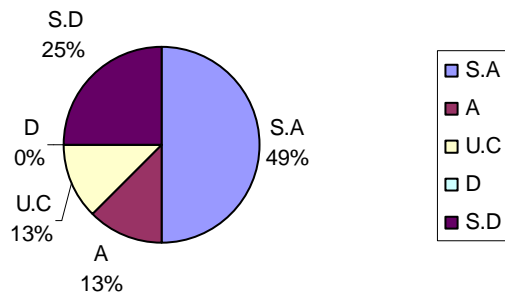
17-The Instructor use variety of appropriate assessment methods and Instrument



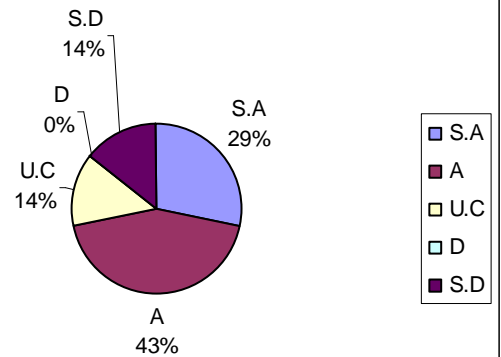
18-The Instructor establishes classroom rules and procedures cooperatively with Students when appropriate



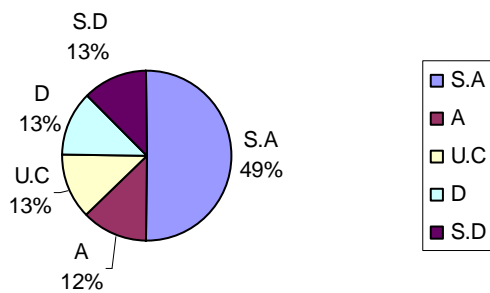
19-The Instructor ensures equitable participation



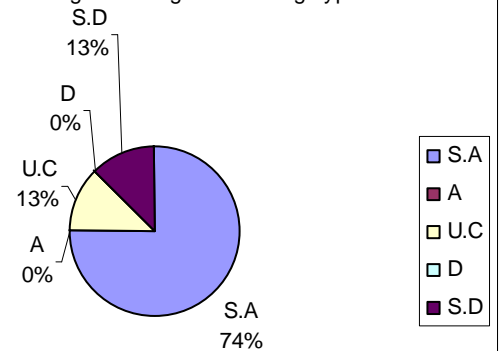
20-The Instructor encourages student to help each other and share ideas



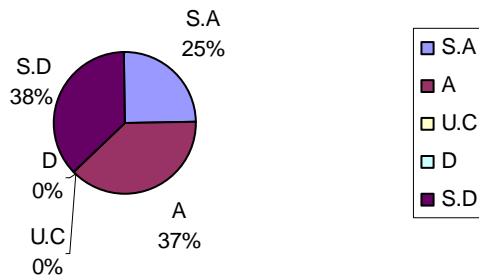
21-The Instructor accept and uses student's ideas, questions and responses



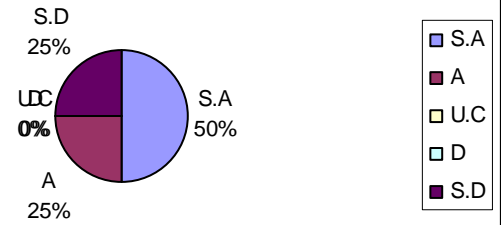
22-The Instructor engages the Students in generating know ledge and testing hypothesis



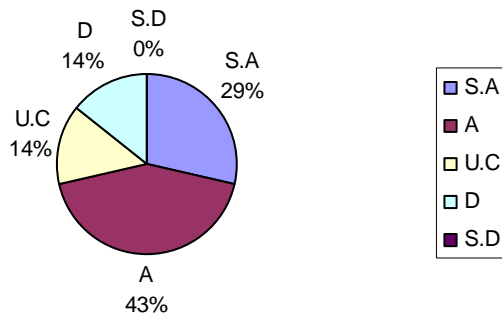
23-The Instructor presents difficult course material clearly



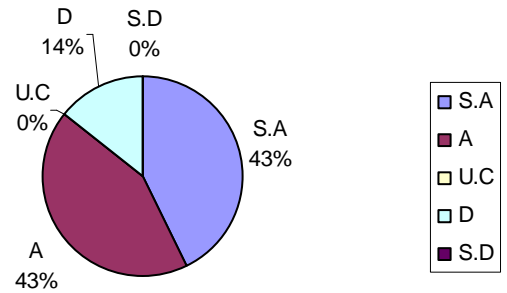
24-The Instructor indicates confidence in student in student's ability to learn



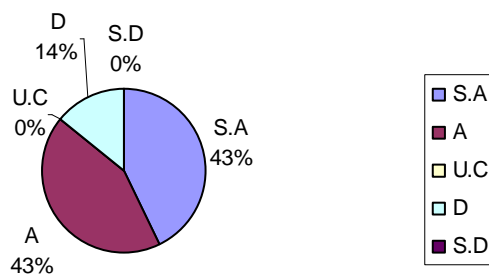
25-The Instructor avoids personal criticism of students



26-The Instructor uses vocabulary and style appropriate to level of students



27-The Instructor pronounces and spells words correctly and uses correct grammar

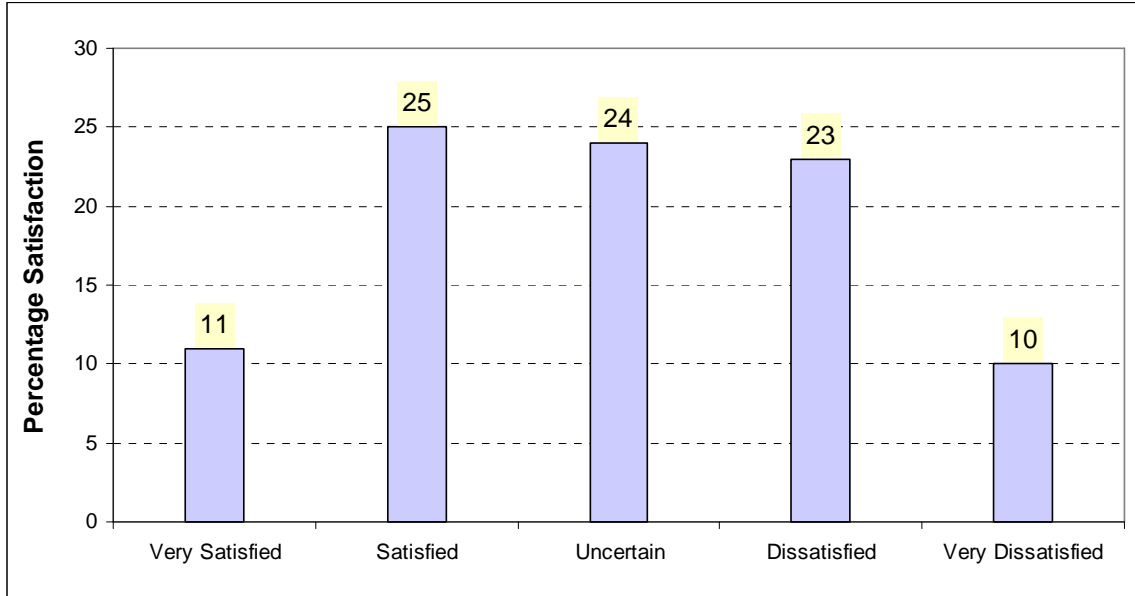


## Annexure – E: Research Papers List

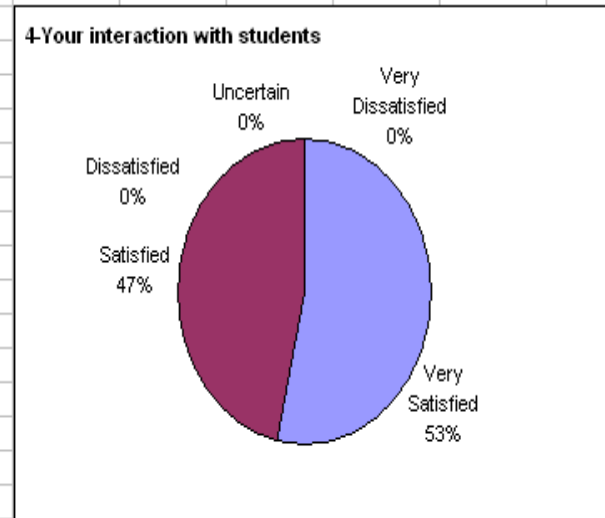
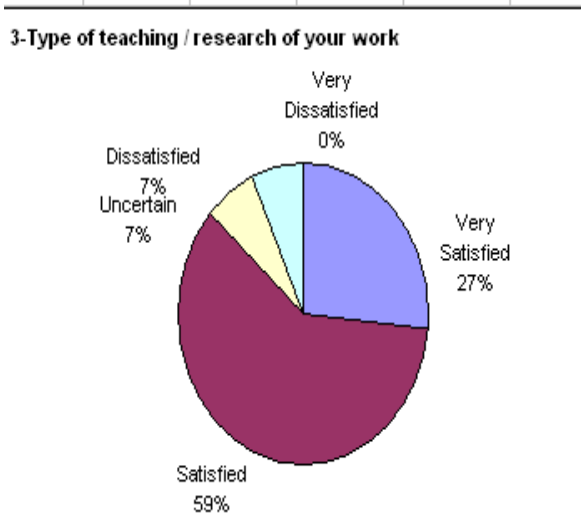
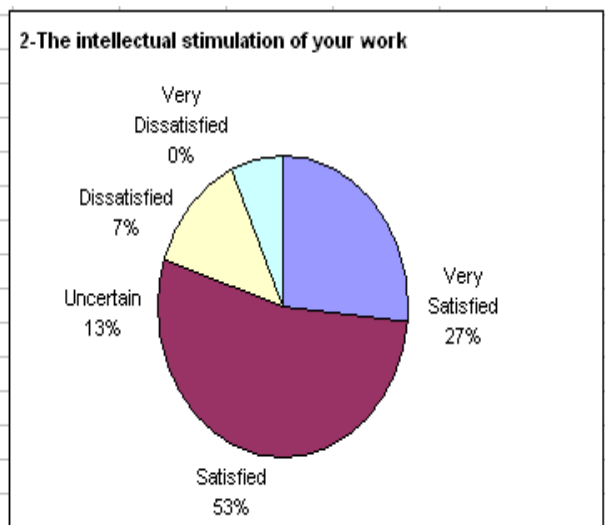
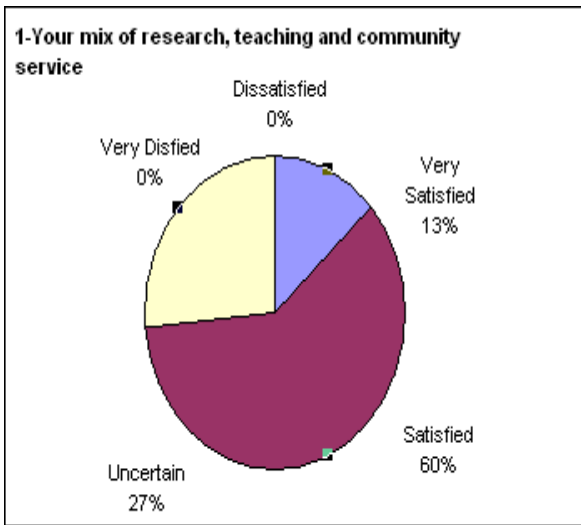
Sr #	Name of Author	Title of Paper	Name of Journal	Impact Factor of the Journal	Vol	Date	Page#
1	Dr. Ishrat Waheed	Specific post-transcriptional inhibition of mRNA for ligand binding chain of IgE high affinity receptor”	<i>Molecular Biological Report</i>	1.482	38	2010	675-81
2	Dr. Inamul Haq and Syed Aun Muhammad	Activity of commercially available herbal drugs against salmonella typhi	<i>Indian journal of Science and Technology,</i>		3	2010	
3	Dr. Khadija Shahid	Reaction of 9-Borabicyclo[3.3.1]nonane with Alkyn-1-yltin Compounds. Molecular Structure of the 9-Propyn-1-yl-9-borabicyclo[3.3.1]nonane Pyridine Adduct	<i>Zeitschrift Naturforsch-hung</i>	0.852	64b	2009	309-402
4	Dr. Khadija Shahid	“Indazaboles - Synthesis and Molecular Structure”.	<i>Journal of Applied Organometallic Chemistry.</i>	1.586	24	2010	398-401
5	Dr. Khadija Shahid	“Interaction of Di- and Triorganotin(IV) Compounds with Carboxylate Ligand: Synthesis, Spectral Characterization, Semi-empirical Study and In Vitro Antimicrobial Activities“	<i>Journal of the Chinese Chemical Society.</i>	0.653	57	2010	659-670
6	Dr. Khadija Shahid	Organotin(IV) complexes of 2-[2',4',6'-trichlorophenylamido] benzoic acid: synthesis, coordination chemistry and semi-empirical study.	<i>Journal of Phosphorus, Sulphur and silicon</i>	0.586	185	2010	2045-2053.
7	Mr. Muhammad Zaman	“2-Chloro-5nitroaniline”	<i>Acta Crystallographica</i>	0.45	E65,	2009	01417,
8	Mr. Muhammad Zaman	“Methyl-3,5-dibromo-4-methylbenzoate” .	<i>Acta Crystallographica.</i>	0.45	E66	2010	0982

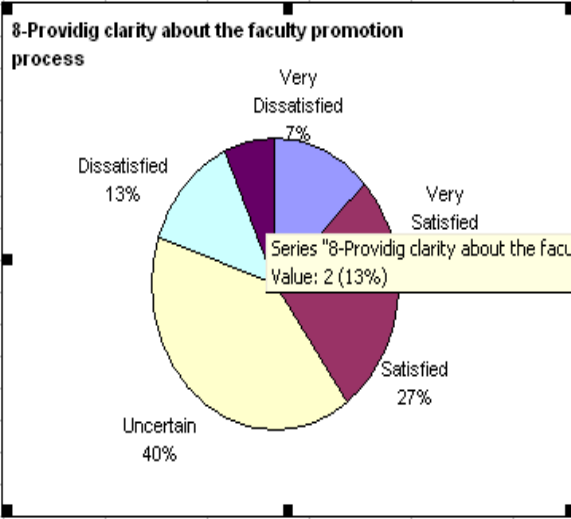
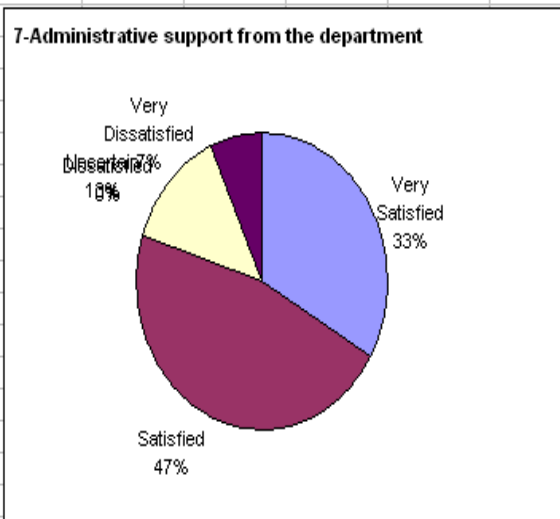
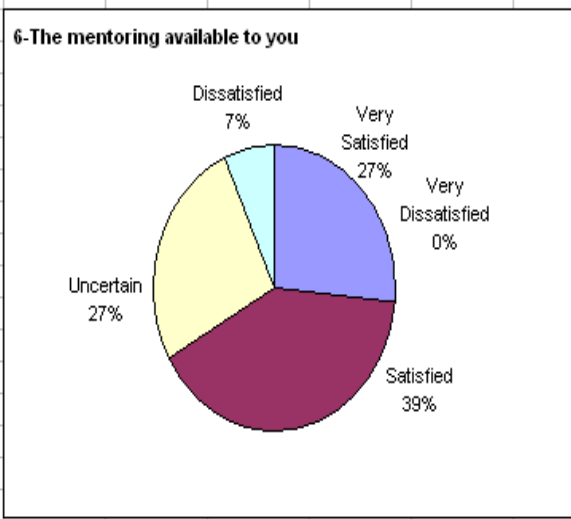
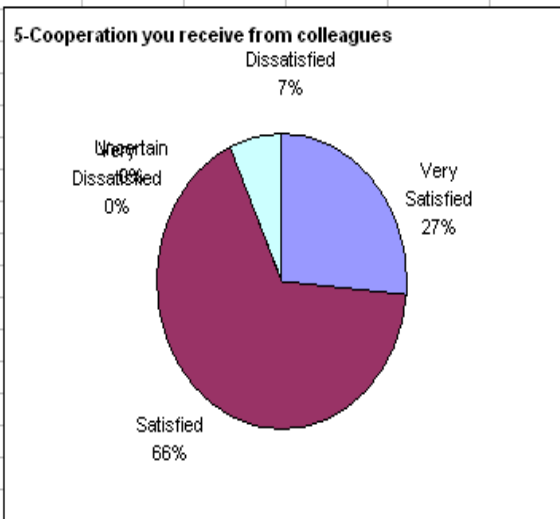
Sr #	Name of Author	Title of Paper	Name of Journal	Vol.	Date	Page#
9	Dr. Karamat Javaid	"Evaluation Gels through Diffusion Cell".	<i>Journal of Pharmaceutical Research</i>	8	2009	--
10	Ms. Kishwar Student of Ph.D. of Dr. Khadija Shahid	"Formulation Of Ferrous Fumarate (COMBINATION) Tablets by Using a Direct Compression Method".	<i>Indian journal of Science and Technology</i>	3	2010	9
11	Dr. G.A. Miana	"An Introduction to General Methodology for Screening of Medicinal Plants"	<i>Hamdard Medicus</i>	52	2009	5
12	Dr. G.A. Miana	Clinical Investigation of Hypoglycemic Effect of Coriandrum Sativum in Type-2 (NIDDM) Diabetic Patients.	<i>Pak J. Pharmacology</i>	7	2006	23
13	Dr. G.A. Miana	Clinical Investigation of Hypoglycemic Effect of Seeds of Azadirachta-Indica in Type-2 (NIDDM) diabetes mellitus...	<i>Pak.J. Pharmaceutical Sciences</i>	19	2006	33
14	Dr. G.A. Miana	Chemical constituents of Scutellaria linearis	<i>Biochemical systematics and ecology</i>		2008	1-3
15	Dr. G.A. Miana	An Introduction to General Methodology for Screening of Medicinal Plants	<i>Hamdard Medicus</i>	5	2009	52

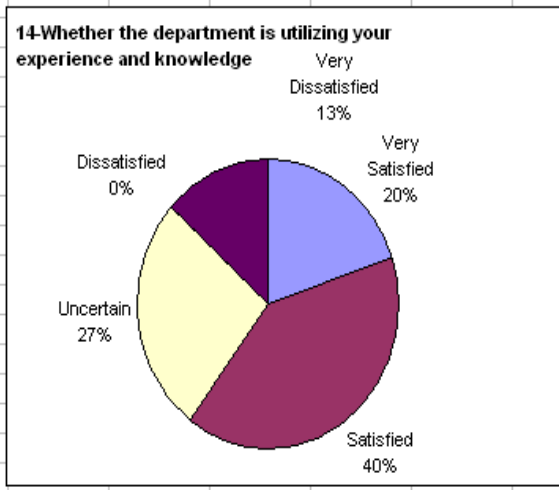
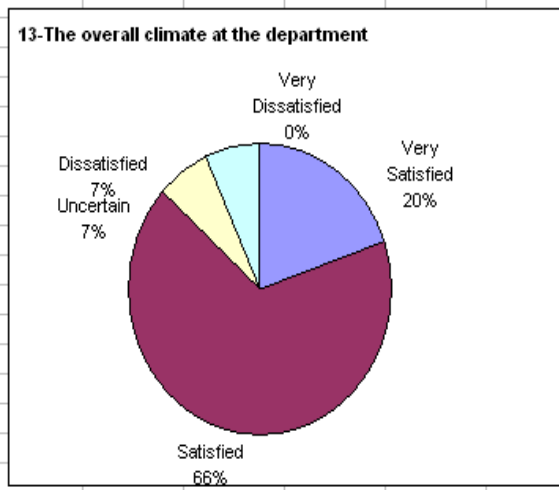
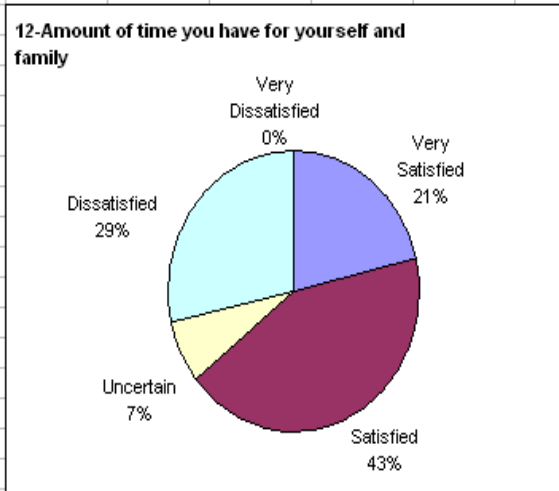
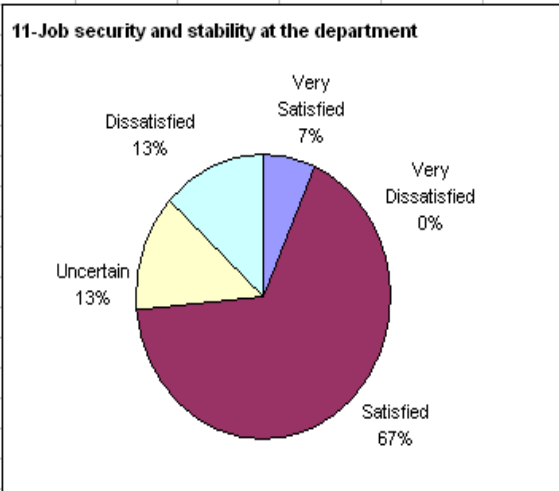
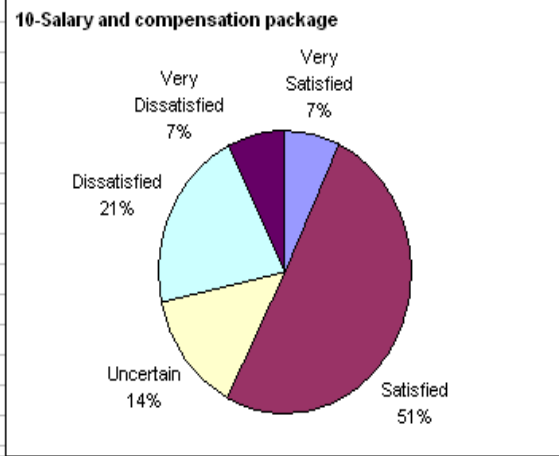
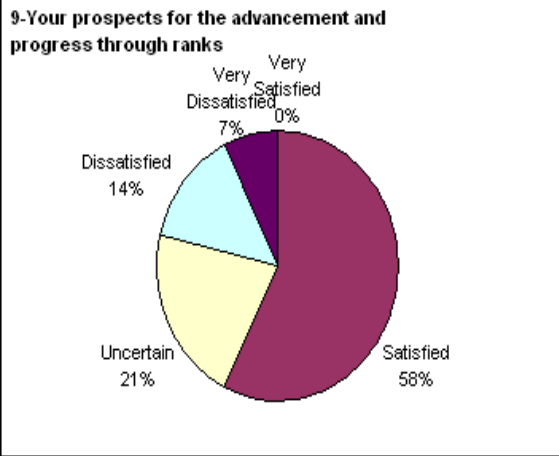
**Annexure – F:      Graduating Students Feedback Sample**



**Annexure – G: Faculty Survey**









## **Annexure – H: Faculty Resume**

Riphah Institute of Pharmaceutical Sciences has following staff members.

**Dr. Inamul Haq**

B. Sc., B. Pharm., Ph. D.  
Dean/Director

**Professor Dr. G. A. Miana**

M. Sc., Ph. D.  
Rector / Director R & D

**Professor Dr. Rafiuzzaman Saeed-ul-Haq**

B. Pharm., Ph. D.  
Professor

**Syed Iftikhar Hussain Shah**

M. Sc.  
Associate Professor

**Mr. Faiq Ahmed Javaid**

B. Pharm., M. Phil.  
Assistant Professor

**Ms. Khadija Shahid**

B. Pharm., M. Phil (Chemistry) Ph. D. thesis to be submitted  
Lecturer/ Asst Professor

**Ms. Farah Azhar**

B. Pharm., M. Phil.  
Lecturer

**Mr. Muhammad Zubair**

B. Pharm., M. Phil.  
Lecturer

**Mr. Muhammad Zaman Ashraf**

M. Sc., M. Phil (Chemistry)  
Lecturer

**Mr. Yasir Asghar**

M. Phil.  
Lecturer

**Miss Bushra Jamil**

B. Pharm., M. Phil.  
Lecturer  
Miss Humaira Gul  
B. Pharm  
Demonstrator

**Miss Sadaf Sana**

B. Pharm  
Demonstrator

**Miss Irum Naz Lodhi**

B. Pharm  
Demonstrator

**Miss Kishwar Sultana**

B. Pharm  
Demonstrator

**Mr. Eawad Naeem**

B. Pharm  
Demonstrator

**Miss Shumaila Zulfiqar**

B. Pharm  
Demonstrator

**Miss Azra Batool**

B. Pharm  
Demonstrator

**Saima Kausar**

B. Pharm  
Demonstrator

**Mr. Zahid Jamal**

M. Sc. (Maths/Stat) M. B. A.  
Lecturer

**Ms. Sadia Sarwat**

M. A. (Pak Studies)  
Lecturer

**Dr. Sajid Shah**  
MBBS, FCPS  
Asso Professor

**Dr. Sabiha M. Haq**  
MBBS, FCPS  
Professor

**Dr. Kauser Abid**  
MBBS  
Asst Professor

**Dr. Mehmood ul Hassan (Path)**  
MBBS  
Demonstrator

**Dr. Fatima Riaz**  
MBBS  
Demonstrator

## **Annexure – I: Laboratory Safety Guidelines**

The Riphah Institute of Pharmaceutical Sciences (RIPS) is committed to providing a safe environment for all. However, laboratory safety is a mutual responsibility and requires full participation and cooperation of all involved persons - students, faculty and staff. The following Lab Safety Guidelines have been established for your/our protection as a student/Researcher in the RIPS laboratories areas.

These rules will be rigidly and impartially enforced.

### **Personal Protection**

- Safety glasses can be worn during work in the Lab depending on the nature of experiment.
- Contact lenses are discouraged. However, students who choose to wear contacts must recognize the inherent increased risks - they are difficult to remove if chemicals get in the eye, they have a tendency to prevent natural eye fluids from removing contaminants, and sudden displacement can cause visual problems that create additional hazards. Soft contact lenses are especially problematic because they can discolor and also absorb chemical vapors causing damage before the wearer is alerted to the problem. If you choose to wear contacts, please tell your lab instructor.
- Appropriate gloves will be provided when needed. Use of gloves is required for handling certain chemicals. Gloves are very expensive. Do not change gloves needlessly.
- Appropriate clothing/White Coat is required. Your clothing is a barrier between your skin and chemicals. You must be covered- also no bare midribs or shoulders. Lab coats are recommended and can be purchased.
- Shoes must be worn. No sandals, thongs, open toed or open heeled shoes.

- Roll up sleeves and tie up loose clothing and long hair when working with equipment, open flame, any chemicals or biological substances.
- Do not eat, drink (including sport bottles and water bottles), or store food in the labs.
- Smoking or use of other tobacco products is prohibited.
- Wash hands after working with chemicals.
- It is the recommendation that during the lab work and handling with chemicals/biological, chatting, noise and shaking hands is prohibited.

### **General Lab Rules**

- Conduct yourself in a responsible manner at all times in the laboratory.
- When first entering a lab room, do not touch any equipment, chemicals, or other materials in the laboratory area until you are instructed to do so.
- Read all instructions carefully and plan your work. Understand the experiment and if in doubt, ask.
- Follow the written lab procedure - laboratory activity at this level is not meant to be creative. Improper combinations or amounts of chemicals can be very dangerous. No unauthorized experiments are to be performed. If you are curious about trying a procedure not covered in the experimental procedure, consult with your laboratory instructor.
- Place book bags, pocketbooks, etc. under the lab tables.
- Lab activities require your undivided attention. No music allowed in student labs. Radios (including Walkman type) and other entertainment devices are not permitted. No cellular phone use.
- Treat chemicals with respect and understand the chemicals you are using.
- Learn where the safety and first-aid equipment is located. This includes fire extinguishers, eyewash stations.
- Notify the instructor immediately in case of an accident, no matter how small it seems.
- Preserved biological materials are to be treated with respect and disposed of properly.

- Leave the lab area clean. Put equipment and chemicals away and wipe off the bench top.

### **Safety Procedures for Microbiological/Biotechnological Experimentation**

- Perform these experiments under aseptic techniques.
- Use disinfectants/antiseptics while experimentation.
- It is highly recommended that performance cannot be done while having “coughing/infections/injuries/minor or major cuts on the hands or skin”. Inform your demonstrator/Instructor for this issue.
- Use masks or Gloves when needed.
- Direct contact with cultures is always prohibited during experimentation.
- During experiment, label each item/article accordingly.
- It is highly recommended “Don’t deal with Pathogenic Microbial Strains” until you are permitted by your teacher.
- Disposal of Cultures/medias/require autoclaving. Follow your Instructor

### **Disposal of Wastes**

- Do not dispose of chemicals in the sink. (Rule of Thumb: If you don’t want to drink it, don’t dump it in the sink). Follow your instructor’s directions for disposal. Be sure to dispose of chemicals in the proper waste collector. Do not mix chemical waste without being instructed to do so. Any container that is used to collect chemical waste must be properly labeled and closed at all times unless actively pouring into it.
- Properly dispose of cultures in the plastic bags. Never throw them in lab garbage cans. Your instructor will provide necessary detail.
- Dispose of broken glass in the cardboard/“broken glass box” in your lab. Do not place general trash in the any of the specialized collection containers.
- “Do not let the potential hazards listed above make you afraid to participate in the lab. If instructions are followed and care is taken, the

likelihood of an accident is greatly reduced. Labs are usually the most fun part of any science course”.

### **Who to Contact**

If you have any questions, the following people are your safety resources:

- Your instructor /Demonstrator in Labs
- Faculty Members
- Student Advisor
- Administration Office

## **Self Assessment Team Report December 2, 2011 (Exit Presentation)**

**Brig ® Dr. Maqsood ul Hassan**

### **Self Assessment Program**

- Successful Assessment Program include
  - Purpose identification
  - Outcomes identification
  - Measurements and evaluation design
  - Data collection
  - Analysis and evaluation
  - Decision-making regarding actions to be taken



# Self Assessment Objectives

- Maintain and continuously enhance academic standards
- Enhance students' learning
- Verify that existing programs meet their objectives and institutional goals
- Provide feedback for quality assurance of academic programs
- Prepare the academic program for review by discipline councils

## Self Assessment Team

- Constituted by VC in Sept 2010
- Members
  - Brig ® Dr. Maqsood ul Hassan, IIMC (Chairman)
  - Mr. Aun Muhammad, AP, RIPS
  - Dr. Muhammad Afzal Rana, AP, DBS

## Terms of Reference

- Conduct of assessment of SAR
- Pin point gaps and deficiencies for improvement
- Report of findings of the Assessment

## Self Assessment Report

- IIMC
- RIPS
- DBS

## Conclusions of SAR

- Class room improvement
- Labs and Project equipment and fund
- Regular teacher training
  - Teaching methodology, Evaluation
- Facilities for students
- Development of Faculty
  - Mix of research and teaching proportion
- Training of support staff

## Visit of SAT to 3 Faculties

- Tuesday Nov 29, 2011
- Visit of Class rooms and Laboratories and allied facilities
- Visit and Meeting with Faculties
  - Dean
  - Incharge Undergraduate Programs
  - Quality Program Team Members

# Class Room Improvement

- Some class rooms have inadequate seating capacities
- Shape of class rooms
  - Problem of light and echo
- Multimedia projector and overhead projector requirement in every class
- Lights and Fans and ACs especially in summer

# Class Room Improvement

- Whiteboard should be dispersive rather the reflective (currently installed)
- Sound system for bigger class rooms
- All big rooms should be reserved for classes only.

## **Laboratory Equipment**

- Being upgraded

## **Regular Teacher Training**

- Teaching is an art
- Excellent communication skills are required
- Specially required for new and young faculty members
- Teaching Methodology
- Preparation and delivery of lectures
- Evaluation of students

## **Facilities for Students**

- Common Room for Male students
- Ample sitting facilities in lawns and under shade
- Sport facilities
  - Basket ball, Badminton, Table tennis
  - Cricket ground
- Industrial and Educational tours

## **Faculty Development (2)**

- Practical skills should be enhanced
- Research facilities and funds
- Balance of teaching workload and research activities
- Student teacher ratio should be adequate

## **Training of Support Staff**

- Technical training regarding handling of Laboratory and Class room equipment
  - Handling of ACs
  - Handling of Multimedia Projectors
  - Handling of PCs
  - Handling of laboratory equipment

# Conclusion

Improvement is a continuous process

- Class Rooms
- Faculty training and development
- Laboratory equipment
- Research and development culture
- Training of support staff
- Facilities for students and Faculty
- Syllabi Review
- Implementation plan is to be developed by the respective faculties

**Annexure K: Implementation Plan of Pharm- D Program**  
**(Shared Class Rooms & Facilities with other Faculties)**

<b>AT Finding</b>	<b>Corrective Action</b>	<b>Implementation Date</b>	<b>Responsible Body</b>	<b>Present Status</b>
1. Inadequate seating capacity in Three class rooms	Add 10 chairs in each class room	By 30 <sup>th</sup> Dec, 2011	RIPS/Registrar Office	In Progress
2. Two class rooms have light and echo problem	Add curtains and carry out sound proofing of walls	By 31 <sup>st</sup> March 2012	-do-	In Progress
3. Deficiency of Multimedia Projectors	Add 1 multimedia projector in 1 class room	By 30th June 2012	-do-	In progress
4. Dispersive white boards	Replace all with mat finish white boards	By 30th April 2012	-do-	In progress
5. Sound system for 1 bigger class rooms	Add sound system	By 30th June 2012	-do-	In progress
<b>Students Facilities</b>				
6. Common room for male students not available	Earmark a bigger room for this purpose	By 30th April 2012	-do-	In progress
7. Sports facility for students	Develop Basket Ball, Bad Minton, and Table Tennis facilities for students	By 30th June 2012	Registrar office	In Progress
8. Shortage of sitting facilities around cafeteria and college verandas	Add all weather chairs/benches for atleast 100 students	By 30th April 2012	Registrar office	In Progress
<b>Faculty Development</b>				
1. Non Attendance of Workshops/Seminars/ Lectures	Provide opportunities to faculty to attend sessions of their interest	By 30 <sup>th</sup> April 2012	Registrar Office/ Finance	In Progress



2. Imbalance of Teaching workload and research activities	Follow HEC instructions	By 30 <sup>th</sup> April 2012	RIPS/HR	In Progress
3. Deficiency of indigenous plans for faculty development	Active RARE to run faculty development courses on regular basis	By 30 <sup>th</sup> June 2012	RIPS/Registrar office/RARE	RARE will hold faculty interactive sessions in July-August 2012
4. Deficiency of support staff to handle ACs, Multimedia	Reorganize manpower allocation from within department. Deficiency if any be filled up	By 30 <sup>th</sup> March 2012	RIPS/HR	In Progress
<b>Syllabi Review</b>				
1. Need to review syllabi for more emphasis on Research, Laboratory and Marketing skills	Review Syllabi through Board of Studies and Board of Faculties	By 30 <sup>th</sup> July 2012	Dean, Incharge Programs and concerned faculty	Action in Hand
Chairman's AT Comments Name and Signature				
Dean's Comments Name and Signature				
QEC Comments Name and Signature				

## **Annexure L: Faculty Course Review Report**

Riphah Institute of Pharmaceutical Sciences (RIPS) is running 14 core courses for the Doctor of Pharmacy (Pharm D) program. All courses curriculum is reviewed periodically by the faculty to assess its effectiveness and contribution in achieving program objectives. Course review also contributes towards making any changes in the syllabi and enhancements required in areas identified as a result of Alumni Survey, Employer Survey and Graduating Students Feedback.

PT members launched HEC Performa 2 (Faculty of Course Review Report) to all the faculty members, to obtain their feedback about courses.

The summary of the overall feedback of all courses identified the following improvement areas:

- a. Communication Skills
- b. Leadership Skills.
- c. Research Aptitude Building.
- d. Confidence Building Measures
- e. Exposure to Pharmaceutical Sector

These improvement areas have been presented in Board of Studies to finalize its recommendations and suggest further actions.

## Annexure M: Rubric Report

<b>Self Assessment Report</b>									
<b>Criterion 1 – Program Mission, Objectives and Outcomes</b>					<b>Weight = 0.05</b>				
<b>Factors</b>					<b>Score</b>				
1. Does the program have document measurable objectives that support faculty/ college and institution mission statements?					5	4	3	2	1
2. Does the program have documented outcomes for graduating students?					5	4	3	2	1
3. Do these outcomes support the Program objectives?					5	4	3	2	1
4. Are the graduating students capable of performing these outcomes?					5	4	3	2	1
5. Does the department assess its overall performance periodically using quantifiable measures?					5	4	3	2	1
6. Is the result of the Program Assessment documented?					5	4	3	2	1
<b>Total Encircled Value (TV)</b>					<b>19</b>				
<b>SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.05</b>					<b>3.17</b>				

<b>Criterion 2– Curriculum Design and Organization</b>					<b>Weight = 0.20</b>				
<b>Factors</b>					<b>Score</b>				
1. Is the curriculum consistent?					5	4	3	2	1
2. Does the curriculum support the program's documented objectives?					5	4	3	2	1
3. Are the theoretical background, problem analysis and solution design stressed within the program's core material?					5	4	3	2	1
4. Does the curriculum satisfy the core requirements laid down by PEC?					5	4	3	2	1
5. Does the curriculum satisfy the major requirements laid down by HEC and the PEC?					5	4	3	2	1
6. Does the curriculum satisfy the professional requirements as laid down by PEC?					5	4	3	2	1
7. Is the information technology component integrated throughout the program?					5	4	3	2	1
8. Are oral and written skills of the students developed and applied in the program?					5	4	3	2	1
<b>Total Encircled Value (TV)</b>					<b>38</b>				
<b>SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.20</b>					<b>3.8</b>				

<b>Criterion 3– Laboratories and Computing Facilities</b>					<b>Weight = 0.10</b>				
<b>Factors</b>					<b>Score</b>				
1. Are the laboratory manuals/ documentation/ instructions etc. for experiments available and readily accessible to faculty and students?					5	4	3	2	1
2. Are there adequate number of support personnel for					5	4	3	2	1

instruction and maintaining the laboratories?					
3. Are the University's infrastructure and facilities adequate to support the program's objectives?	5	4	3	2	1
Total Encircled Value (TV)	15				
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.10	10				

<b>Criterion 4– Student Support and Advising</b>						<b>Weight = 0.10</b>				
<b>Factors</b>						<b>Score</b>				
1. Are the courses being offered in sufficient frequency and number for the students to complete the program in a timely manner?	5	4	3	2	1					
2. Are the courses in the major area structured to optimize interaction between the students, faculty and teaching assistants?	5	4	3	2	1					
3. Does the university provide academic advising on course decisions and career choices to all students?	5	4	3	2	1					
Total Encircled Value (TV)	12									
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.1	8									

<b>Criterion 5– Process Control</b>						<b>Weight = 0.15</b>				
<b>Factors</b>						<b>Score</b>				
1. Is the process to enroll students to a program based on quantitative and qualitative criteria?	5	4	3	2	1					
2. Is the process above clearly documented and periodically evaluated to ensure that it is meeting its objectives?	5	4	3	2	1					
3. Is the process to register students in the program and monitoring their progress documented?	5	4	3	2	1					
4. Is the process above periodically evaluated to ensure that it is meeting its objectives?	5	4	3	2	1					
5. Is the process to recruit and retain faculty in place and documented?	5	4	3	2	1					
6. Are the process for faculty evaluation & promotion consistent with the institution mission?	5	4	3	2	1					
7. Are the process in 5 and 6 above periodically evaluated to ensure that they are meeting their objectives?	5	4	3	2	1					
8. Do the processes and procedures ensure that teaching and delivery of course material emphasize active learning and that course learning outcomes are met?	5	4	3	2	1					
9. Is the process in 8 above periodically evaluated to ensure that it is meeting its objectives?	5	4	3	2	1					
10. Is the process to ensure that graduates have completed the requirements of the program based on standards and documented procedures?	5	4	3	2	1					
11. Is the process in 10 above periodically evaluated to ensure that it is meeting its objectives?	5	4	3	2	1					
Total Encircled Value (TV)	51									
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.15	13.91									

<b>Criterion 6– Faculty</b>		<b>Weight = 0.15</b>				
<b>Factors</b>	<b>Score</b>					
1. Are there enough full time faculty members to provide adequate coverage of the program areas/courses with continuity and stability?	5	4	3	2	1	
2. Are the qualifications and interest of faculty members sufficient to teach all courses, plan, modifies and updates courses and curricula?	5	4	3	2	1	
3. Do the faculty members possess a level of competence that would be obtained through graduate work in the discipline?	5	4	3	2	1	
4. Do the majority of faculty members hold a Ph.D. degree in their discipline?	5	4	3	2	1	
5. Do faculty members dedicate sufficient time to research to remain current in their disciplines?	5	4	3	2	1	
6. Are there mechanisms in place for faculty development?	5	4	3	2	1	
7. Are faculty members motivated and satisfied so as to excel in their profession?	5	4	3	2	1	
<b>Total Encircled Value (TV)</b>	<b>26</b>					
<b>SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.15</b>	<b>11.14</b>					

<b>Criterion 7– Institutional Facilities</b>		<b>Weight = 0.15</b>				
<b>Factors</b>	<b>Score</b>					
1. Does the institution have the infrastructure to support new trends such as e-learning?	5	4	3	2	1	
2. Does the library contain technical collection relevant to the program and is it adequate staffed?	5	4	3	2	1	
3. Are the class rooms and offices adequately equipped and capable of helping faculty carry out their responsibilities?	5	4	3	2	1	
<b>Total Encircled Value (TV)</b>	<b>15</b>					
<b>SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.15</b>	<b>15</b>					

<b>Criterion 8– Institutional Support</b>		<b>Weight = 0.10</b>				
<b>Factors</b>	<b>Score</b>					
1. Is there sufficient support and finances to attract and retain high quality faculty?	5	4	3	2	1	
2. Are there an adequate number of high quality graduate students, teaching assistants and Ph.D. students?	5	4	3	2	1	
<b>Total Encircled Value (TV)</b>	<b>8</b>					
<b>SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.05</b>	<b>8</b>					

$$\begin{aligned}
 \text{Overall Assessment Score} &= S1+S2+S3+S4+S5+S6+S7+S8 \\
 &= 3.7+3.8+10+8+13.91+11.94+15+8 \\
 &= 74.35
 \end{aligned}$$