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**ARID AGRICULTURE UNIVERSITY
RAWALPINDI**



**Self-Assessment Report 2012-14 (4th cycle)
Degree Programmes**

➤ **M. Phil**

DEPARTMENT OF ENVIRONMENTAL SCIENCES

Program Team

1. Prof. Azeem Khalid (Coordinator)
2. Dr. Audil Rashid (Member)
3. Dr. Shahid Mahmood (Member)

Table of Contents

Introduction	4
CRITERION 1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES	4
CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION	39
CRITERION 3: LABORATORIES AND COMPUTING FACILITIES	45
CRITERION 4: STUDENT SUPPORT AND ADVISING	45
CRITERION 5: PROCESS CONTROL	46
CRITERION 6: FACULTY	49
CRITERION 7: INSTITUTIONAL FACILITIES	50
CRITERION 8: INSTITUTIONAL SUPPORT	51
SUMMARY AND CONCLUSION	51

Introduction

The Department of Environmental Sciences established at PMAS-Arid Agriculture University Rawalpindi in May 2007 offers postgraduate degree programmes in the field of Environmental Sciences with research focus on climate change, carbon emission and sequestration, organic and inorganic pollution, and bioremediation of contaminated sites.

The postgraduate degree course at the Department of Environmental Sciences is designed to produce scientists with a sound theoretical knowledge of the basic sciences and practical knowledge of pollution control technologies. It helps them to recognize and comprehend the threats and conflicts in the environment today, appreciate the steps required to develop solutions and enable them to address the issues at local or global level in an effective manner.

The Master of Philosophy (M. Phil) in the environmental sciences is a two year degree program with research work leading students to their interest with additional training through seminars, workshops and national or international conferences. Field visits and study trips are also arranged frequently to strengthen student's practical knowledge and to open new research horizons.

The focus of degree programmes is to equip students for careers in the vast range of environmental professions, particularly in areas related to environmental protection and management. Furthermore, curriculum for various degrees in Environmental Sciences has been developed according to the national and international requirements in order to train students for better environmental management, considering the strong inter-relationship between sustainable economic development and environmental protection

A degree holder from this department would be able to understand contemporary issues in environmental management, knowledge of the interactions between processes operating in the physical environment and ecosystems, together with an awareness of the legislative and ethical frame work within which environmental scientists operate.

To improve and ensure high quality standard of education self-assessment report (SAR) is prepared on Higher Education Commissions (HEC) outlined framework consisting of eight criteria.

Criterion 1

PROGRAM MISSION, OBJECTIVES AND OUTCOMES

This section describes criteria 1 and its associated standards.

Standard 1-1: The program must have documented measurable objectives that support Faculty / College and institution mission statements.

Mission Statement

The mission of M.Phil programme Department of Environmental Sciences is to provide quality education and train manpower through innovative research for the management sustainability of environment.

Objectives

- 1) Assist individuals and groups in society to acquire a greater sensitivity and awareness of the environment in general and of its problems through effective teaching and state of the art curriculum designing for Environmental Science.
- 2) Assisting the students to acquire a basic comprehension of the environment in its totality and of its problems by adapting more sustainable practices in our local community, state and throughout the world.
- 3) Building capacity of students to accomplish research on emerging challenges in the field of environmental science.
- 4) Assist students and groups in society to develop their sense of responsibility and take note of the urgent need to pay attention to environmental problems in order to ensure that they adopt adequate measures in this respect. In students' training through research for protecting precious environments.

Main elements of strategic plan to achieve mission and objectives

- ❖ Teaching program efficacy development for degree awards
- ❖ Up gradation of current Curriculum designe with proposition of new courses with the addition of field trips, collaborative research work and holding national or international conferences
- ❖ Publication of research papers and book chapters in international journals and books
- ❖ Participation and presentation in national or international conferences/Seminars/Workshops
- ❖ Encourage cross-disciplinary collaboration to find new and creative solutions to environmental problems.

Table.1.1. Program Objectives assessment

S. N	Objectives	How measured	When measured	Improvement identified	Improvement made
1	Development of effective teaching and improved curriculum designing for Environmental Science	By evaluating student's response and feedback. The curriculum is revised each year as per HEC guidelines and keeping in view curriculum of other universities.	Teaching methods at the end of each semester while curriculum at the end of each year.	Recent teaching aids and methods need to be incorporated. Courses of applied nature and related to most critical issues of Pakistan need further emphasis	A thorough revision has been made in teaching methods and now recent trends including presentations, assignments and discussion are adopted. New and recent aspects are included in already existing scheme of study and some new courses related to energy crisis, renewable energy and conservation are
2	Grooming of students for environment protection	Crucial environmental issues are discussed and presentations are prepared by the students. Conferences and workshops are also organized by the department almost every year	It is done in each semester and participation in conferences etc is observed at the end of each year.	Students and faculty must be encouraged to participate in national and international conferences to present their research work.	Students are strongly encouraged to participate in the conferences. Several initiatives were taken to indulge students in seminar, workshops in which responsibility was given to them. At the end of each year, a review is made in the presence of all faculty members, PhD and MPhil students and a strategy is discussed for the next year.
3	Capacity building of students for research	Through evaluation of thesis and research	Upon completion of research work and at the time of viva / thesis defense.	Some students need improvement in planning a research proposal based on current problems and present their work at national/ international level.	Research topics related to current issues were assigned to the students.
4.	Enable the students to perform pollution assessment inquiries and develop innovative strategies through	All the students present their synopsis in class	At the end of first semester or start of second semester	Students need to consult literature and they must plan their work on applied aspect and submit a paper at the time of thesis submission.	Students were asked to write review on the topic related to their research.

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

Program Learning Outcomes

All the students of Environmental sciences should possess following abilities after graduating

1. Self-discipline and presentation skills
2. Identification and monitoring of environmental hazards
3. Planning and execution of environmental impact and risk assessment programs
4. Research planning, project proposition skills and research publication skills

Table 1.2: Program outcomes and their relationship with objectives

Outcomes	Objectives			
	1	2	3	4
1	+++	++	++	++
2	++	+++	++	+
3	+++	+++	++	+++
4	+++	++	++	+++

+ = Moderately satisfactory ++ = Satisfactory +++ = Highly satisfactory

Program Assessment Results:

Teacher's evaluation

There are ten teachers in the department namely:

1. Prof. Dr. Tariq Mahmood Professor
2. Dr. Azeem Khalid Associate Professor
3. Dr. Audil Rashid Assistant Professor
4. Dr. Shahid Mahmood Assistant Professor
5. Dr. Tahir Mahmood Assistant professor
6. Ms. Beenish Saba Lecturer
7. Ms. Aniq Batool Lecturer

8. Ms. Waqar un Nisa Lecturer
 9. Mr. Luqman Riaz Lecturer
 10. Mr. Khurram Saeed Lecturer

Table 1: Courses offered and evaluated during spring semester 2013 (M. Phil 2nd)

S. No.	Course Code	Course title	Name of instructor
1	ENV-705	Environmental analytical techniques	Dr. Azeem Khalid
2	ENV-716	Global environmental changes	Dr. Audil Rashid
3	ENV-718	Toxic Organics and Trace Metals in Ecosystem	Dr. Tahir Hayat
4	ENV-719	Special Problem	Respective Supervisor
5	ENV-720	Seminar II	Dr. Tariq Mahmood
6	ENV-723	Physicochemical processes for waste water	Ms. Beenish Saba

Table 2: Courses offered and evaluated during spring semester 2013 (M. Phil 4th).

S. No.	Course Code	Course title	Name of instructor
1	ENV-799	Research and Thesis	Respective Supervisor

Table 3: Courses offered and evaluated during fall semester 2012-13 (M. Phil 1st)

S. No	Course code	Course title	Name of instructor
1	ENV-704	Research planning and report writing	Dr. Tariq Mahmood
2	ENV-711	Agriculture pollution management	Dr. Shahid Mahmood
3	ENV-703	Environmental microbiology	Dr. Shahid Mahmood
4	ENV-726	Environmental biotechnology	Dr. Azeem Khalid

Table 4: Courses offered and evaluated during fall semester 2013 (M. Phil 3rd).

S. No.	Course Code	Course title	Name of instructor
1	ENV-711	Agriculture Pollution Management	Dr. Shahid Mahmood
2	ENV-719	Special problem	Respective Supervisor
3	ENV-720	Seminar 1	Dr. Azeem Khalid

Table 5: Courses offered and evaluated during spring semester 2014 (M. Phil 2nd).

S. No.	Course Code	Course title	Name of instructor
1	ENV-705	Environmental analytical techniques	Ms. Waqar-un-Nisa
2	ENV-709	Bioremediation of Environmental Contaminants	Dr. Shahid Mahmood
2	ENV-713	Climatology	Mr. Luqman Riaz
3	ENV-718	Toxic organics and trace metals in ecosystem	Dr. Azeem Khalid
4	ENV-719	Special problem	Respective Supervisor
5	ENV-727	Impact of natural disasters on global environment	Dr. Azeem Khalid

Table 6: Courses offered and evaluated during spring semester 2014 (M. Phil 4th).

S. No.	Course Code	Course title	Name of instructor
1	ENV-702	Environmental Chemistry	Mr. Khurram Saeed
2	ENV-799	Research and Thesis	Respective Supervisor

Teacher's Evaluation

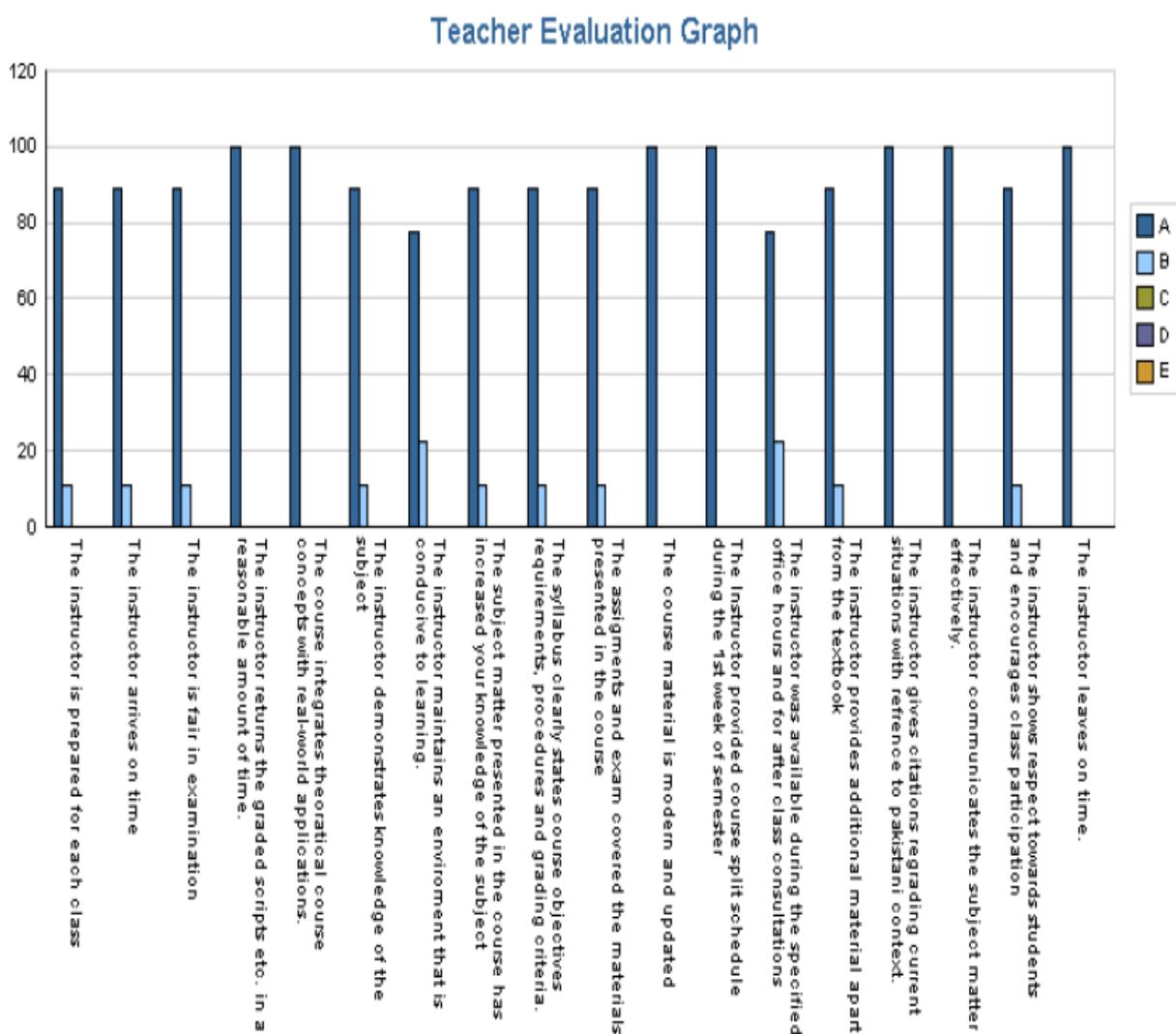
Performa 10

There were ten teachers in the Department numbered 1-10 and their names are mentioned in the above list. The teachers were evaluated by the students at the end of each semester in accordance with Performa 10.

Dr. Azeem Khalid (ENV-705)

80 % of the students reported that the Course was well structured to achieve the learning outcomes (there was a good balance of lectures, tutorials, practical etc.). 100 % of the students were strongly agreed that they made progress in the course. 100 % of the students reported that the course stimulated their interest and thought on the subject area.

Course Title: Environmental Analytical Techniques



A: Strongly Agree, B: Agree, C: Uncertain, D: Disagree, E: Strongly Disagree

General Comments of the Students about this Course

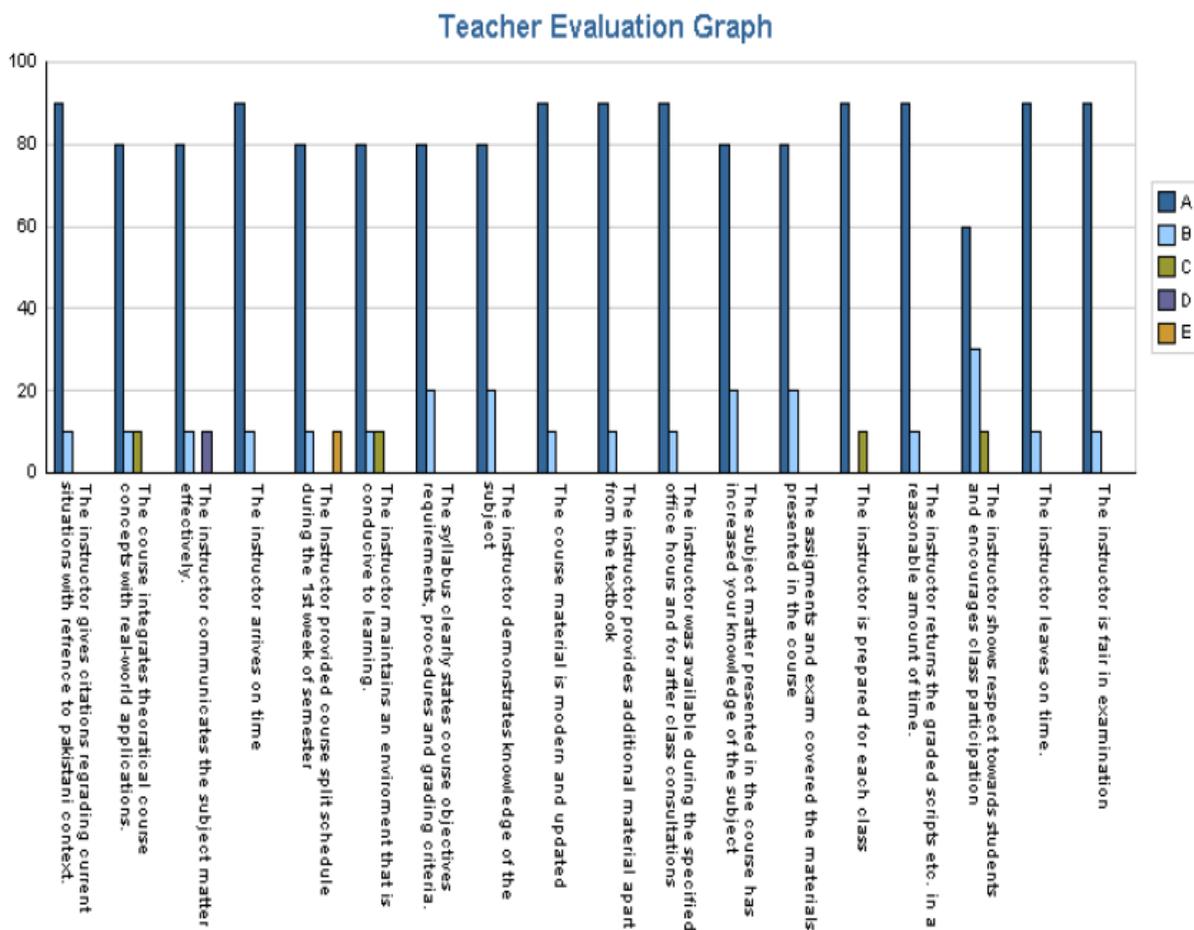
Strength:

- Ideas and concepts were presented clearly.
- Course contents were up-to-date.
- The method of assessment was reasonable.

Dr. Audil Rashid (ENV-716)

Students were satisfied with the behavior and performance of the instructor. More than 70% of the students reported the preparedness of teacher for class. Similarly 80 % students reported that the instructor was fair in examination.

Course Title: Global Environmental Changes



A: Strongly Agree B: Agree C: Uncertain D: Disagree E: Strongly Disagree

General Comments of the Students about this Teacher

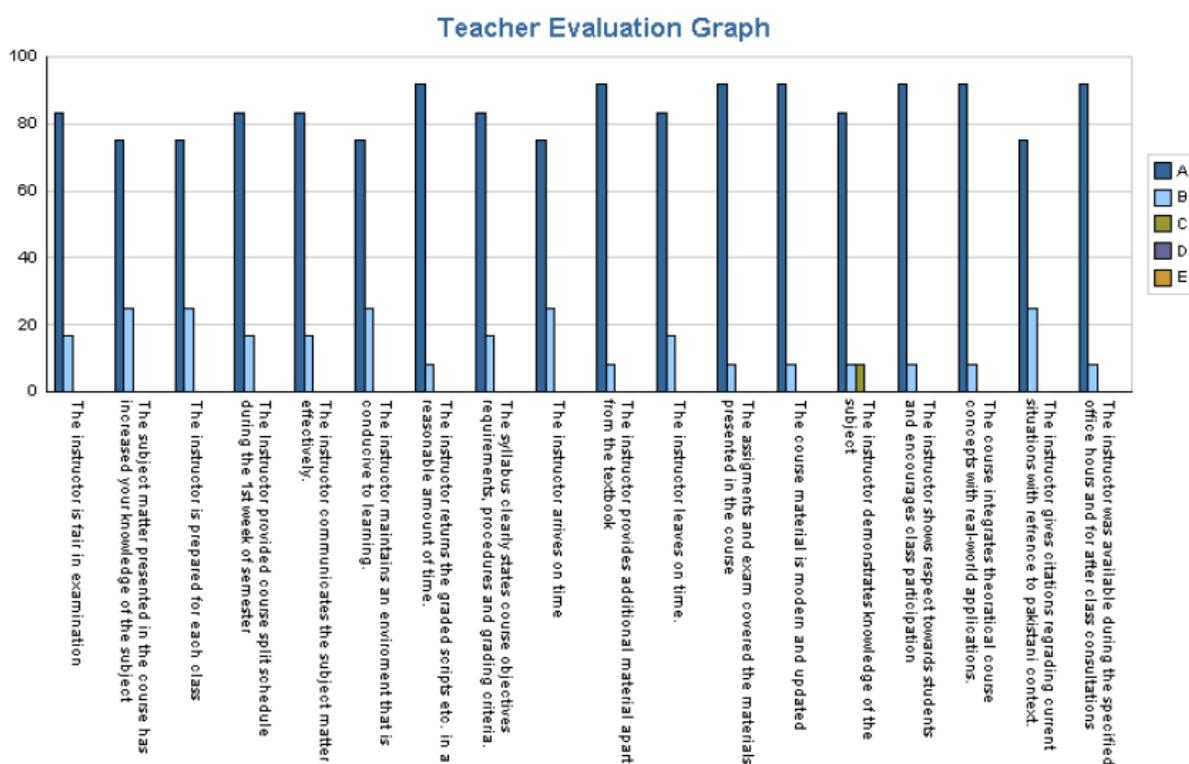
Weaknesses: The instructor was unable to provide the course schedule in the first week of the semester.

Strengths: Teacher was able to teach the course in a good manner, with all attributes of preparation, communication skill, participation, including modern concepts, punctuality and behaviour, etc.

Dr. Tahir Hayat (ENV-718)

Students were satisfied with the course contents and communication skills of the teacher. More than 70 % students reported preparedness of the teacher for lecture. More than 75 % of the students reported that the teacher arrives on time and left on time.

Course Title: Toxic organics and trace metals in ecosystem



A: Strongly Agree B: Agree C: Uncertain D: Disagree E: Strongly Disagree

General Comments of the Students about this Teacher

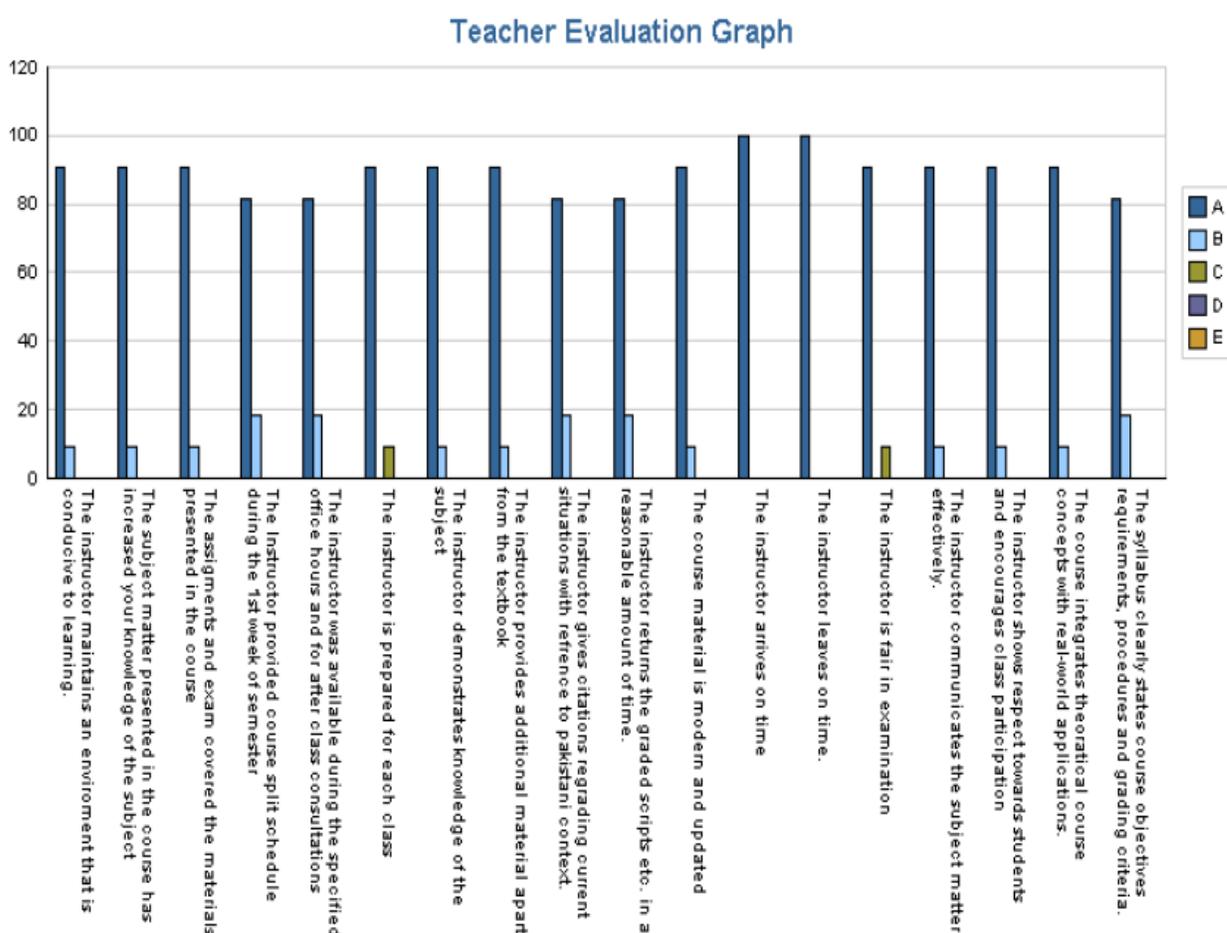
Weaknesses: The student did not indicate any weakness of the teacher.

Strengths: Teacher was able to teach the course in a good manner, with all attributes of preparation, communication skill, participation, including modern concepts, punctuality and behavior, etc.

Ms. Beenish Saba (ENV-723)

Students were satisfied what madam taught during the whole course. More than 80 % students reported that teacher is fair in examination. Almost 90 % students agreed that the assignments and exams covered the materials presented during the whole course. 890 % students reported that course material is modern and updated.

Course Title: Physico-chemical processes for wastewater



A: Strongly Agree B: Agree C: Uncertain D: Disagree E: Strongly Disagree

General Comments of the Students about this Teacher

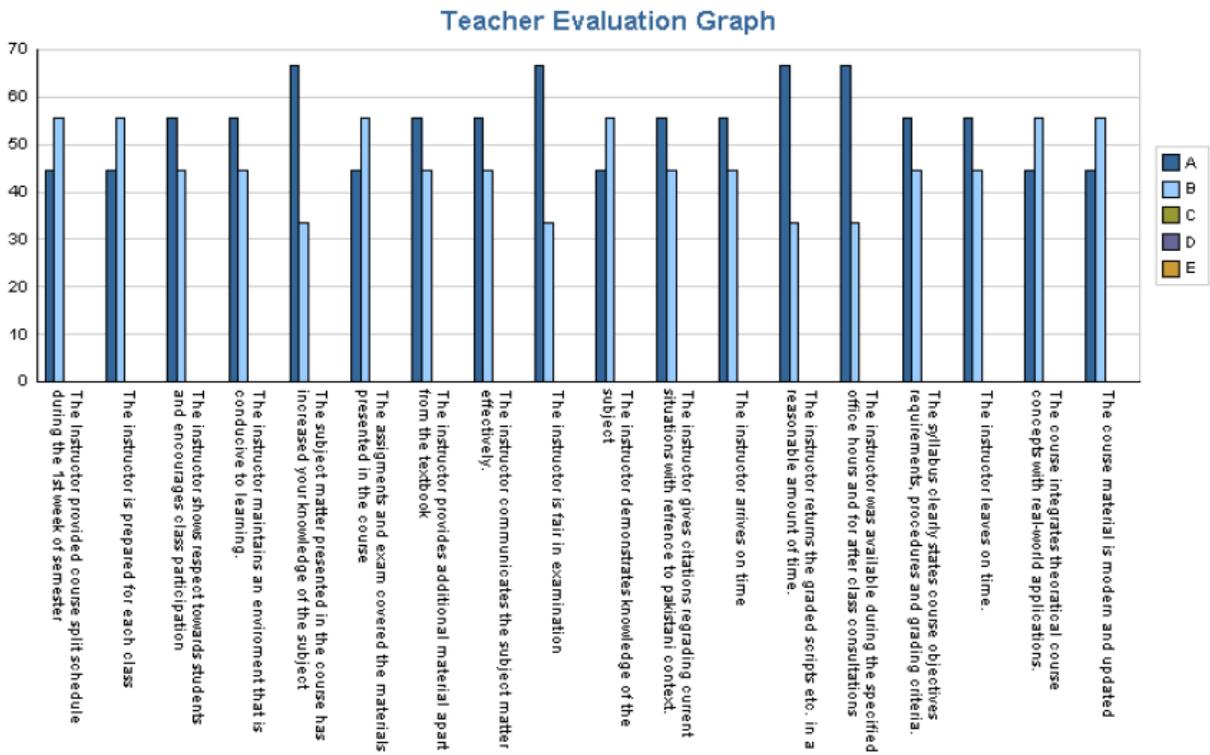
Weaknesses: No weakness was indicated by the students

Strengths: Teacher was able to teach this course in a good manner, with all elements of preparation, communication skill, participation, including modern concepts etc.

Dr. Tariq Mahmood (ENV-704)

Students were satisfied with the course contents and communication skills of the teacher. 66 % of the students responded that teacher was excellently prepared for the class. Excellent communication of subject, relevance of course to Pakistani contents, encouragement of students in class and class duration were placed excellent by 65% of the students.

Course Title: Research Planning and Report Writing



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Return of assignments was not timely

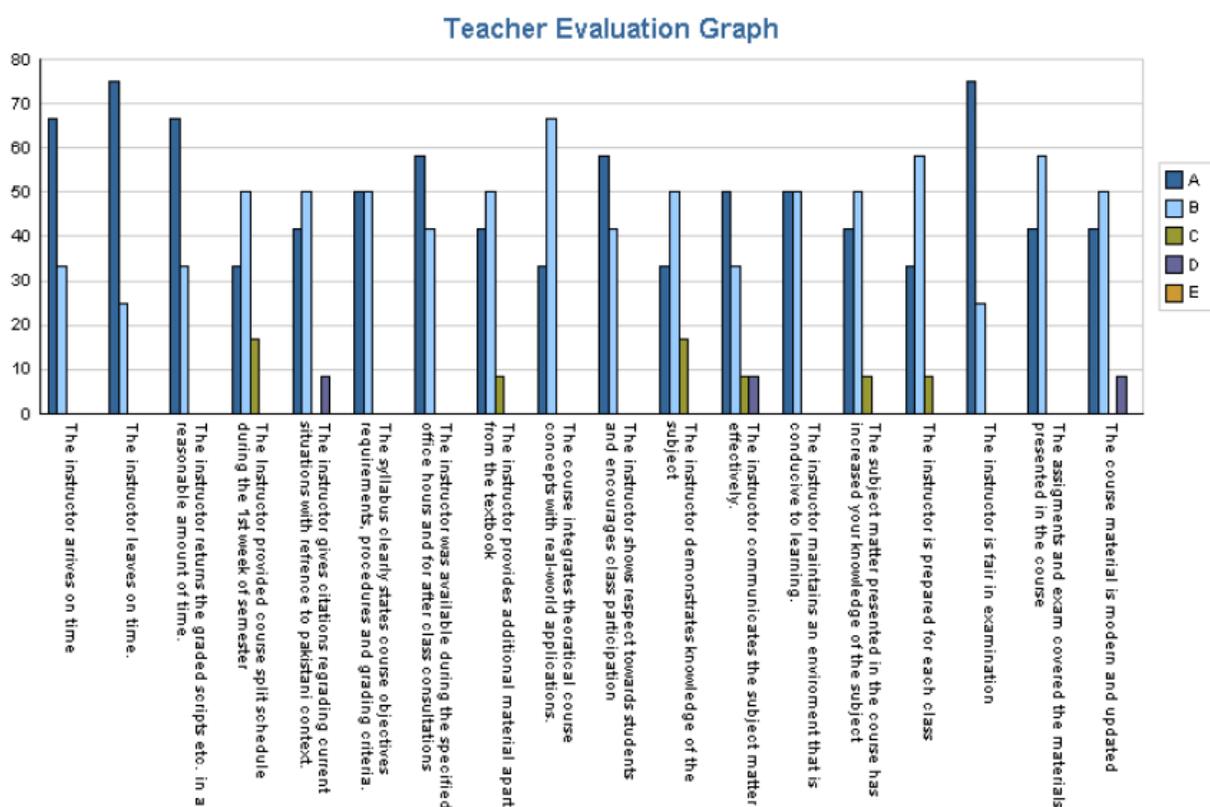
Strengths:

- Excellent communication skills
- Course activities are interesting

Dr. Shahid Mahmood (ENV-711)

Students were satisfied what teacher taught in the class. Instructor was fair in examination is reported by 75 % of the students. According to 75 % of students, instructor arrived and left the class on time. 65 % of the students agreed that course met the needs of real world knowledge.

Course Title: Agriculture Pollution Management



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Return of assignments was not timely

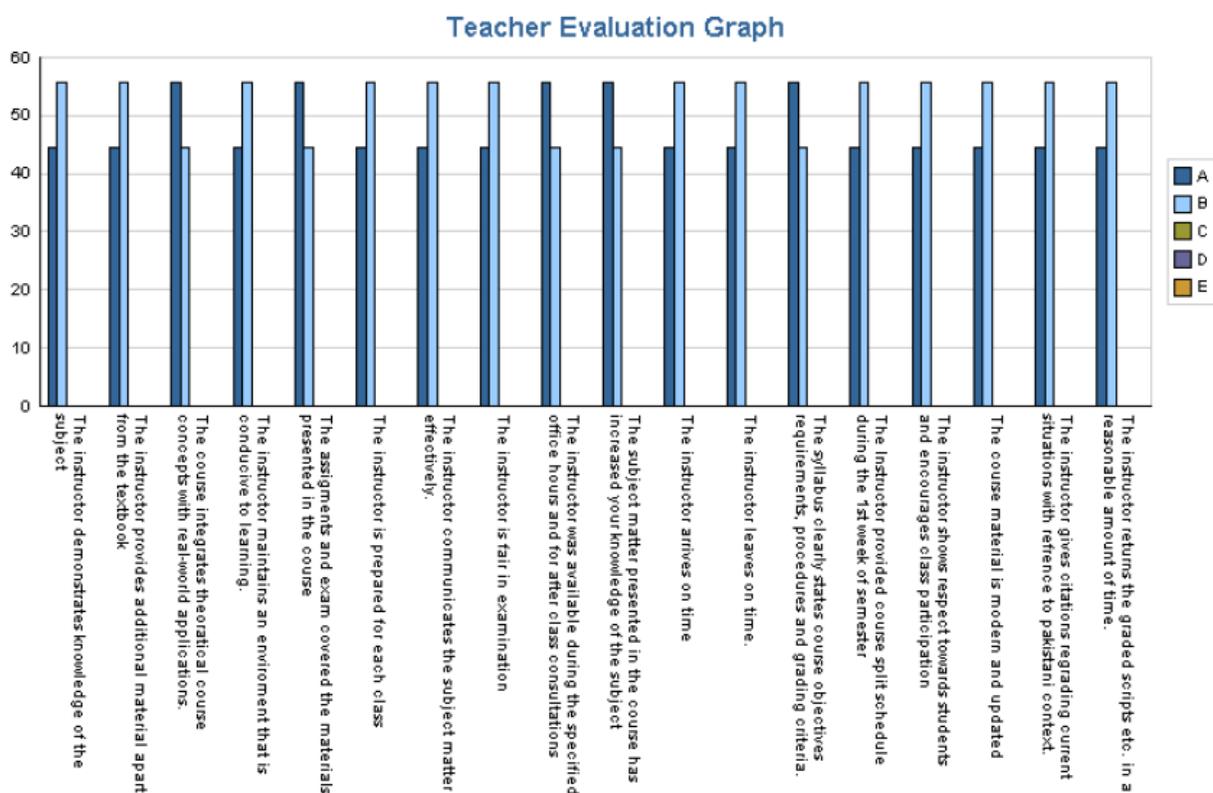
Strengths:

- Excellent communication skills
- Course activities were interesting

Dr. Shahid Mahmood (ENV-703)

55 % of students were strongly agreed that the syllabus clearly states course objectives and its requirements, procedures and grading criteria. 45 % of the students were agreed that instructor provides the additional material of learning except textbooks.

Course Title: Environmental Microbiology



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

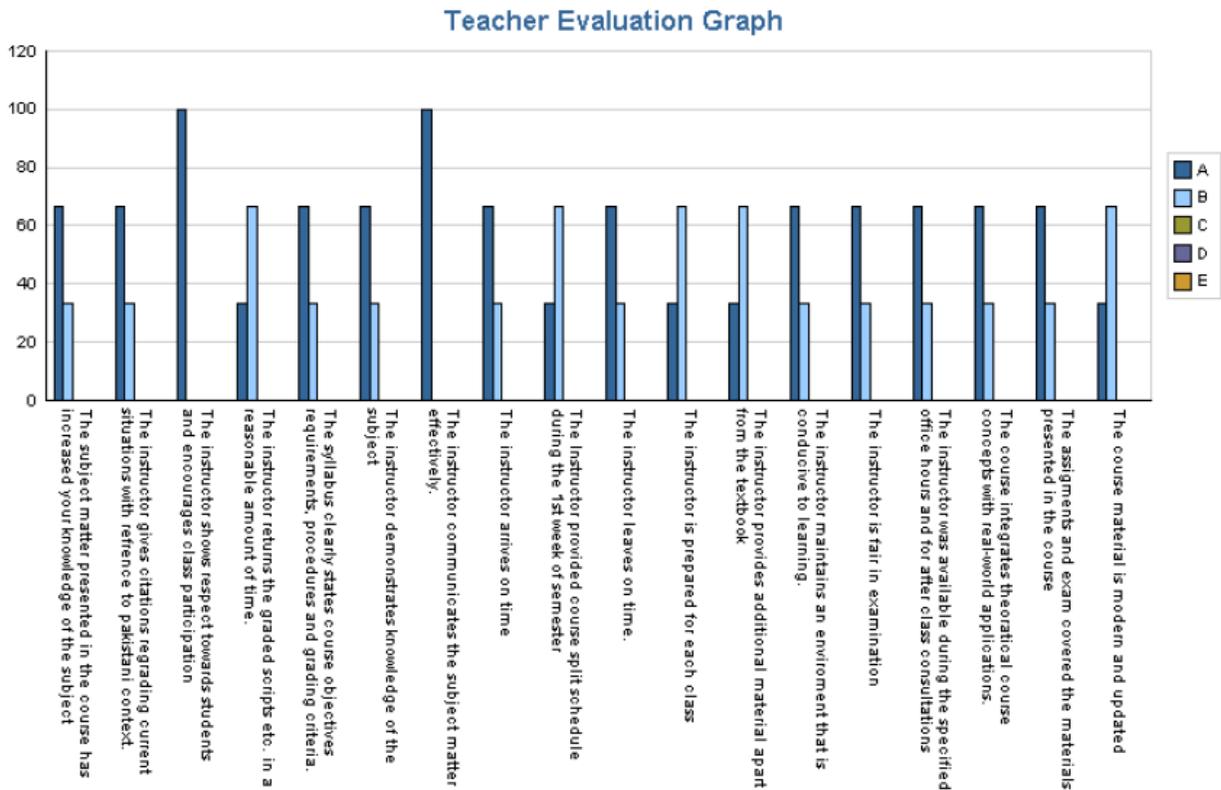
Strengths:

- Course was well organized
- Relevant and informative course

Dr. Azeem Khalid (ENV-726)

Majority of the students response was excellent or in good category regarding to objectives, contents and organization of the course. Students were satisfied with the course and took part enthusiastically. The best responses were obtained in preparedness of the tutor for class as well as communication of subject matter was excellently categorized at 100 %.

Course title: Environmental Biotechnology



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher Weaknesses:

- Teacher should organize field visits of relevant industries and labs

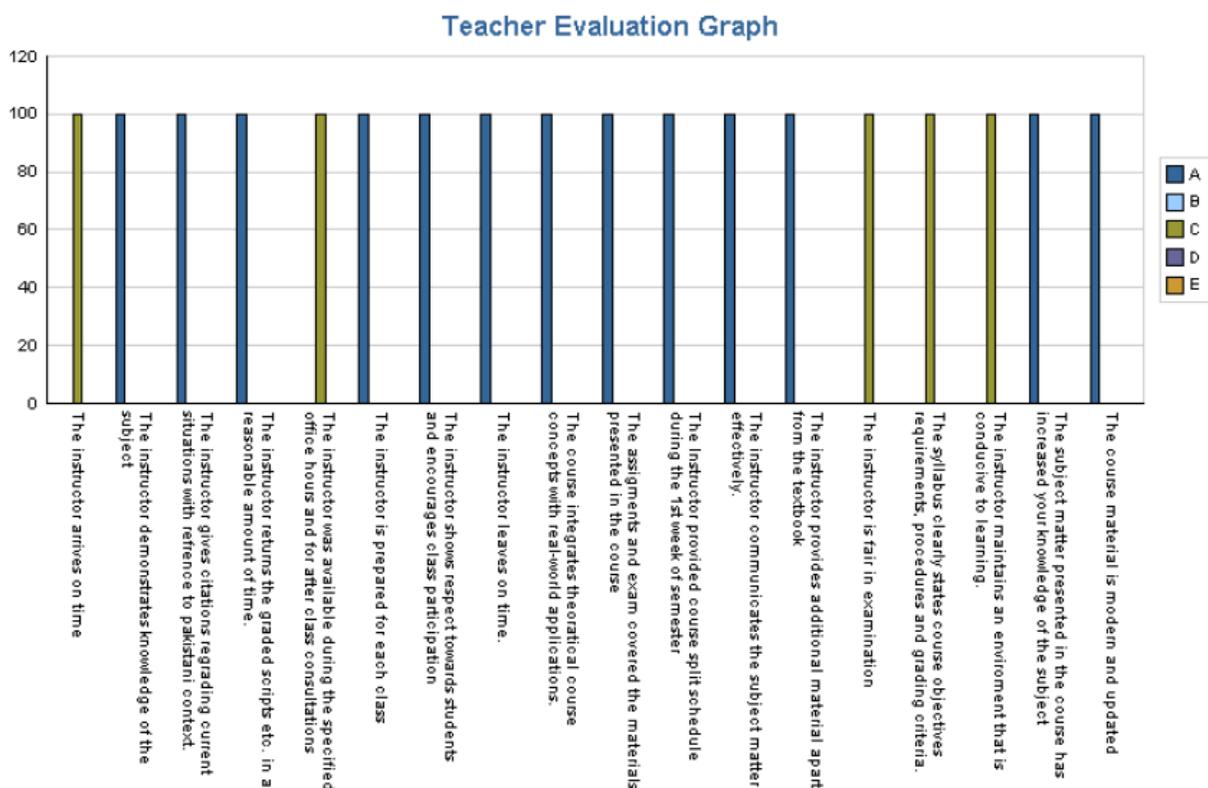
Strengths:

- Course was well organized
- Relevant and informative course

Dr. Shahid Mahmood (ENV-711)

100 % students reported that instructor provided additional information apart from the textbook. Assignments and exams covered the materials provided in the course was reported by 100 % of the students

Course Title: Agriculture Pollution Management



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

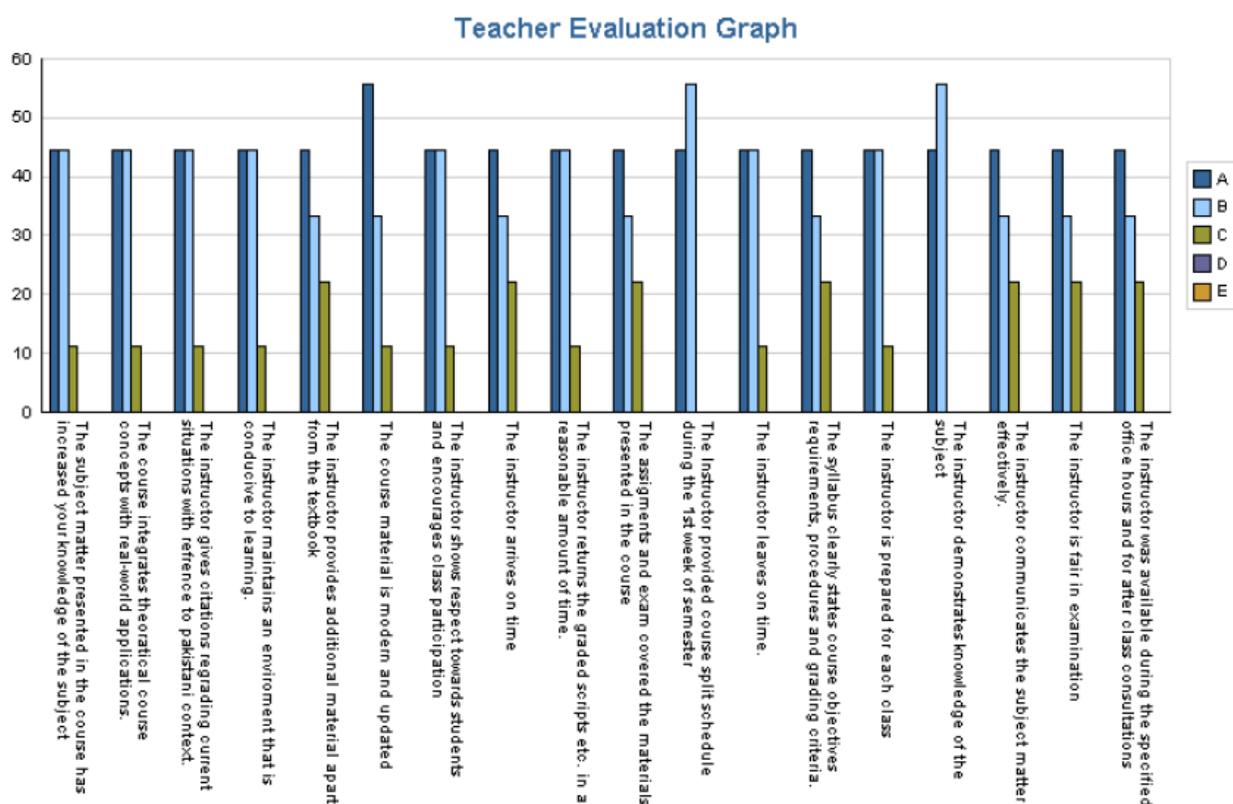
Strengths:

- Course was well organized
- Relevant and informative course

Ms. Waqar-un-Nisa (ENV- 705)

Forty five percent of the students indicated that instructor was available during office hours. Fifty five percent agreed that instructor was prepared for the class and communicated well according to the topic to be taught while 55 % of the students reported that course was modern and updated.

Course Title: Environmental Analytical Techniques



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits to different research labs

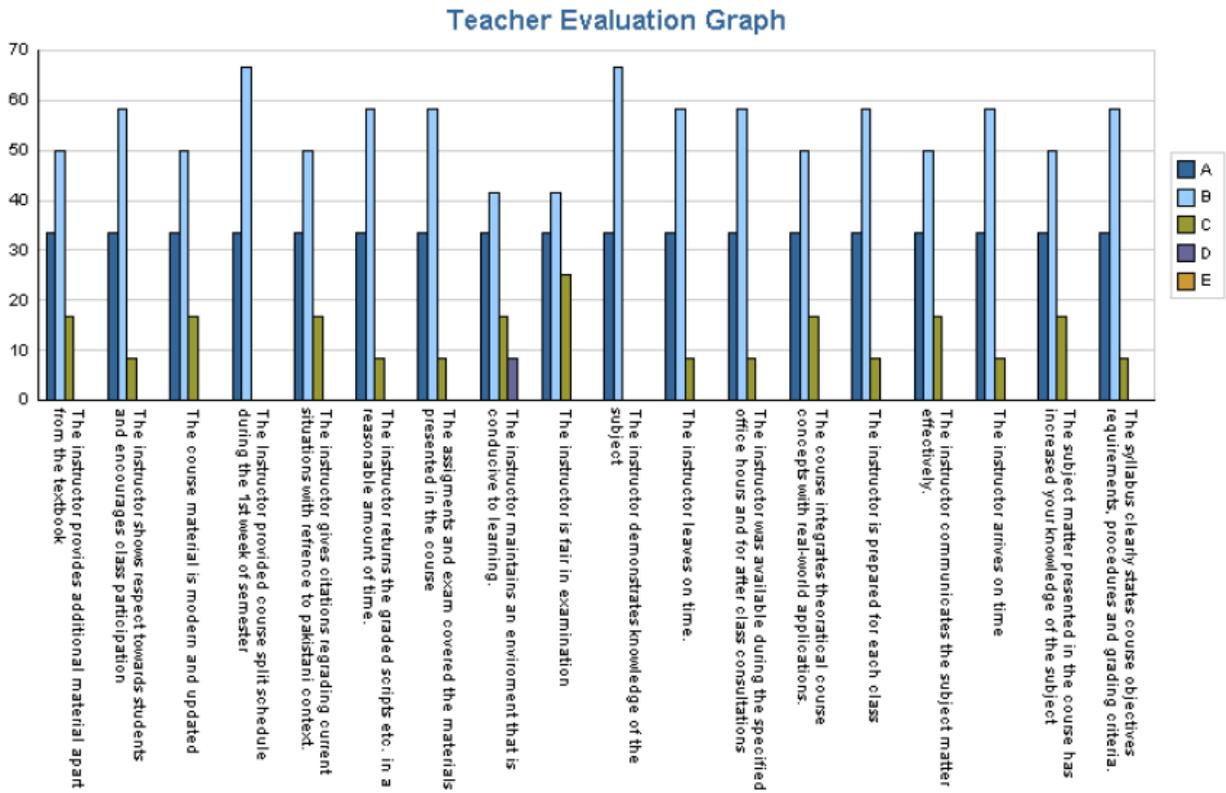
Strengths:

- Course was well organized
- Relevant and informative course

Dr. Shahid Mahmood (ENV-709)

According to the survey, 55 % of the students were agreed that instructor is prepared for each class. The instructor demonstrated knowledge of the subject very well was reported by the 65 % of the students

Course Title: Bioremediation of Environmental Contaminants



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

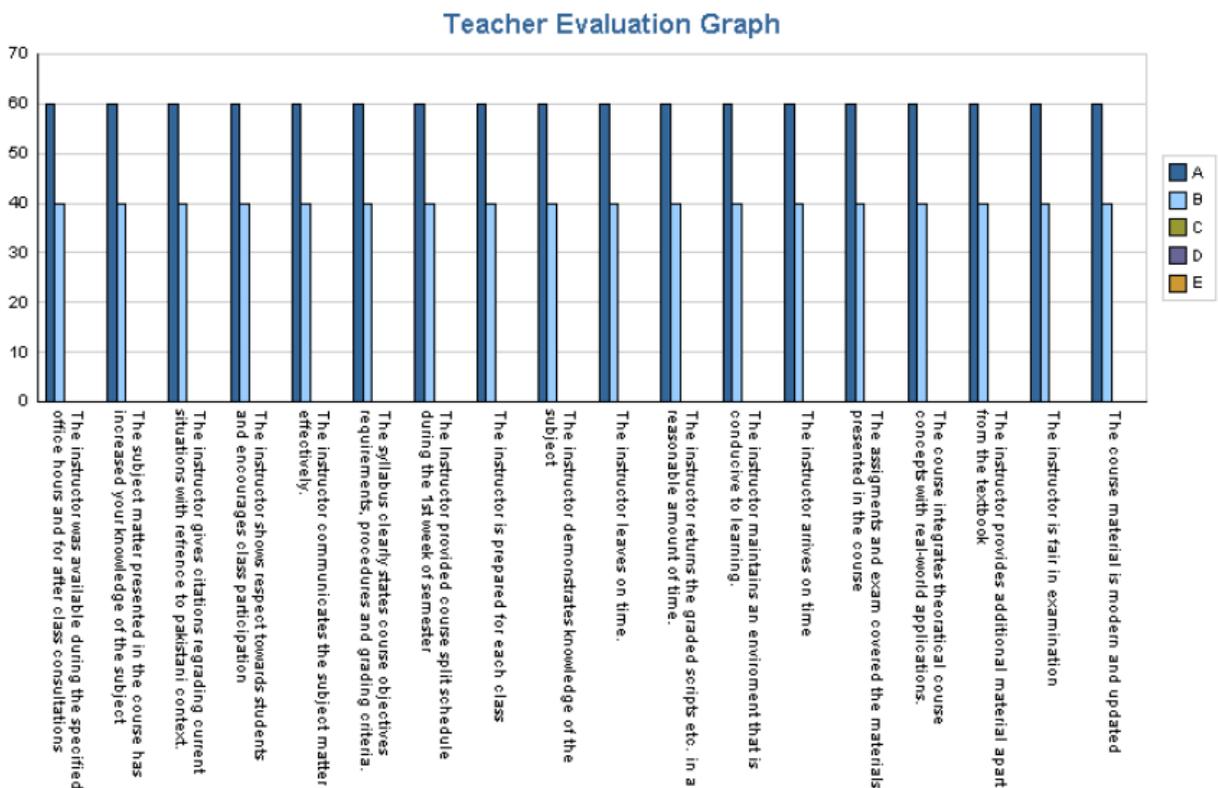
Strengths:

- Course was well organized
- Relevant and informative course

Mr. Luqman Riaz (ENV-713)

The instructor showed the respect towards students and encourage class participation was reported by 90 % of the students. Instructor joined the class on time and left on time was reported by 100 % of the students.

Course Title: Climatology



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

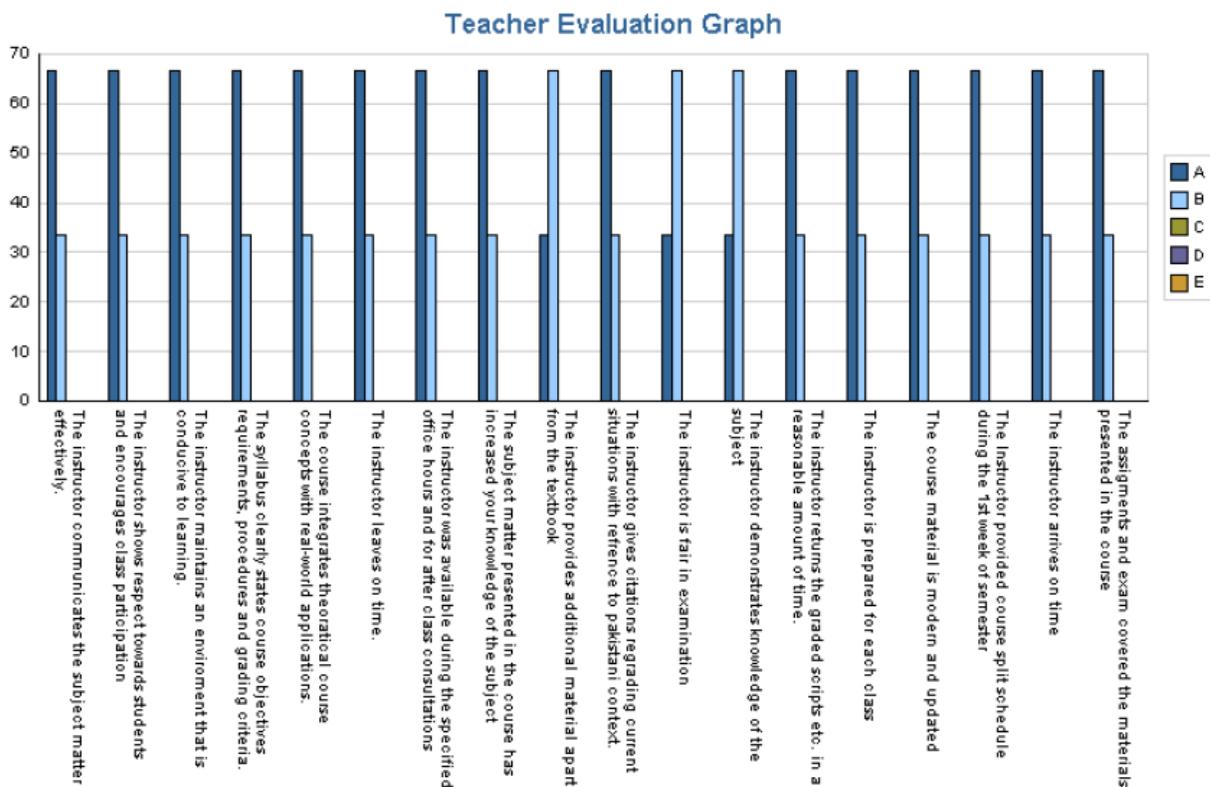
Strengths:

- Course was well organized
- Relevant and informative course

Dr. Azeem Khalid (ENV-718)

100 % of the students agreed that the course materiawas modern updated and increased their knowledge of the subject. They also reported that the instructor put emphasis on textbook as well as other sources of the information. Instructor came in time and left on time during the whole semester.

Course Title: Toxic Organics and Trace Metals in Ecosystem



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

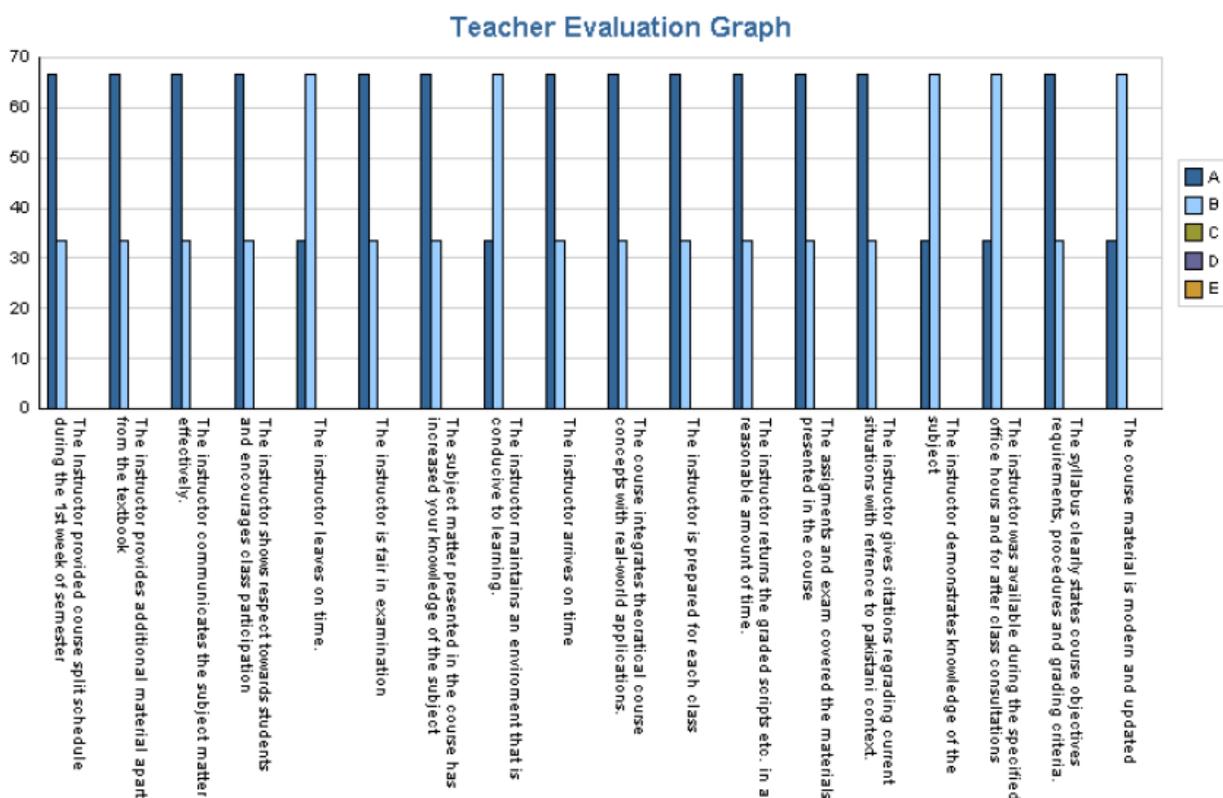
Strengths:

- Course was well organized
- Relevant and informative course

Dr. Azeem Khalid (ENV-727)

The instructor maintained learning environment and taught modern, updated and full of knowledge course material that helped in increasing the matter of subject along with the practical applications of the subject at international as well as national level was reported by 100 % of the students.

Course Title: Impact of Natural Disasters on Global Environment



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

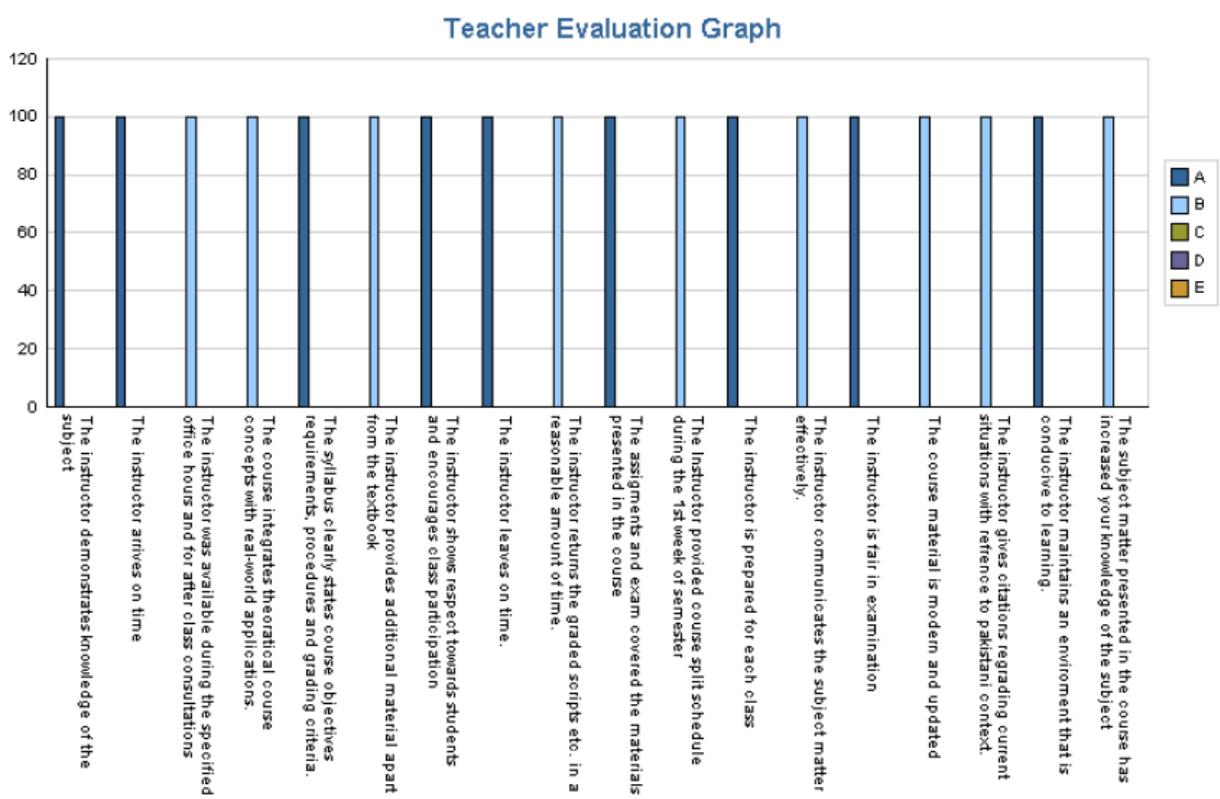
Strengths:

- Course was well organized
- Relevant and informative course

Mr. Khurram Saeed (ENV-702)

Hundred percent of the students agreed that the subject matter presented in the course increased their knowledge of the subject and the instructor maintained the environment of learning in the class during the whole semester that encouraged the students to learn hard about the subject and its applications around the world.

Course Title: Environmental Chemistry



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

Strengths:

- Course was well organized
- Relevant and informative course

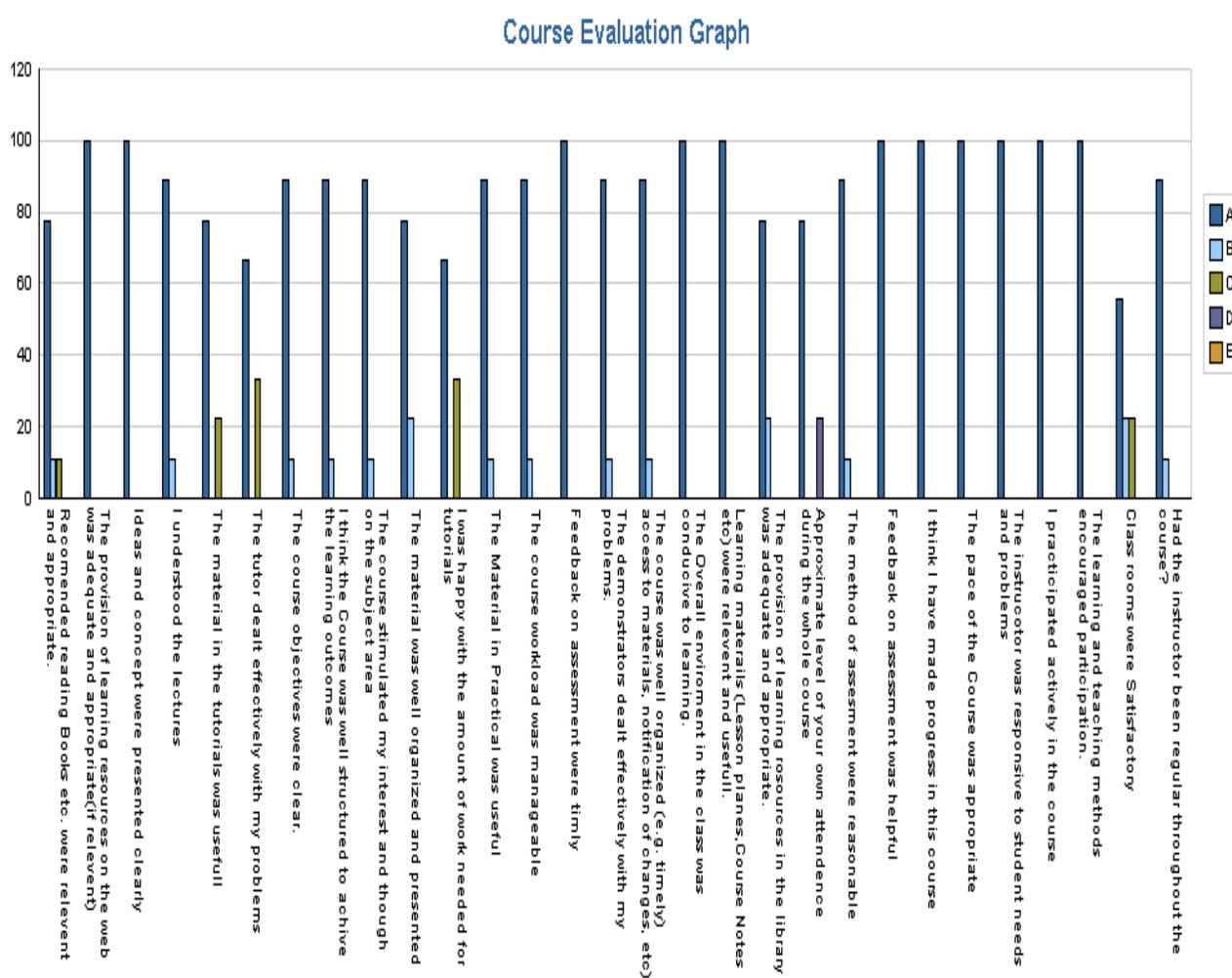
Course Evaluation

Performa 1

Dr. Azeem Khalid (ENV-705)

Eighty percent of the students reported that the course was well structured to achieve the learning outcomes (there was a good balance of lectures, tutorials, practical etc.). Hundred percent of the students strongly agreed that they have made progress in the course. 100 % of the students reported that the course stimulated their interest and thought on the subject area.

Course Title: Environmental Analytical Techniques



A: Strongly Agree, B: Agree, C: Uncertain, D: Disagree, E: Strongly Disagree

General Comments of the Students about this Course

Strength:

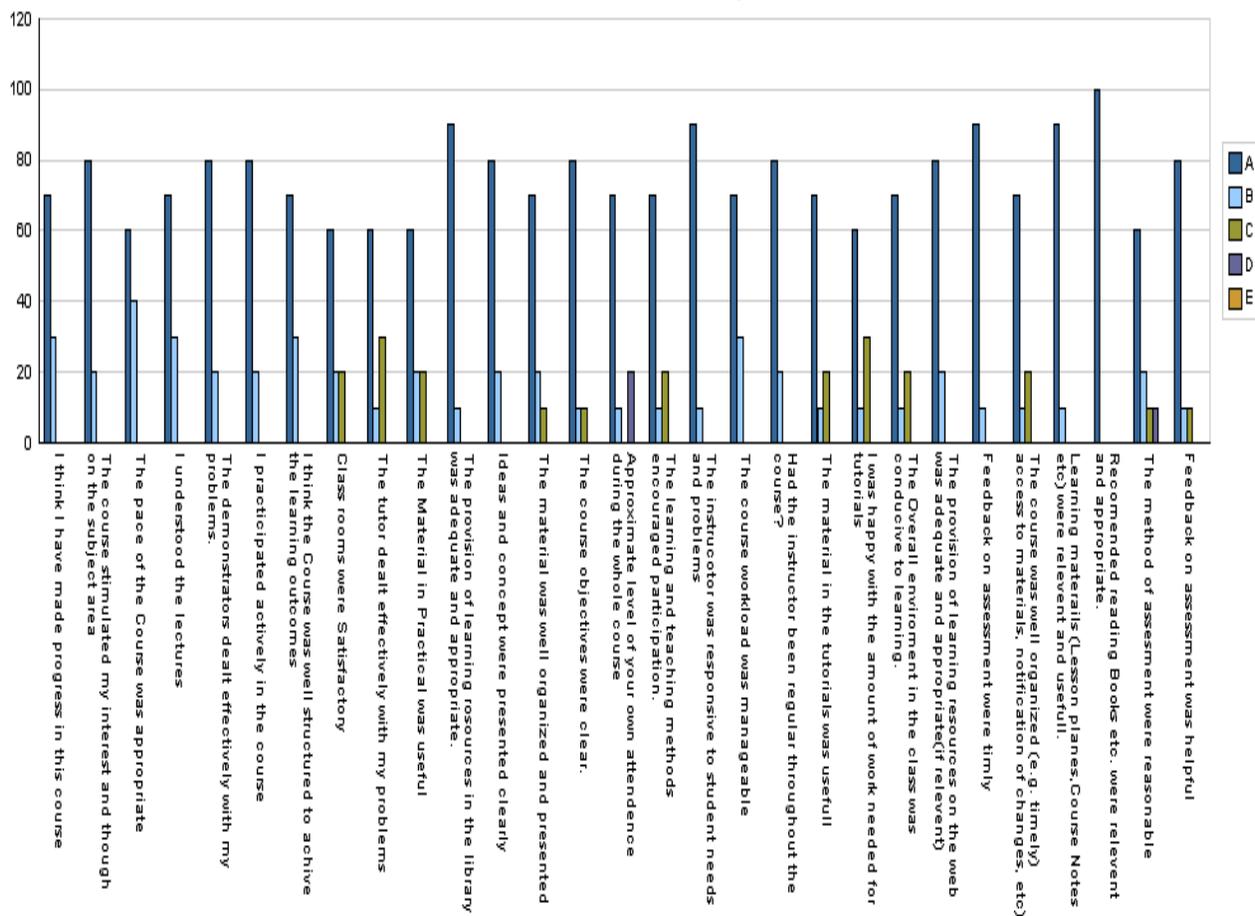
- Ideas and concepts were presented clearly.
- Course contents were up-to-date.
- The method of assessment was reasonable.

Dr. Audil Rashid (ENV-716)

Students were satisfied with the behavior and performance of the instructor. More than 70% of the students reported the preparedness of teacher for class. Similarly 80 % students reported that the instructor was fair in examination.

Course Title: Global Environmental Changes

Course Evaluation Graph



A: Strongly Agree B: Agree C: Uncertain D: Disagree E: Strongly Disagree

General Comments of the Students about this Teacher

Weaknesses: The instructor was unable to provide the course schedule in the first week of the semester.

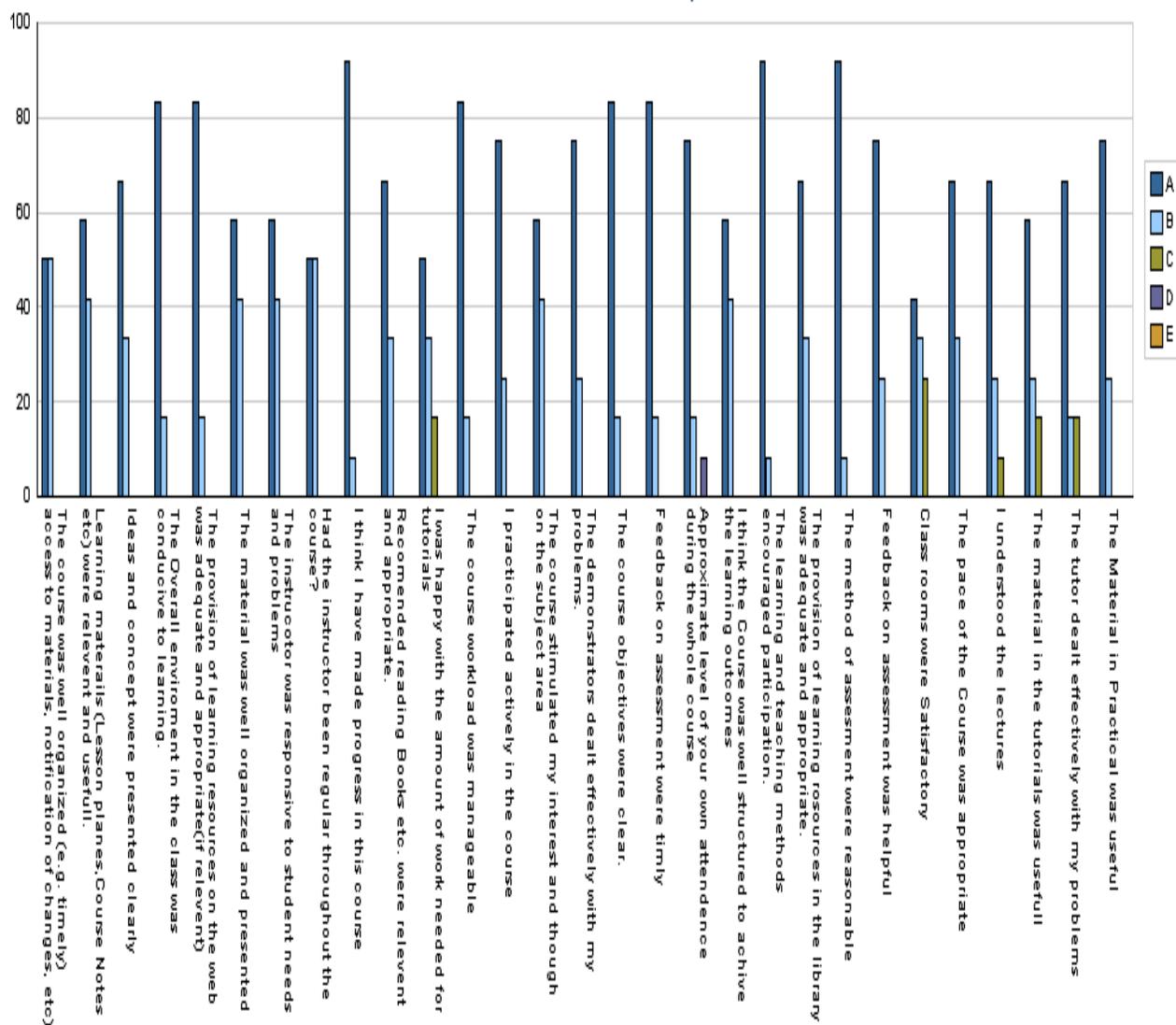
Strengths: Teacher was able to teach the course in a good manner, with all attributes of preparation, communication skill, participation, punctuality and behavior, including modern concepts etc.

Dr. Tahir Hayat (ENV-718)

Students were satisfied with the course contents and communication skills of the teacher. More than 70 % students reported preparedness of the teacher for lecture. More than 75 % of the students reported that the teacher arrives on time and left on time.

Course Title: Toxic organics and trace metals in ecosystem

Course Evaluation Graph



A: Strongly Agree B: Agree C: Uncertain D: Disagree E: Strongly Disagree

General Comments of the Students about this Teacher

Weaknesses: The student did not indicate any weakness of the teacher.

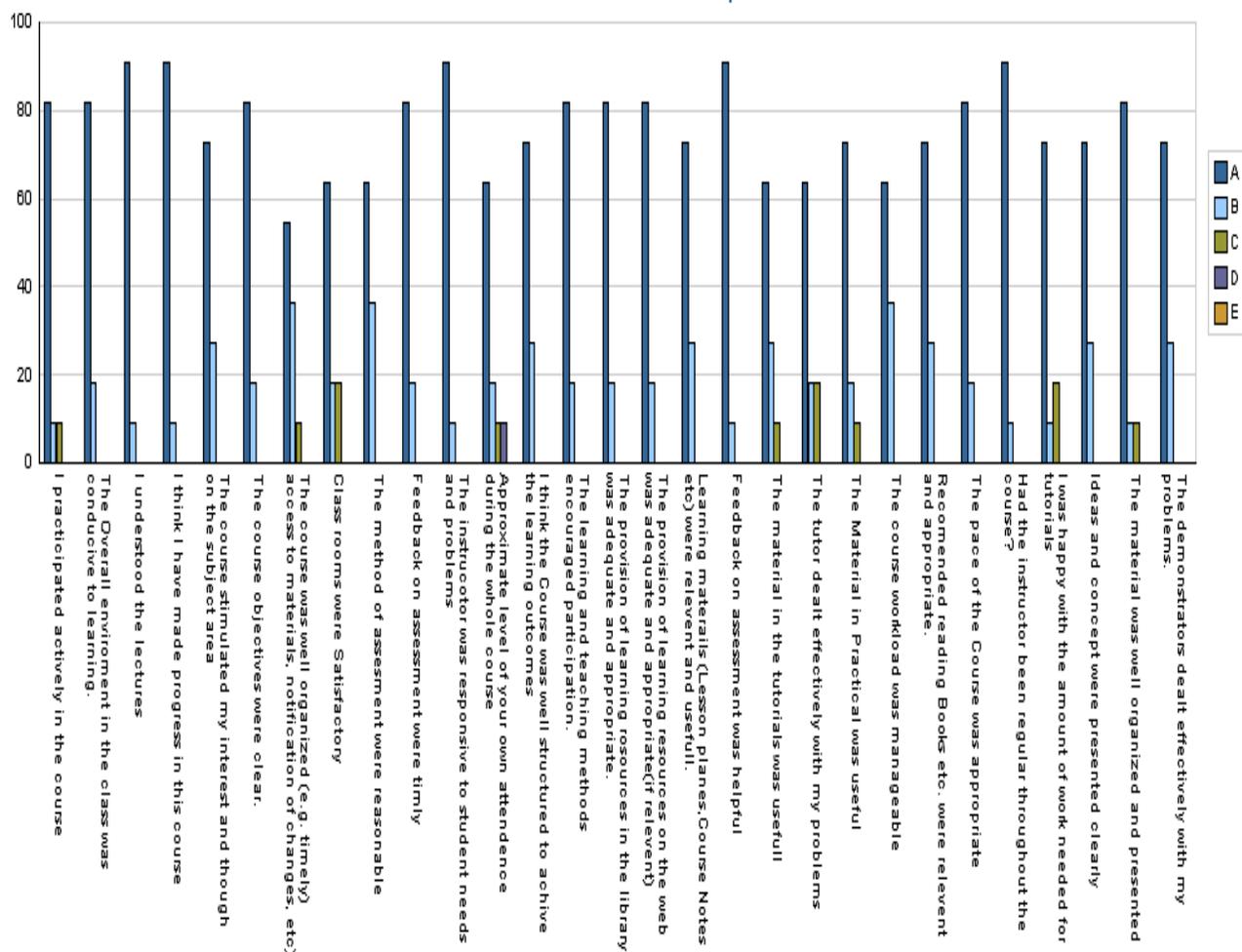
Strengths: Teacher was able to teach this course in a good manner, with all attributes of preparation, communication skill, participation, including modern concepts, punctuality and behavior, etc.

Ms. Beenish Saba (ENV-723)

Students were satisfied what madam taught during the whole course. More than 80 % students reported that teacher is fair in examination. Almost 90 % students agreed that the assignments and exams covered the materials presented during the whole course. 890 % students reported that course material is modern and updated.

Course Title: Physico-chemical processes for wastewater

Course Evaluation Graph



A: Strongly Agree B: Agree C: Uncertain D: Disagree E: Strongly Disagree

General Comments of the Students about this Teacher

Weaknesses: The student did not indicate any weakness of the teacher.

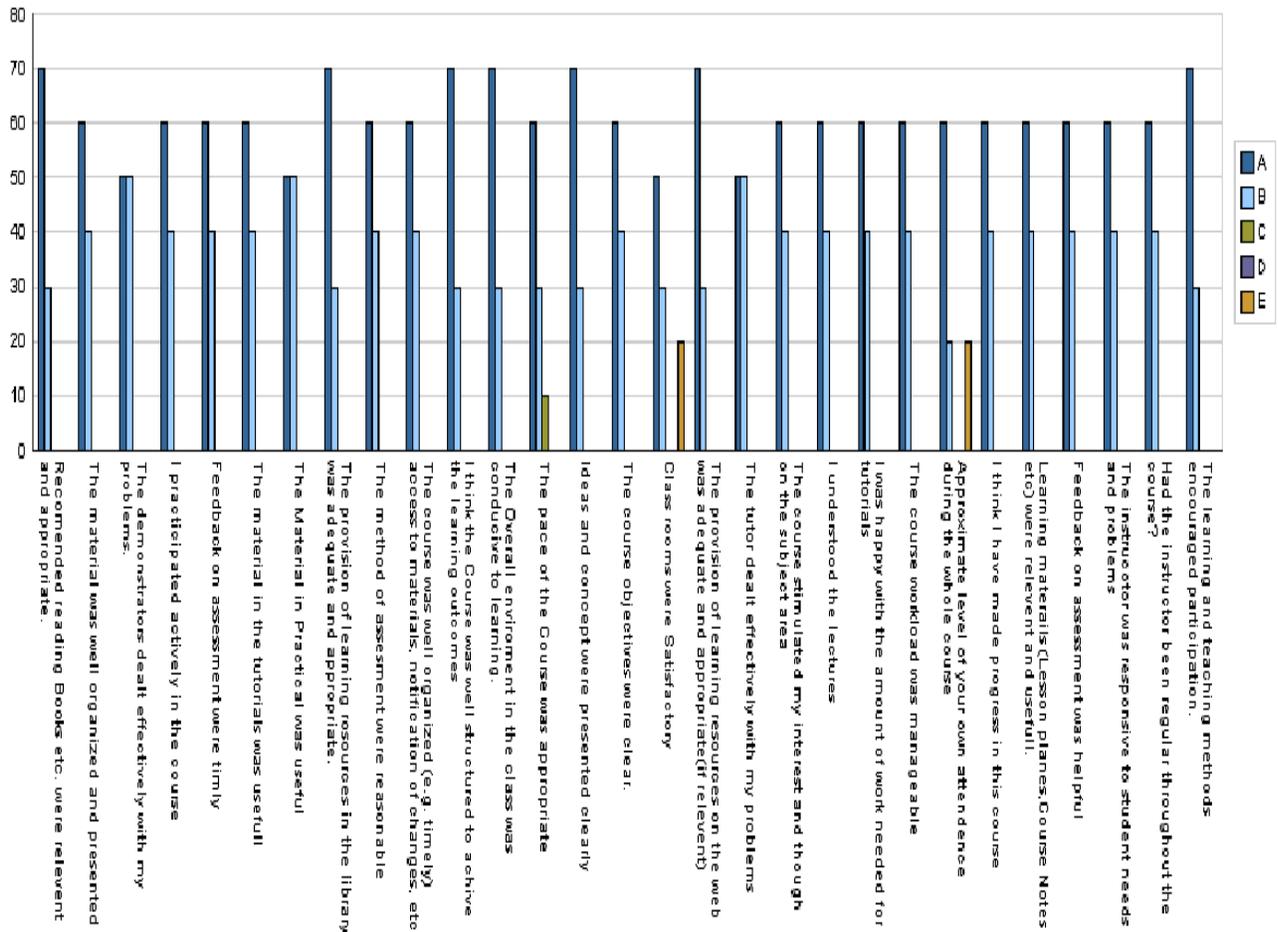
Strengths: Teacher was able to teach this course in a good manner, with all attributes of preparation, communication skill, participation, including modern concepts, punctuality and behavior, etc.

Dr. Tariq Mahmood (ENV-704)

Students were satisfied with the course contents and communication skills of the teacher. 66 % of the students responded that teacher was excellently prepared for the class. Excellent communication of subject, relevance of course to Pakistani contents, encouragement of students in class and class duration were placed excellent by 65% of the students.

Course Title: Research Planning and Report Writing

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Return of assignments was not timely

Strengths:

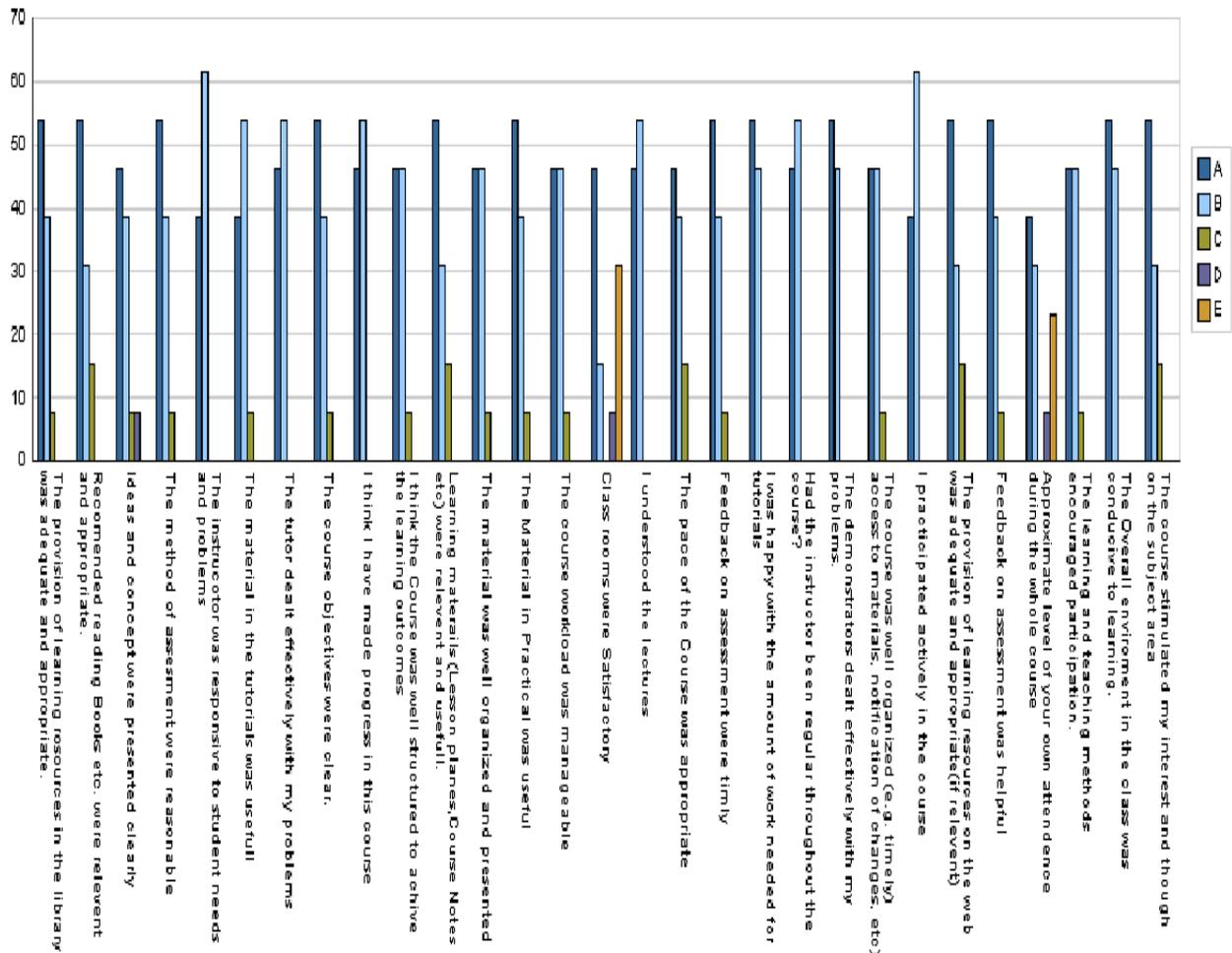
- Excellent communication skills
- Course activities are interesting

Dr. Shahid Mahmood (ENV-711)

Students were satisfied what teacher taught in the class. Instructor is fair in examination is reported by 75 % of the students. According to 75 % of students, instructor arrives and leaves the class on time. 65 % os students are agreed that course meets the needs of real world knowledge.

Course Title: Agriculture Pollution Management

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Return of assignments was not timely

Strengths:

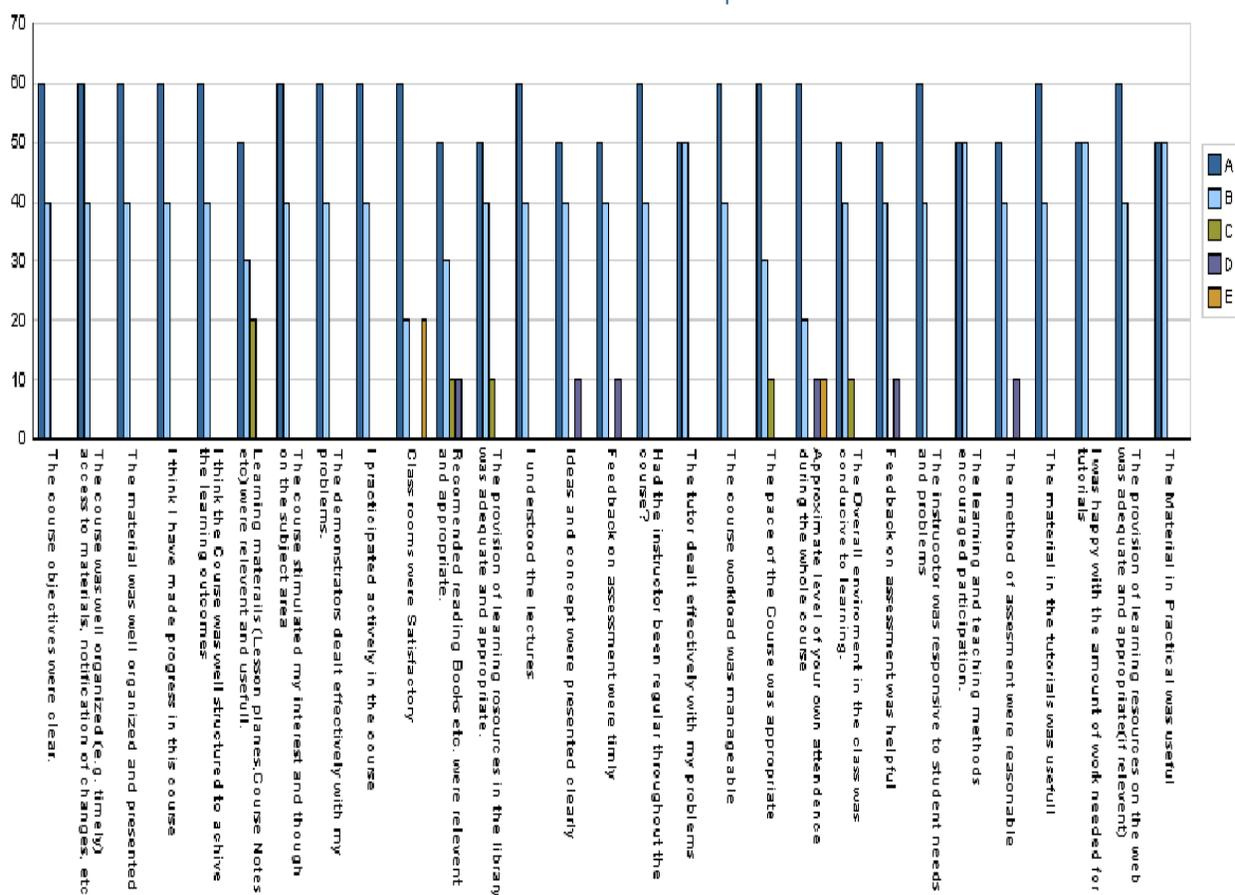
- Excellent communication skills
- Course activities are interesting

Dr. Shahid Mahmood (ENV-703)

55 % of students were strongly agreed that the syllabus clearly states course objectives and its requirements, procedures and grading criteria. 45 % of the students were agreed that instructor provides the additional material of learning except textbooks.

Course Title: Environmental Microbiology

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher Weaknesses:

- Teacher should organize field visits

Strengths:

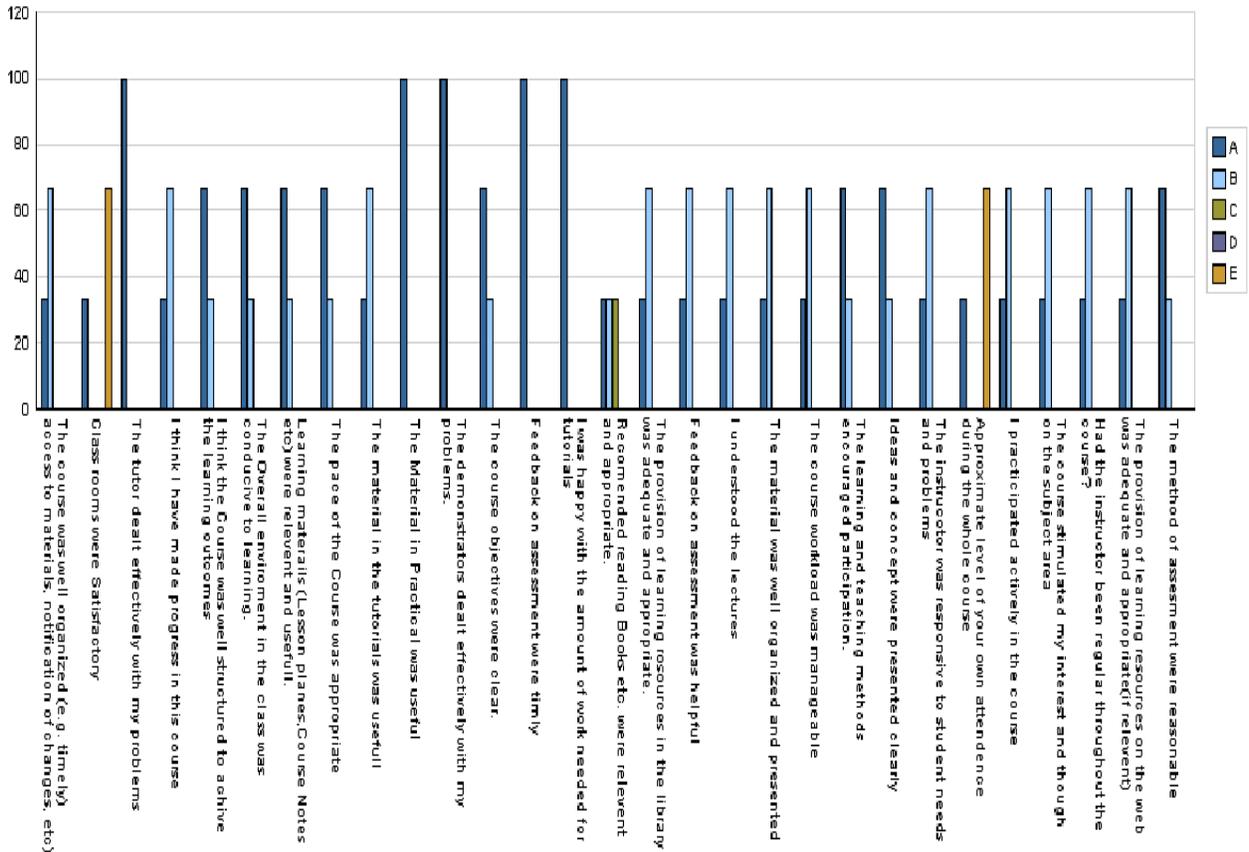
- Course was well organized
- Relevant and informative course

Dr. Azeem Khalid (ENV-726)

Majority of the students response was excellent or in good category regarding to objectives, contents and organization of the course. Students were satisfied with the course and took part enthusiastically. The best responses were obtained in preparedness of the tutor for class as well as communication of subject matter was excellently categorized at 100 %.

Course title: Environmental Biotechnology

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

Strengths:

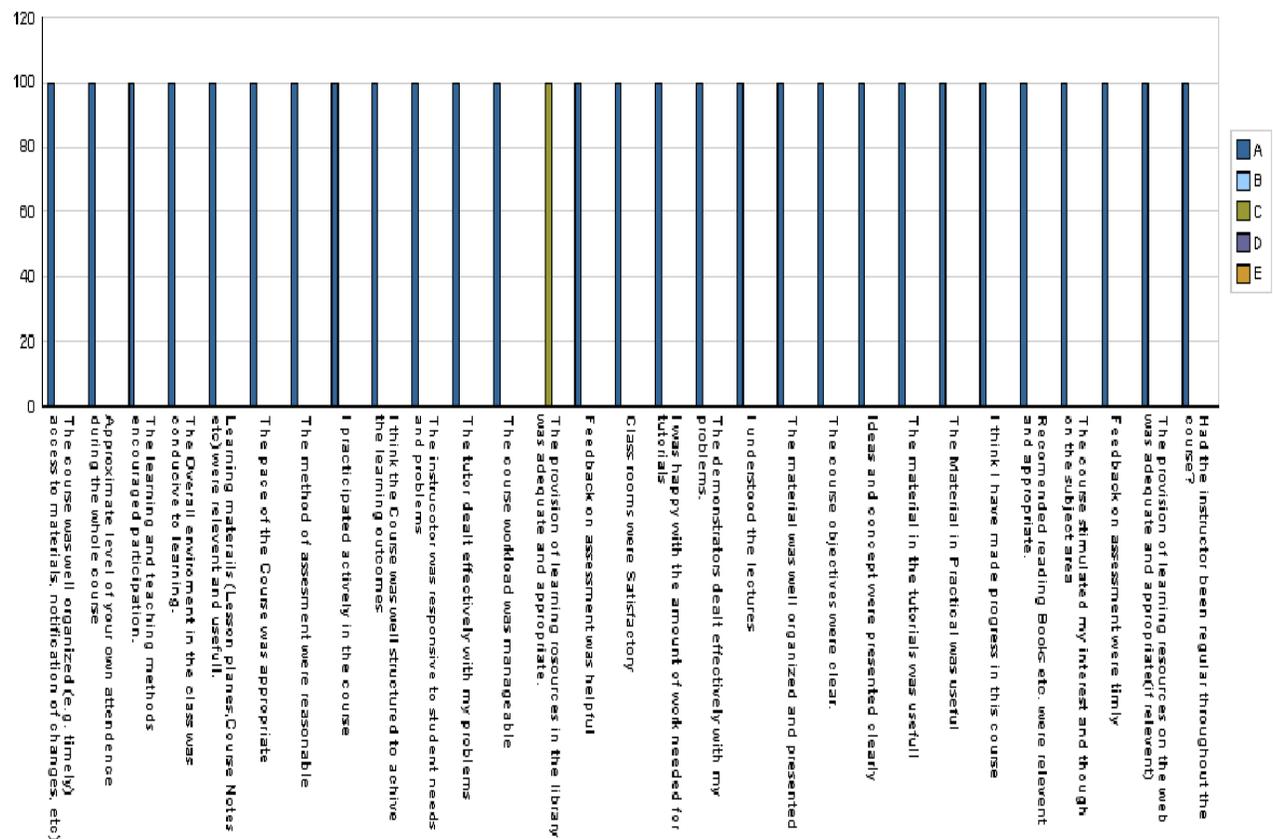
- Course was well organized
- Relevant and informative course

Dr. Shahid Mahmood (ENV-711)

100 % students reported that instructor provided additional information a part from the textbook. Assignments and exams covered the material provided in the course was reported by 100 % of the students

Course Title: Agriculture Pollution Management

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

Strengths:

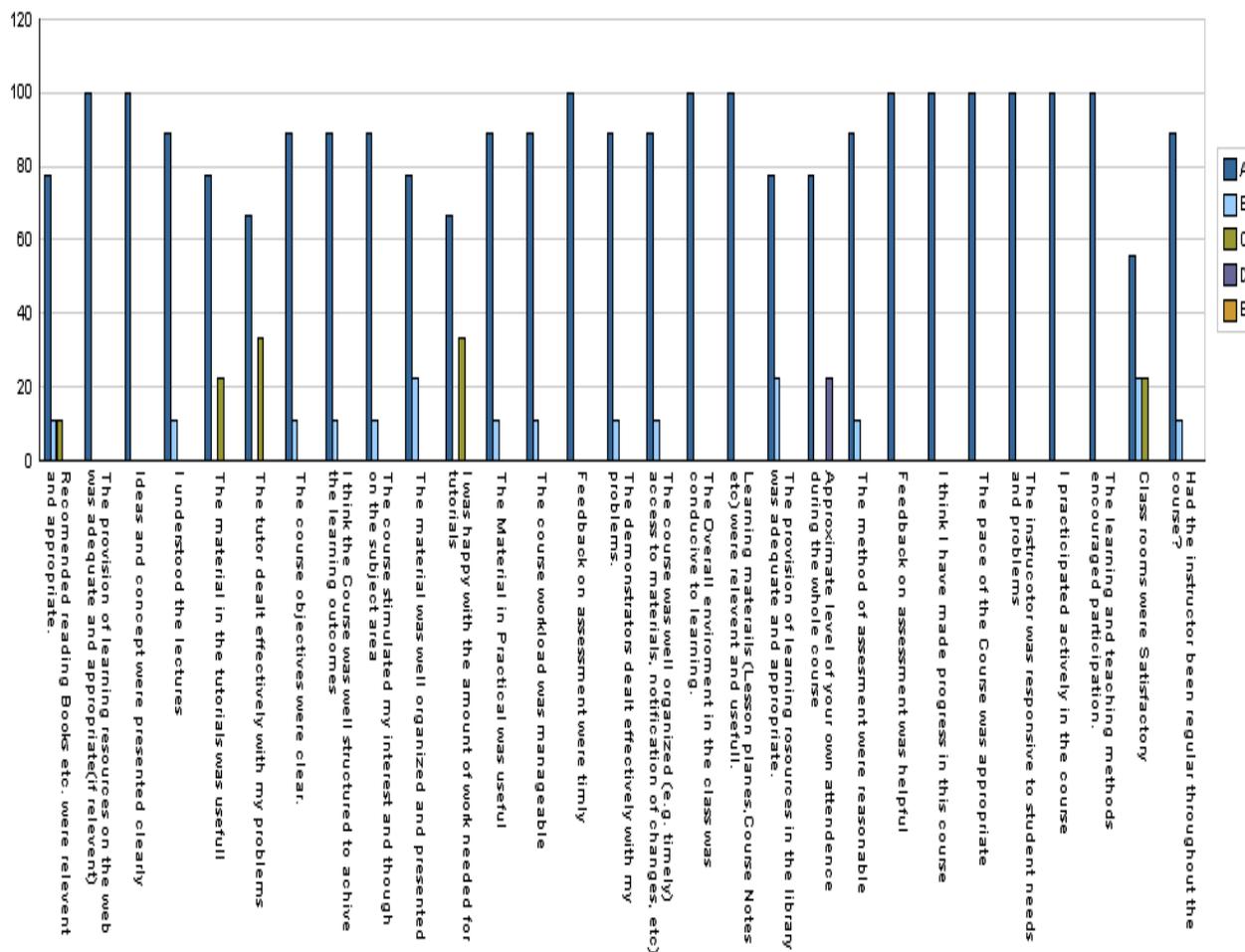
- Course was well organized
- Relevant and informative course

Ms. Waqar-un-Nisa (ENV- 705)

45 % of the students indicated that instructor was available during office hours. 55 % of the students agreed that instructor was prepared for the class and have communacted well according to the topic to be taught. 55 % of the students reported that course is modern and updated.

Course Title: Environmental Analytical Techniques

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

Strengths:

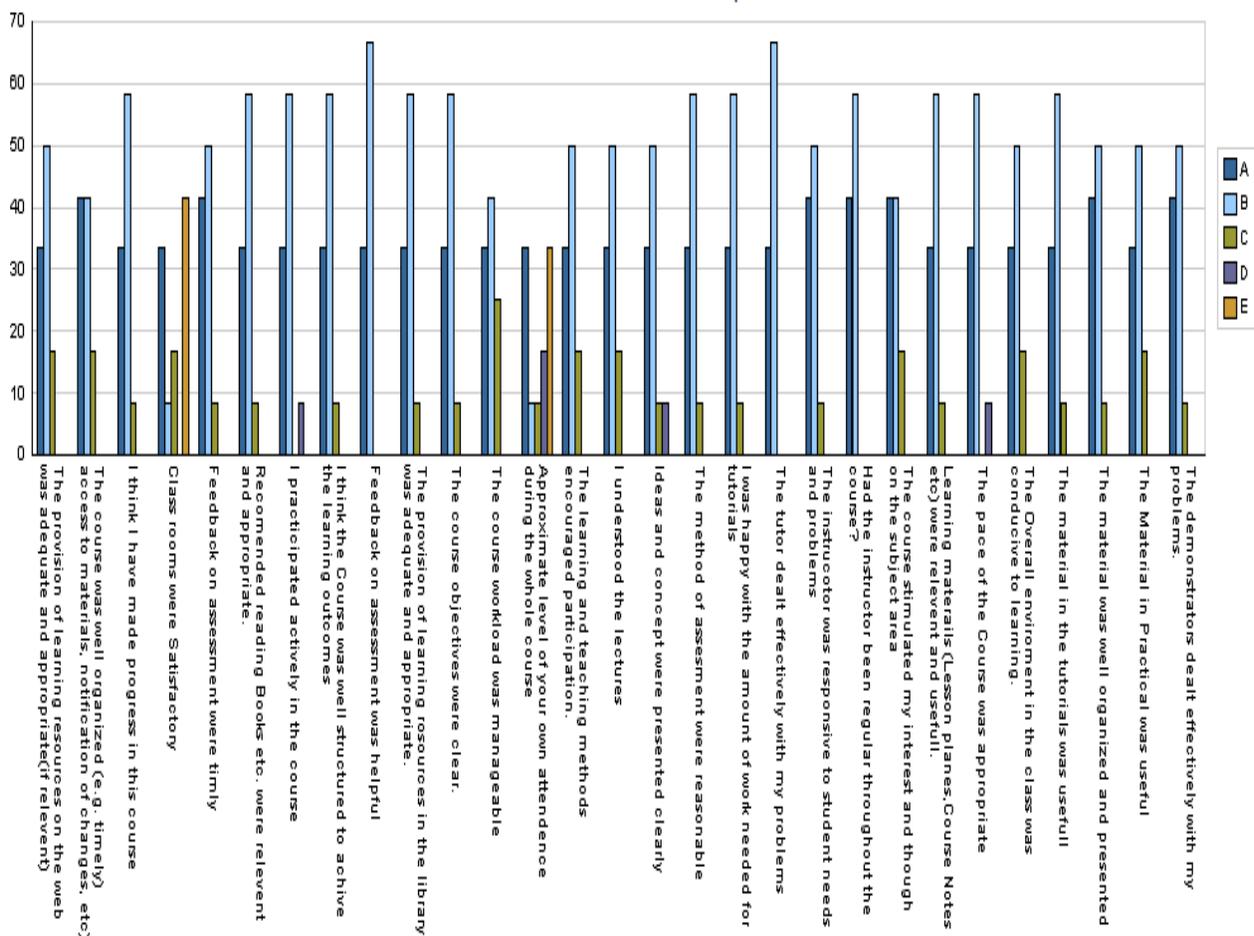
- Course was well organized
- Relevant and informative course

Dr. Shahid Mahmood (ENV-709)

According to the survey 55 % of the students were agreed that instructor is prepared for each class. The instructor demonstrates knowledge of the subject very well is reported by the 65 % of the students

Course Title: Bioremediation of Environmental Contaminants

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

Strengths:

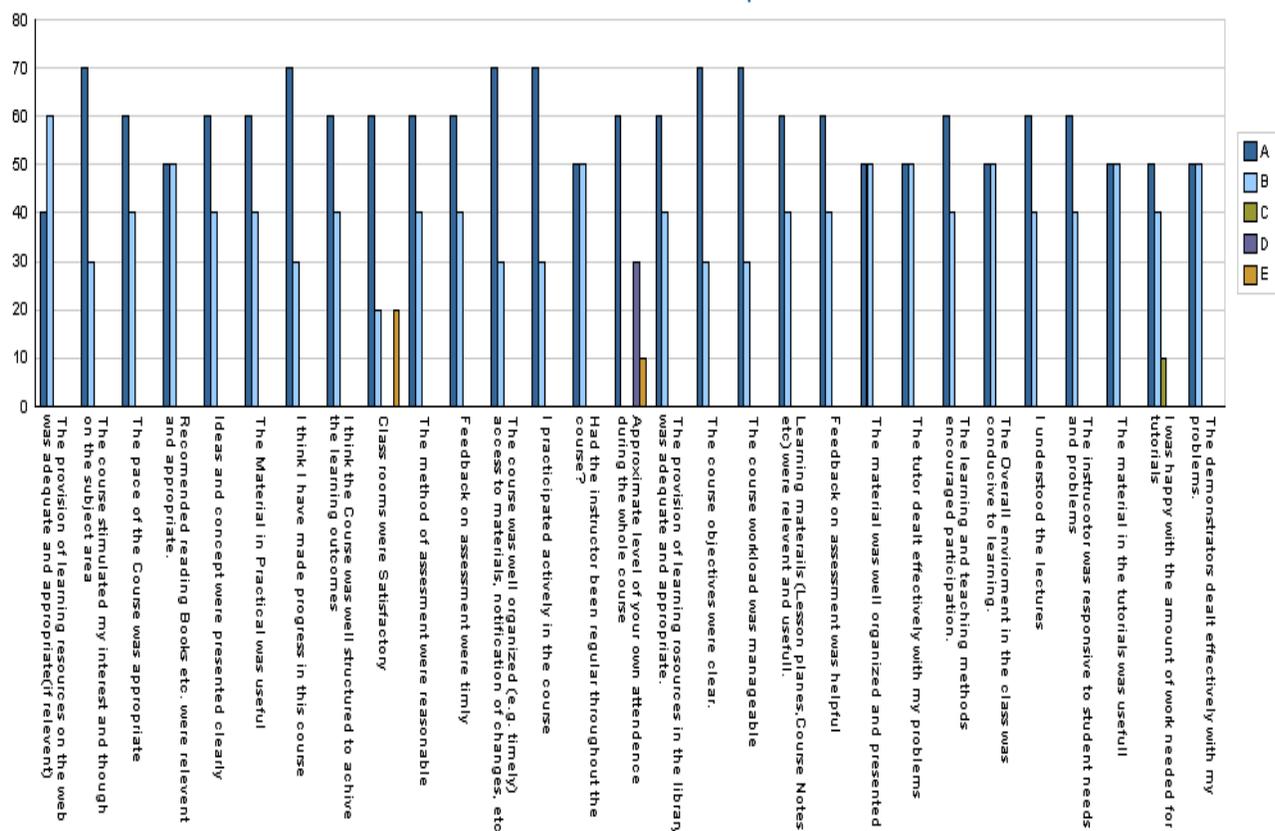
- Course was well organized
- Relevant and informative course

Mr. Luqman Riaz (ENV-713)

The instructor shows the respect towards students and encourage class participation was reported by 90 % of the students. Instructor joins the class on time and left on time is reported by 100 % of the students.

Course Title: Climatology

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

Strengths:

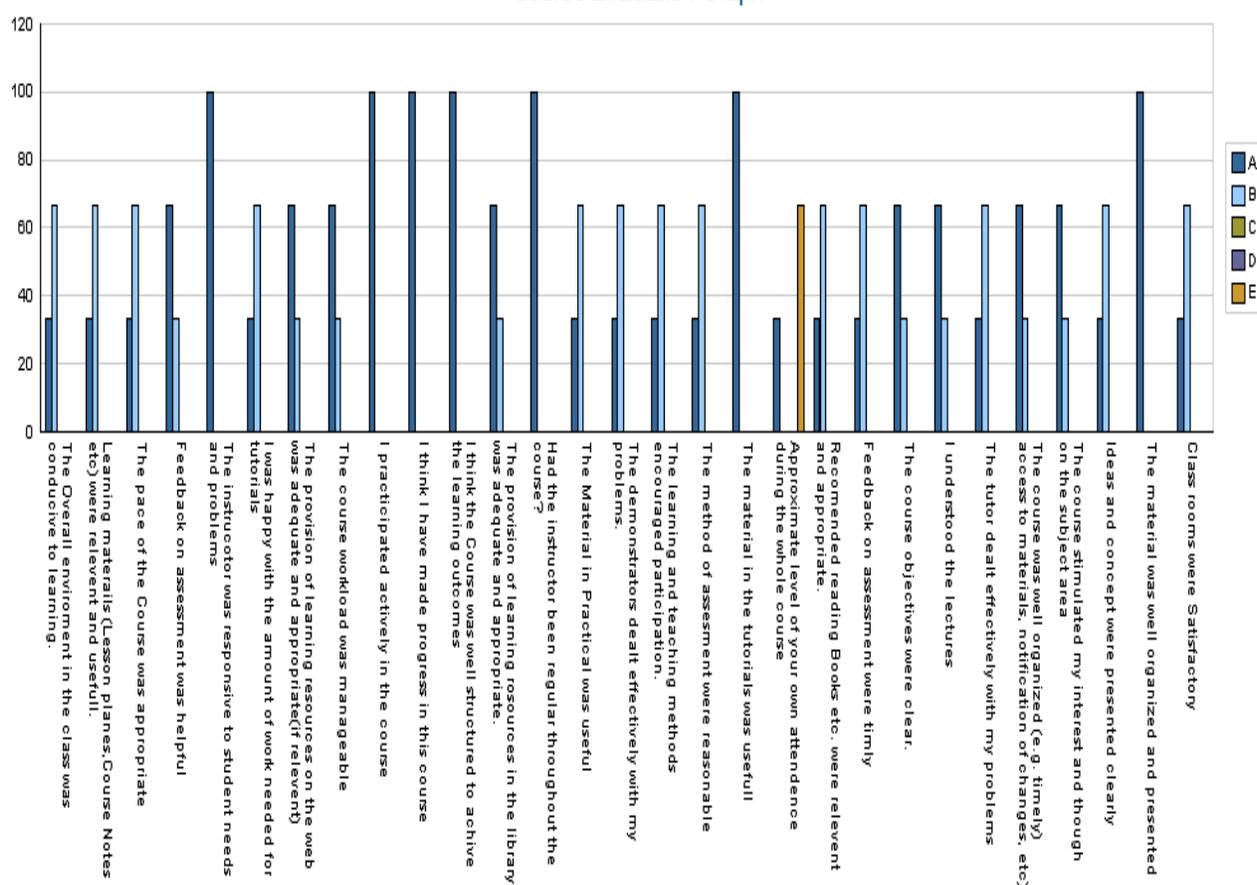
- Course was well organized
- Relevant and informative course

Dr. Azeem Khalid (ENV-718)

100 % of the students were agreed that the course materia is modern, updated and increase their knowledge of the subject with modern time requirements. They also reported that the instructor put emphasis on textbook as well as other sources of the information. Instructor comes on time and left on time during the whole semester.

Course Title: Toxic Organics and Trace Metals in Ecosystem

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher

Weaknesses:

- Teacher should organize field visits

Strengths:

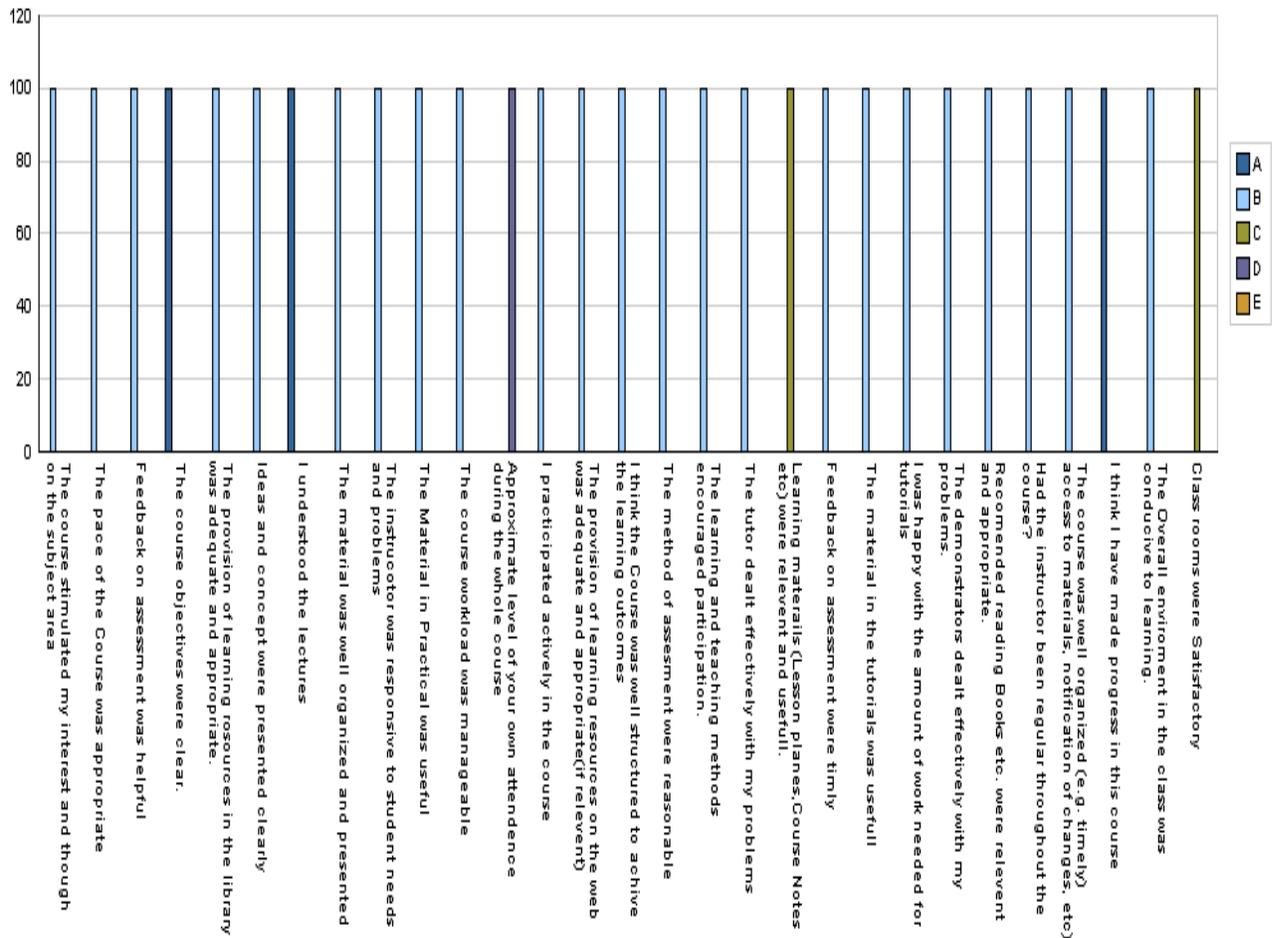
- Course was well organized
- Relevant and informative course

Dr. Azeem Khalid (ENV-727)

The instructor maintains the environment of learning and taught modern, updated and full of knowledge course material that help in increasing the matter of subject along with the practical applications of the subject at international as well as national level is reported by 100 % of the students.

Course Title: Impact of Natural Disasters on Global Environment

Course Evaluation Graph



Key: A: Excellent B: Good C: Appropriate D: poor E: Strongly Disagree

General Comments of the Students about the Teacher Weaknesses:

- Teacher should organize field visits

Strengths:

- Course was well organized
- Relevant and informative course

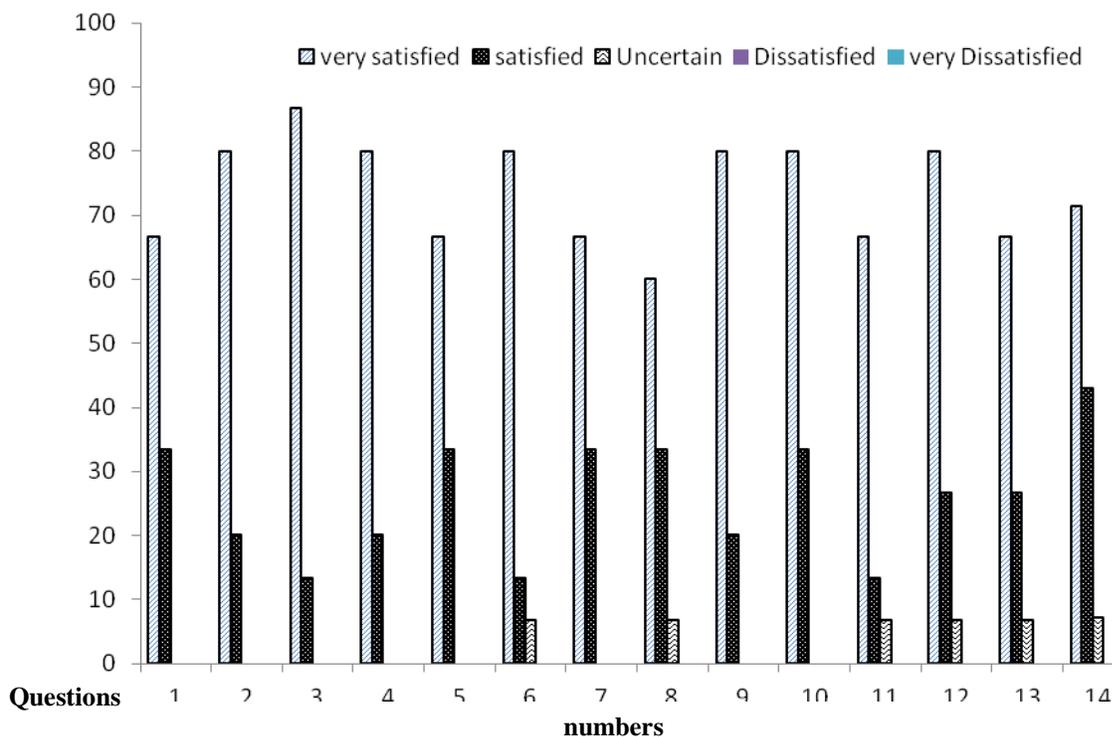
Performa 2: Faculty course review report

Questionnaire for the evaluation of faculty course review was filled and analyzed. It was observed from evaluation that the faculty was satisfied with curriculum. The evaluation was done through mid and final term examinations for all courses offered by the Department. Some courses were lengthy and teachers suggested dividing them.

Course code	Title	Credit value	Assessment methods	No of students	Comments on curriculum	Any change in future in course	Semester	Course Instructor
ENV-702	Environmental Chemistry	3(2-2)	Midterm and Final	20	Course was well organized		Spring	Mr. Khurram Saeed
ENV-703	Environmental Microbiology	3(2-2)	Midterm and Final	20	Course was interesting	Should be divided	Fall	Dr. Azeem Khalid
ENV-704	Research Planning and reporting	3(2-2)	Midterm and Final	20	Course was up to date		Fall	Dr. Tariq Mahmood
ENV-705	Environmental analytical techniques	3(2-2)	Midterm and Final	20	Relevant and informative		Spring	Dr. Azeem Khalid
ENV-709	Bioremediation of Environmental Contaminants	3(2-2)	Midterm and Final	20	Up to date		Spring	Dr. Shahid Mahmood
ENV-711	Agriculture Pollution Management	3(3-0)	Midterm and final	15	Good	Course material should be updated	fall	Dr. Shahid Mahmood
ENV-713	Climatology	3(2-2)	Midterm and final	20	Interesting and informative		Spring	Mr. Luqman Riaz
ENV-716	Global Environmental Changes	3(3-0)	Midterm and final	20	Informative	Contents should be simplified	Spring	Dr. Audil Rashid
ENV-718	Toxics organics and trace metals in ecosystem	3(2-2)	Midterm and final	20	Interesting		Spring	Dr. Tahir Hayat
ENV-723	Physicochemical processes for waste water	3(2-2)	Midterm and final	20	Up to date		Spring	Ms. Beenish Saba
ENV-726	Environmental Biotechnology	3(2-2)	Midterm and final exam	20	Lengthy	Course contents should be simplified	fall	Dr. Azeem Khalid

Performa 3: Survey of Graduating Students

Results of survey of graduating students based on Performa 3 are represented in the given graph. The graduating students in the last semester were surveyed after thesis evaluation. More than 80 % students showed their satisfaction regarding all the parameters on average, whereas 20 % of the students were highly satisfied regarding all information asked.



Results of graduating student’s survey

Best Aspects of the Program

- ❖ Highly qualified faculty
- ❖ Commencement of workshops and international conferences annually
- ❖ Study programs with international collaboration

Weaknesses:

- Faculty foreign training is required
- Laboratory equipment needs up gradation
- Computational facilities needs extension

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 main strength of the department is the availability of all expertise viz. Microbiology, Urban Health, Ecotoxicology, Treatment techniques, and Management, with full acquaintance of their respective subjects, having vast knowledge of local environmental problems and global perspective. Majority of the faculty members have international degrees and are expert/professionals in their fields with quality research publications in national and international Journals. They have also implemented national research projects and are highly conscious of the problems to be taken by the postgraduate students.

Weaknesses Identified in the Program

Advancement in teaching and research can not be achieved in the absence of enough lab facilities and equipments. There is a need for short term foreign training to young faculty members. Green-house facilities are not sufficient for students. Common rooms, post-graduate laboratories, library and survey/field diagnostic aids are also lacking. The students’ work indicates that there is some opportunity for improving communication skills and the focusing on the practical aspects.

Performa 4: RESEARCH STUDENTS PROGRESS REVIEW

Survey of M. Phil. research students’ progress review was conducted through Performa 2. Results are given below in graphs:

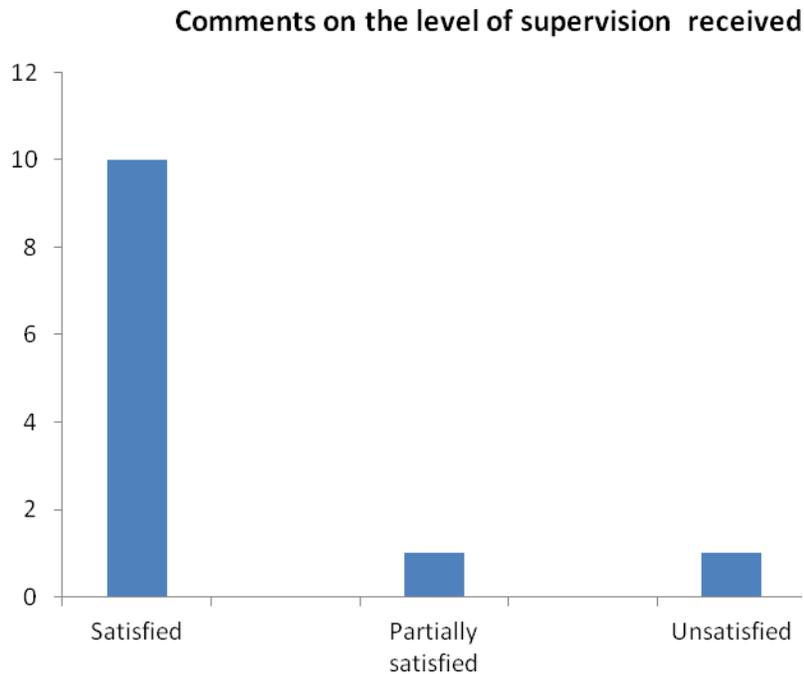


Fig. Level of supervision received by M. Phil. students

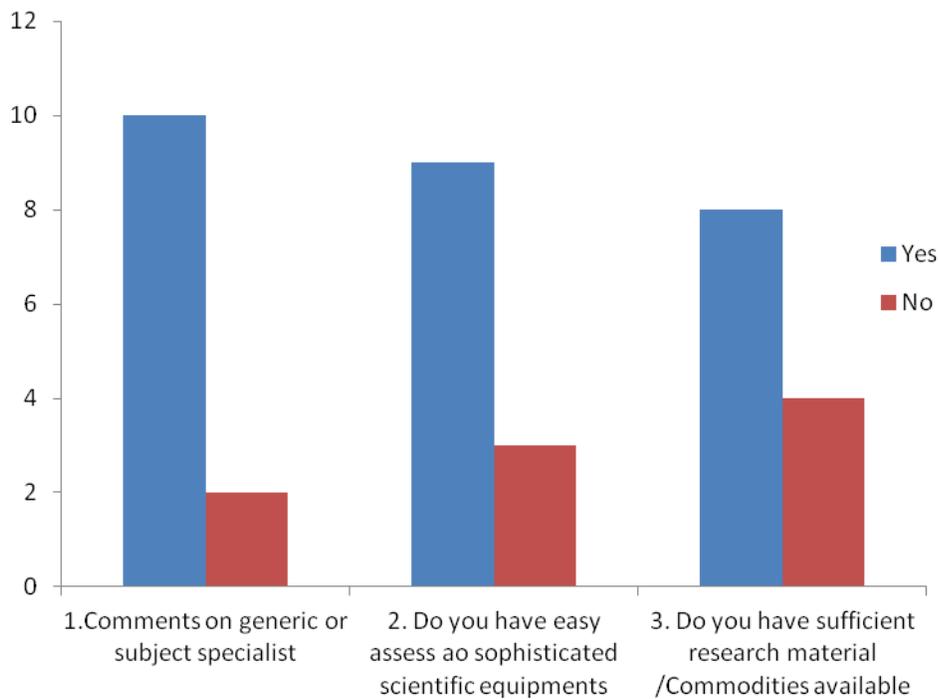


Fig. Responses of M. Phil. students on Misc. Issues

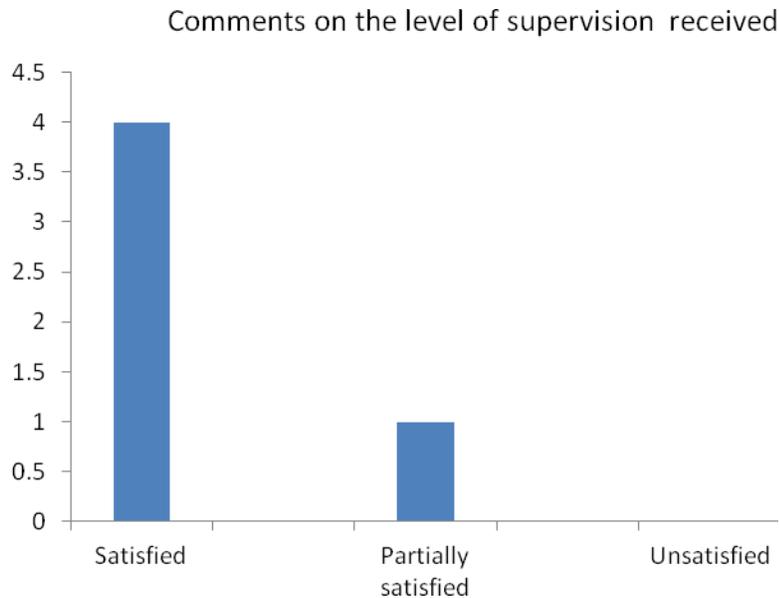


Fig. Level of satisfaction by M. Phil. students

Performa 5: Results of faculty survey

The data regarding results of faculty survey showed that 50% of the students were very satisfied, 30% satisfied, 5% uncertain, 8% dissatisfied and 7% very dissatisfied with their job clarity about promotion process. However, most of the faculty members reported that they were highly satisfied with the

admisintraive support.

S No.		Dr. Tariq	Dr. Azeem	Dr. Audil	Dr Tahir Hayat
1	Your mix of research, teaching and community service	A	A	B	B
2	The intellectual stimulation of your work	B	A	A	A
3	Type of teaching / research you currently do.	A	A	B	B
4	Your interaction with students	A	A	A	A
5	Cooperation you receive from colleagues.	B	B	A	A
6	The mentoring available to you.	B	B	B	B
7	Administrative support from the department.	B	B	B	B
8	Providing clarity about the faculty promotion process.	A	B	B	B
9	Your prospects for advancement and progress	A	A	B	B

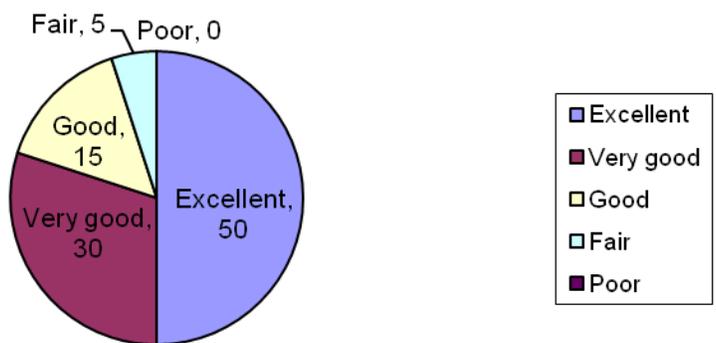
Performa 7: Alumni Survey Results

Department of Environmental Sciences was established in 2007 and till the fourth cycle of SAR 6 batches of post graduate students have been awarded with the degrees. Proforma 7 was provided to students to get the required information and feedback. The overall results of program assessment by the Alumni are presented in Graph.

Questions: I: Knowledge

1. Math, science, humanities and professional discipline.
2. Problem formulation and solving skills
3. Collecting and analyzing appropriate data
4. Ability to link theory to practice
5. Ability to design a system component or process
6. IT knowledge.

Knowledge

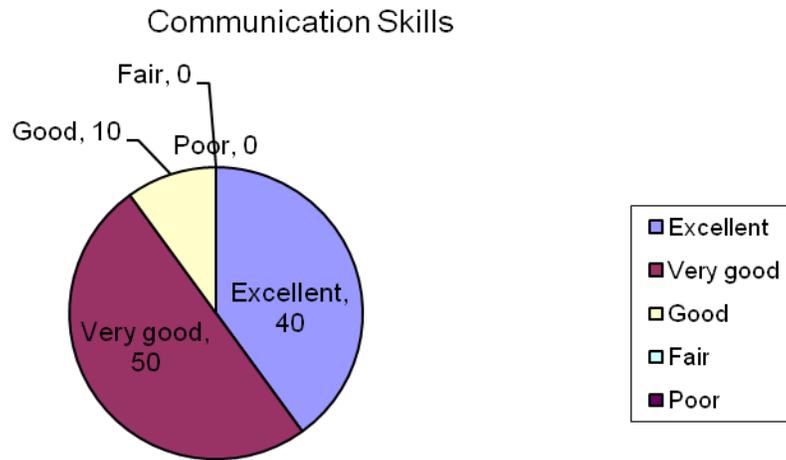


Questions: I: Knowledge

Majority of the Alumni have rated the knowledge imparted by the department at grade A (excellent). Problem formulation and solving skills of the department were placed in excellent category by 50 % of the students.

Questions: II: Communication Skills

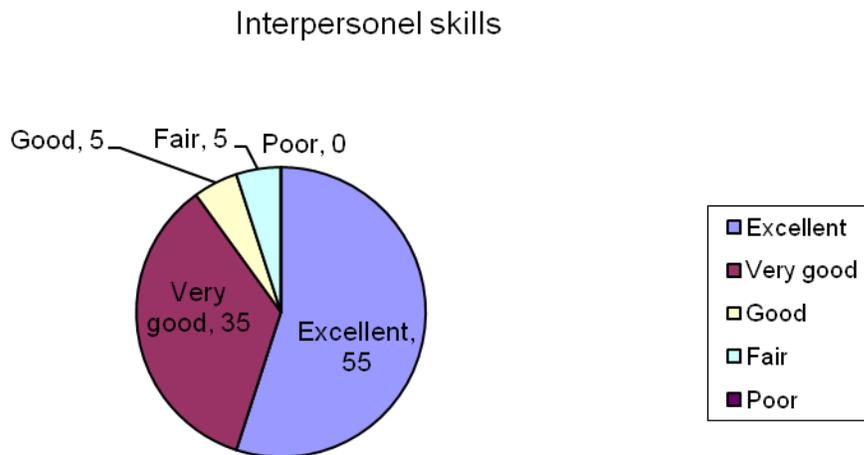
1. Oral communication
2. Report writing
3. Presentation skills



Questions: III:

Interpersonal Skills

1. Ability to work in teams
2. Independent thinking
3. Appreciation of ethical values



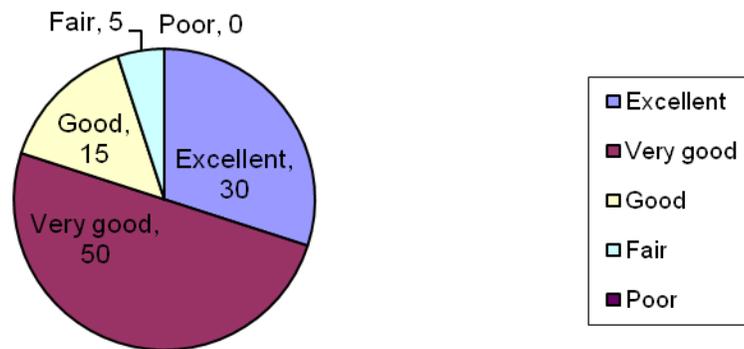
Interpersonal skills have been graded A by majority of the Alumini. Ability to work in team was placed in excellent category by 55 % of the students.

***Questions: IV: Management / Leadership Skills**

1. Resource and Time management skills
2. Judgment

3. Discipline

Management/ Leadership skills



Regarding management and leadership skills majority of the alumini rated the responses at grade A and B. Resource and time management skills were placed in very good category by 50 % of the students.

V: General comment

Vii: General comments

VII: Department Status

- Infrastructure
- Faculty
- Repute at National level
- Repute at international level

Performa 8: Employer Survey

As there are no graduating students working in the department by the end of spring semester 2014 performa 8 was sent to students working in several organizations and their feedback was documented. Students graduated from the department are valuable part of different organizations including Punjab information technology board, International Union for Conservation of Nature, Bahria University, International Islamic University and Fatima Jinnah Women University. They are satisfied with the problem solving skills of the department. They are contented with all parameters regarding time management skills, ability to work in team as well as admiration of ethical values etc. Some of the students highlighted that department should improve its research facilities.

Questions: I: Knowledge

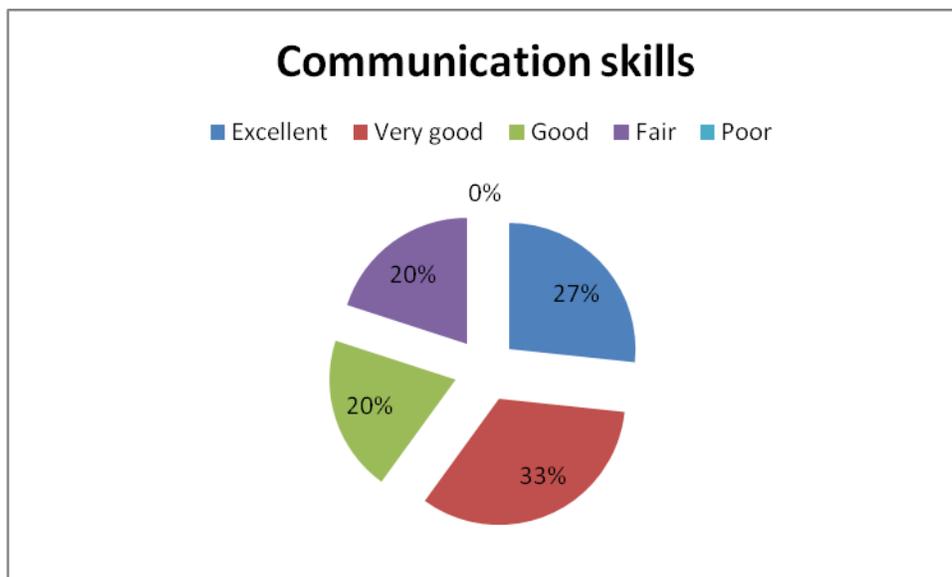
1. Math, science, humanities and professional discipline.
2. Problem formulation and solving skills
3. Collecting and analyzing appropriate data
4. Ability to link theory to practice
5. Ability to design a system component or process
6. IT knowledge



Majority of the organization have rated the knowledge imparted by the department at grade A (excellent). Problem formulation and solving skills of the students were placed in excellent category by 33 % of the students.

Questions: II: Communication Skills

1. Oral communication
2. Report writing
3. Presentation skills



Questions: III: Interpersonal Skills

1. Ability to work in teams
2. Independent thinking
3. Appreciation of ethical values



Interpersonal skills have been graded B by majority of the institutions. Ability to work in team was placed in excellent category by 20 % of the students.

***Questions: IV: Management / Leadership Skills**

1. Resource and Time management skills
2. Judgment
3. Discipline



Regarding management and leadership skills majority of the alumini rated the responses at grade A and B. Resource and time management skills were placed in very good category by 50 % of the students.

V: General comment

Vii: General comments

VII: Department Status

- Infrastructure
- Faculty
- Repute at National level
- Repute at international level

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

Performance of the faculty members pertaining to research activities indicates that there are 60 research papers and 5 projects during the year 2012-14. The department has organized one training workshop in 2013 and the faculty has presented several papers at national and international conferences.

Year 2013-14

Faculty	Publications	Projects	Others(Abstracts, reports etc)
Dr. Tariq Mahmood	13	_____	1
Dr. Azeem Khalid	21	3	7
Dr. Audil Rashid	7	2	6
Dr. Shahid Mahmood	7	_____	_____
Ms. Aniqā Batool	6	_____	_____
Ms. Beenish Saba	9	_____	_____

Criterion 2

CURRICULUM DESIGN AND ORGANIZATION

Degree Title: M. Phil

Intent: All the courses for degree program are approved by the Higher Education Commission, Pakistan prepared by a committee. When needed, curriculum for the Department of Environmental Sciences is revised/updated through different bodies. At department level, Board of Studies, which comprised of senior faculty members, is responsible for updating the curriculum. This body is authorized to formulate syllabus and course content. The chairperson of the Department is the convener of this body. The courses are then sent to the Board of Faculty for approval. The Dean of the Faculty, who is also the convener, conducts meeting. As per university rules courses after the approval from the Faculty Board, are placed before the University Academic Council for their approval.

Degree Plans

Presently three degree programs are organized by the department:

- M.Sc. in Environmental Sciences with research work, submission of thesis and evaluation by four committee members including one external
- M. Phil degree program consists of 2 academic years/ 4 semesters two semester course work and two semester research work with submission of thesis and evaluation by four committee members including one external.
- Ph.D. in Environmental Sciences with 2 semester course work and research work

Pre-requisites: minimum academic requirements

A candidate seeking admission to the Course for the Degree of Master of Science in full and partial residence:

- i. Must have passed the Bachelor Degree Examination (fourteen years education) in aggregate with 45% marks or its equivalent from a recognized institution

in related subjects Botany/Zoology/Chemistry/ Geography/Physics/ Microbiology) or an equivalent qualification in relevant discipline from HEC recognized institution and as approved by admission committee. The candidates domiciled from any area of Pakistan are eligible for admission. The admission to the university is on merit which is determined on percent marks in last degree.

- ii. A candidate seeking admission to the Course for the Degree of M. Phil in full and partial residence:
- iii. Must have passed the Master Degree Examination (sixteen years education) in aggregate with at least 50% marks or its equivalent from a recognized institution in related subjects (Biological Sciences/ Physical Sciences/ Agriculture Sciences/Forestry/MBBS /BDS/ DVM /Pharmacy/B.Sc or B.E. Engineering) or an equivalent qualification in relevant discipline from HEC recognized institution.
- iv. The admission is offered on open merit basis with equal opportunity for male and female students.
- v. The nominees of different departments/organizations with minimum of 2nd division or its equivalent in Bachelor degree are eligible.

Minimum Requirements for the Award of M.Sc & M. Phil Degrees:-

- I. The duration of the Course for the Degrees of M.Sc. and M. Phil Environmental Sciences is 4 semesters for whole-time students and six semesters for part-time students/partial residents and not more than six and eight semesters respectively.

The requirements to be completed by each student for award of degree are:-

- a. The M.Sc. degree is comprised minimum of 50 credits course work and 10 credits of thesis (Marks of thesis are not counted towards calculation of CGPA). The final semester includes research and thesis of 10 credit hours. Degrees are awarded after completing the required number of credit hours (courses) followed by thesis and its final evaluation by a viva examination.
- b. The M. Phil degree is comprised of minimum 30 credits of course work and 10 credits of thesis (Marks of thesis are not counted towards calculation of CGPA). The last two semesters includes research and thesis of 10 credit hours. Degrees are awarded after completing the required number of credit hours (courses) followed by thesis and its final evaluation by a viva examination.
- c. The requirements in (a) and (b) above are excluding the credits required for rectifying course deficiency, if any
 - iii) Nearly two-third of the credits for the course work is in the major field of study, and one-third in the minor fields of study: on the basis of the minimum requirements; the minor fields may be one or two but do not exceed three. The ratio of one-third and two-third do not apply to credits taken over and above the minimum requirements.
 - iv) All students in M.Phil. are required to pass a Comprehensive Examination after completion of their course work.

The following courses are compulsory:-

"Statistics Courses Stat-700, Stat-701" for all the M.Sc students. Advanced level courses are offered for M.Phil students. Seminar is mandatory for M.Sc and M.Phil students while special problem is applicable to M. Phil students only.

Examination and Weightage

a) Theory

In theory paper, students' evaluation is done by mid-term examination, assignments/ quizzes and final examination. Both the mid-term and final examinations are compulsory. A student who misses the mid-term examination is not allowed a make-up examination and is awarded zero marks in that examination. In case a student does not appear in the final examination of a course, he/she will be deemed to have failed in that course. In theory, weightage to each component of examination is as prescribed hereunder.

Mid Examination	30%
Assignments	10%
Final Examination	60%

b) Practical

For practical examination (if applicable) 100% weightage is given to practical final examination.

Eligibility for Examination

A student is eligible to sit for the examination provided that he/she has attended not less than 75 % of the classes in theory and practical, separately. The minimum pass marks for each course are 40% for M.Sc/M.Phil.

Supervisory Committee:-

1. Each student doing M.Sc/M.Phil will have a supervisory committee for his thesis to advise him in his Programme of studies and research.
2. The supervisory committee will be constituted during the Ist semester for M. Sc and M.Phil students and will consist of a minimum of 3 members.
3. The committee will be approved by the Advanced Studies and Research Board on the recommendations of the Chairman, Dean and Board of Studies.
4. The Supervisory Committee shall consist of at least three members of the faculty, two from major field and one from any department, provided that if an outstanding specialist in a major or minor field of study is available outside the University he may be appointed as a member/co-supervisor of the Supervisory Committee.
5. One of the teacher members from the major field of study will be designated as Chairman of the Supervisory Committee.

Academic Standing:-

- Grade Point Average
 - (a) Maximum grade point average: 4.00
 - (b) Minimum grade point average for Obtaining M.Sc/M.Phil Degree: 2.50
- To remain on the roll of the University a student shall be required to maintain the following minimum GPA/CGPA in each semester:

Semester	CGPA
1 st	1.50
2 nd	1.75
3 rd	2.00
4 th	2.50
- A student, who obtains CGPA of 2.00 or above but less than 2.50, upon the completion of entire approved course work, may be allowed to repeat the courses of the previous semesters in which he had obtained the lowest grades, in order to improve the CGPA so as to obtain the minimum of 2.50 within the maximum time allowed for the award of degree, failing which he shall cease to be on the roll.
- A student will be required to repeat those courses of the previous semesters in which he/she had failed, at the first available opportunity, provided that his/her maximum workload, including the courses being repeated by him/her, will not exceed the normal workload.

Thesis:-

- A student shall be entitled to submit thesis for examination after he/she has passed all the final examinations in the approved courses and comprehensive examination provided he/she has also fulfilled the residential requirements.
- The thesis shall be prepared and presented in the manner laid down in the instructions approved by the Advanced Studies and Research Board.
- The unbound thesis shall be referred to the examiners for evaluation duly certified by the supervisory

committee that the contents and form of the thesis are satisfactory for submission.

Evaluation:-

- There shall be 10 credit hours allocated for the thesis which shall not be counted towards calculation of CGPA.
- A Board of Examiners comprising members of the Supervisory Committee and one external examiner shall evaluate the thesis.
- The external examiner shall be appointed by the Vice Chancellor from the persons proposed by the Advanced Studies and Research Board, out of the panel of names recommended by the Board of Studies or any other expert in the major field of research.
- At least three members of the Board of Examiners of whom one must be an external examiner, shall for the purpose of evaluating the thesis, hold a viva-voce examination.
- The date, time and venue of thesis examination must be notified at least one week before the commencement. The faculty and students interested to participate in the oral presentation may be allowed. The notification to this effect may be made by the chairman of the Department concerned with intimation to the Director Advanced Studies and Controller of Examinations.
- The Controller of Examination shall get the thesis evaluated within three months after the date of its submission/resubmission in his office. Any delay beyond three months must be brought to the notice of the Vice Chancellor.
- All the members of Supervisory Committee present shall sign the thesis after the viva-voce examination after making necessary corrections and incorporating therein any suggestions by the Board of Examiners. The Board of Examiners in the letter grades as Pass/Fail shall evaluate the thesis.
- All the members of the Board of Examiners present shall sign the result sheet prescribed for this purpose at the end of the examination. The major supervisor will submit the results to the Controller of Examinations within 24 hours.
- In case of disagreement among the examiners regarding the acceptance of the thesis, it shall be referred to another external examiner appointed by the Vice Chancellor whose decision shall be final.
- If a candidate fails in the thesis examination, he/she may enroll again and submit a revised thesis on payment of the prescribed examination fee but he/she shall not be entitled to resubmit his/her thesis before the expiry of six months after the date of the declaration of the result of the last thesis examination. He/she can avail this chance only once.

Thesis Research:-

A student admitted to the Course in partial residence shall undertake research work in a laboratory or institute approved by the Syndicate on the recommendations of the Academic Council and Advanced Studies & Research Board.

Comprehensive Examination:-

- Comprehensive examination will consist of a written part followed by an oral part and cover both the major and minor field of studies after the completion of course work.
- The examination will be taken by the student on the dates to be decided by the Department and notified by the Controller of Examinations.
- Each department shall have its own committee of three members including Chairman of the Department who will also be the Chairman of the Examination Committee. In addition, the Director Advanced Studies or his nominee shall be the ex-officio member of the committee. One member will be nominated by the Vice Chancellor at the time of examination. The committee will be constituted by the Vice Chancellor on the recommendation of the respective department and Director Advanced Studies & Research. The committee shall be constituted for one year at the start of each academic year.
- If one member of the committee is not present due to some Emergency, Examination may taken in the presence of four members out of five, however presence of research supervisor is mandatory. The result announced will be valid.
- Comprehensive examination will be qualifying and the examination committee will separately evaluate the student on his/her performance in written and oral parts of the examination.
- If a student fails to qualify in the comprehensive examination, he/she will be eligible to reappear,

once only in the comprehensive examination within the time given for the degree.

Scheme of Studies for the degrees of M.Sc./M.Phil/Ph.D in Environmental Sciences

S.No.	Title of the Courses	Credit hours
1.	ENV-701 Introduction to Environmental Sciences	3(3-0)
2.	ENV-702 Environmental Chemistry	3(2-2)
3.	ENV-703 Environmental Microbiology	3(2-2)
4.	ENV-704 Research Planning and Report Writing	3(2-2)
5.	ENV-705 Environmental Analytical Techniques	3(2-2)
6.	ENV-706 Environmental Impact and Risk Assessment	3(3-0)
7.	ENV-707 Pollution Control Technologies	3(2-2)
8.	ENV-708 Remote Sensing and GIS Applications in Environment	3(3-0)
9.	ENV-709 Bioremediation of Environmental Contaminants	3(3-0)
10.	ENV-710 Solid Waste Management	3(3-0)
11.	ENV-711 Agricultural Pollution Management	3(3-0)
12.	ENV-712 Environmental Law and Policy	3(3-0)
13.	ENV-713 Climatology	3(2-2)
14.	ENV-714 Eco-Health Management and Safety Approaches	3(3-0)
15.	ENV-715 Public Health and Human Ecology	3(3-0)
16.	ENV-716 Global Environmental Changes	3(3-0)
17.	ENV-717 Wastewater Treatment Process Design	3(3-0)
18.	ENV-718 Toxic Organics and Trace Metals in Ecosystem	3(2-2)
19.	ENV-719 Special Problem	1(1-0)
20.	ENV-720 Seminar – I, II	1(1-0)
21.	ENV-721 Cleaner Production Technology	3(3-0)
22.	ENV-722 Waste Reuse and Recycling	3(3-0)
23.	ENV-723 Physico-Chemical Processes for Wastewater	3(2-2)
24.	ENV-724 Advanced Processes for Wastewater Treatment	3(3-0)
25.	ENV-725 Environmental Management Systems	3(3-0)
26.	ENV-726 Environmental Biotechnology	3(2-2)
27.	ENV-727 Impact of Natural Disasters on Global Environment	3(3-0)
28.	ENV-728 Energy Conservation and Renewable Energy Resources	3(3-0)

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

Table 2.2: Shows that the curriculum of the department is consistent with the program objectives.

Courses	1	2	3	4
Env- 702, 703,704, 705, 709	+++	++	++	+++
Env-706, 711, 716, 713, 718, 723, 726, 727	+++	+++	++	++
Env-719, 720,	++	+++	+++	++

+ = Moderately satisfactory

++ = Satisfactory

+++ = Highly satisfactory

Assessment of the Environmental Sciences Curriculum

The assessment of curriculum given in Table 2.2 and the courses are cross tabulated according to the program outcomes.

- The curriculum satisfies the core requirements for the program, as specified the respective accreditation body.
- The curriculum satisfied the general arts and professional and other disciplines required for the

program according to demands and requirements set by the Higher Education Commission of Pakistan.

Standard 2-2: The curriculum supports the program’s documented objectives.

The curriculum fits very well and satisfies the core requirements for the program’s documented objectives.

Standard 2-3: Theoretical backgrounds, problem analysis and solution design must be stressed within the program’s core material.

Table-2.3 indicates courses that play vital role in building theoretical background, problem analysis and solution design.

Elements	Course code	Course name
Theoretical Background	Enve-706	Environmental Impact and Risk Assessment
	Env-707	Pollution Control Technologies
	Env-709	Bioremediation of Environmental Contaminants
	Env-710	Solid and Hazardous Waste Management
	Env-711	Agricultural Pollution Management
	Env-712	Environmental Law and Policy
	Env-714	Eco-Health Management and Safety Approaches
	Env-715	Public Health and Human Ecology
	Env-716	Global Environmental Changes
	Env-727	Impact of natural Disasters on Global Environment
Problem Analysis	Env-701	Introduction of Environmental Sciences
	Env-702	Environmental Chemistry
	Env-703	Environmental Microbiology
	Env-704	Research Planning and Report Writing
	Env-705	Environmental Analytical Techniques
	Env-713	Climatology
	Env-708	Remote Sensing and GIS application in Environment
	Env-718	Toxic Organics and Trace Metals in Ecosystem
Solution Design	Env-726	Environmental Biotechnology
	Env-717	Wastewater treatment process design
	Env-719	Special Problem
	Env-720	Seminar-I,II
	Env-721	Cleaner Production Technology
	Env-722	Waste Reuse and Recycling
	Env-723	Physico-chemical Processes for Wastewater
	Env-724	Advance Processes for Wastewater Treatment
ENV-728	Energy Conservation and renewable energy resources	

Standard 2-4: The curriculum satisfied the core requirement laid down by accreditation bodies

- Not Applicable

Standard 2-5: The curriculum satisfied the major requirement laid down by HEC.

- The curriculum satisfies the major requirement laid down by HEC

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

In curriculum preparation, all aspects of information technology were considered and after a critical analysis, relevant aspects were integrated into the program as:

- Students enrolled in M.Phil degree program are taught courses on GIS and remote sensing in order to fulfill the I.T. requirements of the programs.

Standard- 2.7: Oral and written communication skills of the student must be developed and applied in the program.

Two seminars, each with one credit hour are compulsory at the Post-graduate level.

- Students are given Assignments on specific titles (as part of their course work) which they present orally and submit as written report. This is practiced to improve their oral and written communication skills.

Department also organizes different national and international conferences, workshops and celebrates World Environment Day, World Water Day, International Biodiversity day etc. during which students are specially motivated to take part in various competitions to build confidence in them and to improve their skills and presentation abilities.

CRITERION 3

LABORATORIES AND COMPUTING FACILITIES

The PMAS Arid Agriculture University Rawalpindi is committed to provide support and valuable information to prospective students regarding admissions, scholarships and other related orientations. The University web portal has developed specific space to display the information about the departments therefore, capitalizing this opportunity the Department of Environmental Sciences has a detailed webpage and related research activities. The new comers are given the orientation lectures each year at the department level apart from the comprehensive welcome plus orientation outreach which is usually being arranged every year by the Directorate of Students Affairs.

Standard-3.1: Laboratory manuals/documentation/instructions for experiments must be available and daily accessible to faculty and students.

Manuals are available though Laboratory manuals for some specific subject (wastewater treatment, solid waste analysis, water analysis) are not available. In case of emergency security plan (like fire extinguishers) are not sufficient. To meet the needs of research students the laboratories are not spacious and are inadequate. The equipments are not sufficient too.

Standard-3.2: There must be support personal for instruction and maintaining the laboratories.

In order to maintain laboratory, there is only one laboratory attendant and its difficult for one person to manage equipment, glassware, chemicals, material etc. One laboratory attendant assists the students in practicals, cleaning and washing. But he does not have the relevant knowledge and training. There is need of one Lab technician with good laboratory skills.

Standard-3.3: The University computing infrastructure and facilities must be adequate to support program's objectives.

Computing facilities support: Not available to all students.

Shortcoming in computing infrastructure: Computers with quick access to internet facilities should be available to all the postgraduate students

CRITERION 4

STUDENT SUPPORT AND ADVISING

The faculty and staff of the Department have been directed to to provide guidance and information regarding various educational and social issues. In order to achieve this, the following steps are taken:

1. To keenly observe the behavioral and study patterns of the students and to identify and resolve any issues that may hamper their studies.
2. To expand the mental horizons of the students beyond the class room by arranging tours/visits to facilities and places (specifically research laboratories and industries) related to

- their course work
3. To keep the administration abreast of the progress of studies of all students.

Standard 4.1: Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner.

- i. In accordance with the guidelines provided by the HEC and based on the recommendations of the Academic Council concerning the scheme of studies, all the courses mentioned in the Prospectus are offered to students at the post graduate level. The same policy is followed for M.Sc., M. Phil., and Ph.D. classes. However, the number of courses offered is dependent upon the teaching staff and facilities available to the Department.
- ii. The criteria laid down by the HEC are firmly followed during the teaching of every course.
- iii. The courses offered at the Postgraduate levels are specifically designed to fulfill the human resource requirements of public and private sector institutions/industries. In addition to that extensive consideration has been given to the applied nature of the subject (Environmental Sciences) hence each year the course contents/scheme of study is updated to meet the demands of time and enable the students to learn most recent environmental issue and their practical solution.

Standard 4.2: Courses in the major areas of study must be structured to ensure effective interaction between students, faculty and teaching assistants

The design and structuring of course work is a continuous process in which the effectiveness of the contents of each course is ensured through regular input by the teaching staff and the students. The following steps are taken to ensure the participation of all tiers of the Department in the process of course work structuring:

- i. The teaching staff periodically seeks the input of the students regarding course structure and effectiveness through questionnaires as well as individual meetings.
- ii. Input from the teaching assistants/senior students is also encouraged and welcomed in this regard.
- iii. Observations and opinions gathered in this manner are given due weightage during the process of restructuring and updating courses in the meetings of the board of studies.

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.

The significance of the availability of appropriate educational guidance to the students and its role in shaping their future careers is greatly recognized. The following steps have been taken to ensure the access of all students to qualified educational advice:

- i. The teaching staff is directed to maintain awareness of the progress of all students and to keep in view their strengths and weaknesses. This is especially important since Environmental Science is a very broad discipline and students having different educational backgrounds, ranging from Geology, GIS and Remote Sensing to Chemistry and Biology enrolled in the Department. As a consequence, students often require quality advice from their teachers regarding the choice of courses.
- ii. The teaching staff has also been directed to keep abreast of the changes taking place in the job market and update their students periodically.

CRITERION 5

PROCESS CONTROL

Standard 5.1: The process by which students are admitted to the program must be based on quantitative and qualitative criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

- i. All admissions to the Environmental Sciences Department are made in strict accordance with the stipulations of the University Administration.
- ii. Admission criteria for different courses are reviewed and, if deemed necessary, revised before the

- commencement of the admission process for the concerned semester.
- iii. Advertisements for admission to various courses in the Department are properly placed in daily newspapers which have circulation at the national level so as to ensure that people from all provinces/regions have access to this information.
- iv. The admission criteria for these courses are mentioned in the advertisement in exact terms so as to avoid any legal complications later on.

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.

- i. Newly admitted students are registered at the commencement of their first semester. The students are issued Registration Numbers by the Registrar Office. The Registration Number is unique for each student and it remains specific for the respective student even if he/she completes the degree from the department and joins a new department for another higher degree in future.
- ii. Merit for admission is determined by the concerned authorities using various criteria, such as percentage of marks achieved in the entry test, performance in previous educational career, etc
- iii. During each semester, evaluation of the students is performed a number of times through different stages of examination. The evaluation may involve written tests, quizzes, projects and special problems. A student is promoted to the next semester only after he/she attains pass marks in each course, as prescribed by the concerned authorities.
- iv. The admission process does not remain static. The performance of the admitted students is used as a yardstick for the measurement of the success of the admission system. Based on this criterion, recommendations are periodically submitted to the higher authorities for bringing about changes in the admission system for future semesters.

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.

The recruitment policy followed by the University is in accordance with the recruitment guidelines set by the HEC. The process for induction of fresh faculty members is as follows:

- i. Advertisements for new faculty admissions in the Environmental Sciences Department are placed in those newspapers which have nation wide circulation.
- ii. Applications for these new faculty positions are received by the Office of the Registrar. The applicants are short-listed on the basis of their qualifications, experience, publications and any other criteria established by the University. Call letters are then issued to the selected candidates.
- iii. The short-listed candidates are then interviewed by the University Selection Board and two candidates—principal candidate and alternate candidate—are then recommended against each post. Consequent upon final approval by the University Syndicate, selection letters are issued to the principal candidates directing them to join their respective posts within a stipulated time period.
- iv. In case of non-availability of principal candidate, alternate candidates are issued selection letters.
- v. The induction of new candidates is dependent upon the number of vacancies approved by the authorities.
- vi. Owing to the financial limitations being currently faced by the Higher Education Institutions, it is not possible to set in place a mechanism for offering attractive incentives in order to retain the services of highly qualified faculty members. However, the HEC also supports the appointment of highly qualified faculty members as foreign faculty professors and National Professors in various Departments of the University.

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.

- i. The faculty members of the Environmental Sciences Department remain constantly engaged in the process of updating/revising curriculum and course contents on the basis of the feedback received from the students and information received from a multitude of extra-institutional sources, for example, information obtained from other institutions of higher education, industries, government agencies, etc.
- ii. Environmental Sciences is a rapidly expanding discipline. In particular, climate change and the real-time assessment of the environmental impact of natural disasters are emerging at the forefront of environmental research. In view of these circumstances, the Department of Environmental Sciences keeps on adding new courses at various levels to keep pace with the changes internationally occurring within the discipline. The addition of courses like Climatology, Applications of GIS and Remote Sensing in Environment and Impacts of Natural Disasters on the Global Environment are a testimony to the Department's flexibility to intra-disciplinary changes.
- iii. In order to communicate teaching material more effectively to the students, various audio-visual aids, for example, Overhead Projectors and Multimedia are used as supplements to lectures.
- iv. All possible efforts are made to ensure the availability of the latest journals, research papers and research reports, etc., to the students.
- v. Regular meetings of the teaching staff are held to discuss and review the finer points of teaching methodology and student evaluation.

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 university authorities have laid down the student evaluation procedures to ensure that the graduates of the Department have completed all the requirements of the program in which they had been enrolled. The various criteria used for the evaluation of the students are surprise tests, quizzes, written assignments, multimedia presentations, seminars, special problems, practicals, mid-term examinations and final examinations, with the maximum weightage being given to mid-term and final examinations. Simultaneously the additional evaluations (for example surprise tests, special problems, presentations, seminars, etc.) are also used to evaluate the performance of the students in supplement to mid-term and final examinations. Results are notified within 10-20 days of the examinations.

In theory, weightage to each component of examination is as prescribed here under:

Mid Examination	30%
Assignments	10%
Final Examination	60%

Grade points are as follows

Marks Obtained	Grade	Grade point Remarks
80-100 %	A 4	Excellent
65-79 %	B 3	Good
50-64 %	C 2	Satisfactory
40-49 %	D 1	Pass
Below 40 %	F 0	Fail

- Gold medals are awarded to the students who secure highest marks. Degrees are awarded to the students on the convocation that is held every year.

CRITERION 6

FACULTY

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.

Table 6.1 Faculty distribution of program areas

Specialized areas	Number of Faculty members	Number of Courses offered
Climate Change and plant physiology	1	4
Environmental Microbiology and biotechnology	1	5
Urban ecology and GIS analysis	1	4
Toxicology , Physicochemical processes for wastewater	1	4
Waste water toxicology, Drinking water quality	1	3

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 placed. Effective Programs for Faculty Development

Professional training and availability of adequate research and academic facilities are provided to the faculty members according to the available resources. Currently two faculty members have completed post docs. One member is going to USA for PhD under Fulbright fellowship program. One faculty has enrolled her PhD in the department while one faculty member already PhD, now have applied for post-doc. The faculty members have presented their research work in several national and international conferences.

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

The young faculty members are highly enthusiastic for research activities and participate in planning and execution of departmental activities. Avenues for research funding are provided through university research fund and national/international projects.

Results of faculty survey employing Performa 5 (Annexure-V) were summarized and are given Table 6.2. The results showed high satisfaction of the teachers over most of the parameters. However, performance and merit based rewards policy must be opted for the faculty at university level.

Table 6.2: Results of Faculty Survey

S.No	Parameters	Dr. Tariq	Dr. Azeem	Dr. Audil	Ms. Aniq	Ms. Beenish
1	Your mix of research, teaching and community service	A	A	B	B	B
2	The intellectual stimulation of your work	A	A	A	B	A
3	Type of teaching/research you currently do.	A	A	B	B	A
4	Your interaction with students	A	A	A	A	A
5	Cooperation you received from colleagues	A	A	A	A	A
6	The mentoring available to you	B	B	B	B	B
7	Administrative support from the department	A	A	A	A	A
8	Providing clarity about the faculty promotion Process	A	B	B	B	B
9	Your prospects for advancement and progress through ranks	NA	B	B	B	B
10	Salary and compensation packages	A	A	B	B	B
11	Job security and stability at the department	A	A	A	A	A

12	Amount of time you have for yourself and family	A	B	B	B	B
13	The overall climate at the department	A	A	A	A	A
14	Whether the department is utilizing your experience and knowledge	A	A	B	B	A
15	What are the best programs/ factor currently available in your department that enhances your motivation and job satisfaction?	Coopera tive attitude of staff and the students	Favora ble academ ic research and writing environ ment	Coopera tive Atmosp here	Sound climate for working and research	Cooperation of the faculty member and students
16	Suggest programs/factors that could improves your motivation and job satisfaction	Researc h group establish ment	Performance and merit based promotion.	Lab facilities improve ment	More funding and facilitati	Lab facilities

A= Very Satisfied; B= Satisfied; C= Uncertain; D= Dissatisfied; E= Very Dissatisfied

CRITERION 7

INSTITUTIONAL FACILITIES

According to this criterion, the institution must have the infrastructure to support new trends in learning such as e-learning including digital publications, journals etc.

- The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel. Insufficient library's technical collection of books. Recommended books and relevant journals of the programs are not available to the students.
 - These aspects need to be strengthened in number and space.
- Class rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.
 - Standard wise description of this criterion is given a under

Standard- 7.1: The institution must have the infrastructure to support new trends in learning such as e-learning.

- The faculty has access to e-library which is very helpful for the high quality education and producing research of international standard. Department has its own WiFi devices for easy access to the internet facility provided by the university. However the department has the following shortcomings/problems:
- Breach of power intermittently, due to which research and academic work both are suffering.
- Untrained supporting staff like lab technician.
- Scanty budget for consumables.

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 Central Library had initially limited number of books, journals and periodicals. Now the department has recommended many new books for the library and many of these have been added to the stuff, yet facilities need to be improved to meet the standards of a University Library. However the department has its own stock of few recently published books which is kept in cabins as there is no separate library at the department level due to limited space available to the department. These books are available to students for their assignments and learning.

Standard- 7.3: Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.

Currently the department has only one class room which is obviously not enough for the all degree programs and lab is also used for classes which affect the research activities. Practical lab space is not sufficient as only one lab is used both for research and practical demonstration purpose so the the quality of teaching and research is effected. Renovation of one lab allocated to the department last year is pending. Budget was allocated but work has not been started even after one year.

CRITERION 8 **INSTITUTIONAL SUPPORT**

The university administration has been struggling hard to strengthen and upgrade all the departments and establish new faculties and Institutes. The university is also trying to attract highly qualified faculty.

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.

The financial resources of the department are insufficient to meet the needs of the students. Individual research grants for students and faculty are mainly supporting the departmental research activities. There is a need to allot rooms to be used as departmental library, computer facility and lab. The financial resources should also be increased.

Suggestions and factors that can contribute to the motivation of the faculty are given as follows:

- Research grants for young faculty members may be allocated.
- Performance based incentives to the faculty

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

The intake of M.Sc. and M.Phil students is once in a year. However Ph.D. students are enrolled in each semester.

A strict merit policy is applied during admission coupled with GRE/NTS or entry test.

Standard- 8.3: Financial resources must be provided to acquire and maintain library holdings, laboratories and computing facilities.

Total budget of the department for the financial year 2013-14 is about Rs. 50,000, and its hard to meet the departmental needs particularly the purchase of chemicals for laboratories for practical purpose and books for the department library. With such limited amount the department is fulfilling its basic requirements through some projects of the faculty but still a reasonable amount of budget is required to purchase chemicals and glass ware.

SUMMARY AND CONCLUSION

The SAR (self assessment report) for the M.Phil programme of the Department of Environmental Sciences, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, presents a brief and concise description of department, its activities and ongoing steps to improve academics specifically of M.Phil programme. Department of Environmental Sciences was established in 2007 initiating three degree programs including M.Sc., M.Phil. and Ph.D. Currently the department provides degrees with specialization in climate change and plant physiology, environmental microbiology and biotechnology, GIS and public health and is producing environmentalists who are working in various universities, research institutes and private organizations.

The discipline of environmental sciences deals with delicate and crucial issues of the environment with the mission to impart quality education, introduce new and innovative techniques and conduct research so that environmental issues can be minimized and resolved. For this purpose, four specific objectives were sought which are measurable and achievable and were analyzed thoroughly in accordance with the criteria set by Higher Education Commission. The program mission objectives and outcomes are assessed and strategic plans are presented to achieve the goal, which are again measurable through definite standards. Programme outcomes appeared to be satisfactory. Teachers' evaluation revealed satisfactory standards, and most of the students ranked

them in high category and satisfied by the level of education and training imparted by them. Alumni surveys revealed variable results with regards to knowledge, interpersonal skills, management and leadership skill. Weaknesses were identified which are related to some practical demonstrations and improvements have been suggested.

Pre-requisites are fully observed, academic schemes are fully prepared in advance and examinations are conducted as per schedules and. M.Phil degree programmes is fully premeditated. Whose usefulness was measured through different standards and it was found to range between satisfactory to highly satisfactory. It was concluded that laboratory facilities are needed to further strengthen. Proper steps are taken to guide the students for programme requirements. They are well informed of relevant scientific societies and job opportunities. As regards the process control covering admission, registration, recruiting policy, courses and delivery of material, academic requirements, performance and grading, university as well as Higher Education Commission have set forth proper rules, which are properly followed. At present there are six faculty members, four are PhD. Among non Ph.Ds, one teacher has won Fulbright scholarship and she has been given admission in Ohio State University USA. Another teacher is pursuing her PhD studies in the department. Teacher's performance is highly satisfactory during 2012-14, which is clearly reflected from the number of publications, citations and projects won by the faculty. Similarly, a very high number of papers have been presented at national and international conferences by the department teachers and students.

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, performance of the department may be further improved considering the following points.

- Provision of at least one more classrooms will facilitate students learning process and would create a better environment of learning.
- One laboratory needs renovation and up-gradation so that postgraduate students can carry out their research without difficulty utilizing a dedicated fully equipped research lab.
- Refresher courses for supporting staff should be arranged to increase level of expertise.
- Budget allocated for department and research activities should be increased.

Performa 9 Faculty Resume-1

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Work Experience :	18 Year(s)
Research Interest :	<input type="checkbox"/> Plant-microbe interactions <input type="checkbox"/> Environmental microbiology & biotechnology
Projects: 2013-14	2 (on-going) 4 (submitted)
Students supervised (2013-14)	M.Sc./ M.Phil.= 13 PhD +04 (in progress)
Papers presented at national/international level (2013-14)	6
Total Publications :	121
Publications (2013-14)	
<ol style="list-style-type: none"> Mahmood, S., A. Khalid, T. Mahmood J.C. Loyola-Licea and D.E. Crowley. 2014. Biotreatment of Reactive Black-5, aniline and CrVI by <i>Pseudomonas</i> sp. in biochar packed bioreactors. Journal of Hazardous Material (Under review). Aslam, M., A. Khalid, T. Mahmood and B. Saba. 2014. Potential of <i>Staphylococcus</i> sp. for improving growth and biomass yield of maize (<i>Zea mays</i> L.) irrigated with dye-contaminated water. Biomass & Bioenergy. (Under review). Imran, M., M. Arshad, D.E. Crowley, F. Negam, B. Shaharoon and A. Khalid. 2014. Yeast extract promotes decolorization of azo dyes by <i>Shewanella</i> sp. through its activity as redox mediator. Applied Microbiology and Biotechnology (under review). Anjum, M., A. Khalid and T. Mahmood. 2014. Anaerobic co-digestion of catering waste with partially pretreated lignocellulosic crop residues. Journal of Cleaner Production. (Accepted with revision). Chishti, Z., Khaliq-ur-Rehman, S. Hussain, A. Khalid and M. Arshad. 2014. Optimization of environmental factors affecting biodegradation of chlorpyrifos insecticide in soil slurry by <i>Enterobacter</i> sp. SWLC2. World Journal of Microbiology and Biotechnology. (Under review). Saba, B., M. Jabeen, A. Khalid, T. Mahmood and I. Aziz. 2014. Effectiveness of rice agricultural waste, microbes and wetland plants in the removal of reactive black-5 azo dye in microcosm constructed wetlands. International Journal of Phytoremediation (Accepted). Mahmood, S., A. Khalid, M. Arshad and R. Ahmad. 2014. Effect of trace metals and electron shuttle 	

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Faculty Resume-2

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Research Interest :	<input type="checkbox"/> Climate Change <input type="checkbox"/> Carbon sequestration/stocking/Biochar <input type="checkbox"/> Heavy Metal Toxicity
Projects: 2013-14	2 (on-going) 1 (submitted)
Students supervised (2013-14)	M.Sc./ M.Phil. = 5 PhD = 3
Papers presented at national/international level (2013-14)	7
Total Publications :	47
Publications 2013-14	
<ol style="list-style-type: none"> 1. Mahmood, S., A. Khalid, M. Arshad, T. Mahmood and D.E. Crowley. 2014. Detoxification of azo dyes by oxido-reductase enzymes. <i>Critical Reviews in Biotechnology</i> (Accepted). 2. I. Aziz., N. bangash, T. mahmood and K.R. Islam. 2014. Impact of no-till and conventional tillage practices on soil chemical properties. <i>Pakistan Journal of Botany</i> (Accepted) 3. Irfan Aziz, Tariq Mahmood and Rafiq Islam Khandakar. 2014. Impact of long-term tillage and crop rotation on concentration of soil particulate organic matter associated carbon and nitrogen. <i>Pak. J. Agri. Sci., Vol. 51(3), 1-8; 2014</i> 4. Mahmood, S., A. Khalid, T. Mahmood J.C. Loyola-Licea and D.E. Crowley. 2014. Biotreatment of Reactive Black-5 azo dye, aniline and CrVI by <i>Pseudomonas</i> sp. in biochar packed bed bioreactors. <i>Journal of Hazardous Materials</i>. (Under Review) 5. Saba, B., M. Jabeen, A. Khalid, T. Mahmood and I. Aziz. 2014. Effectiveness of agro-waste, microbes and wetland plants in the degradation of reactive black-5 azo dye in microcosm constructed wetlands. <i>Chemosphere</i> (Under review) 6. Abid J., T. Mahmood, A. Khalid and M.T. Siddique. 2014. Optimization of pyrolysis yields of <i>Broussonetia papyrifera</i> (paper mulberry) and application of biochar product for the improvement of maize growth. <i>International Journal of Agriculture and Biology</i> (In press). 7. Mahmood, S., A. Khalid, T. Mahmood, M. Arshad and R. Ahmad. 2013. Potential of newly isolated bacterial strains for simultaneous removal of hexavalent chromium and reactive black-5 azo dye from tannery effluents. <i>Journal of Chemical Technology and Biotechnology</i> 88: 1506-1513. 8. Shahzadi, I., A. Khalid, S. Mahmood, M. Arshad, T. Mahmood and I. Aziz. 2013. Effect of bacteria containing ACC deaminase on growth of wheat seedlings grown with chromium contaminated water. 	

Pakistan Journal of Botany 45: 487-494.

9. Rashid, A., **T. Mahmood**, F. Mahmood, A. Khalid, B. Saba, A. Batool and A. Riaz. 2013. Phytoaccumulation, competitive adsorption, and evaluation of chelators metal interaction in lettuce plant. Environmental Engineering and Management Journal. <http://omicron.ch.tuiasi.ro/EEMJ/>.
10. Ud Din, I., A. Rashid, **T. Mahmood** and A. Khalid. 2013. Effect of land use activities on PAH on urban soils of Rawalpindi and Islamabad, Pakistan. Environmental Monitoring and Assessment. 85(10): 8685-8694.
11. Saba, B., A. Khalid, A. Nazir, H. Kanwal and **T. Mahmood**. 2013. Reactive black-5 azo dye treatment in suspended and attach growth sequencing batch bioreactor using different co-substrates. International Biodeterioration and Biodegradation 85: 556-562.
12. Bangash, N., A. Khalid, **T. Mahmood** and M.T. Siddique. 2013. Screening rhizobacteria containing ACC deaminase for growth promotion of wheat seedlings under water stress. Pakistan Journal of Botany 45: 91-96.

Faculty Resume-3

Dr. Audil Rashid	
Assistant Professor	
Ph.D. (Environmental Biology) Quaid-i-Azam University, Islamabad.	
Department of Environmental Sciences	
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Email :	audil@uair.edu.pk
Address :	Department of Environmental Sciences, Pir Mehr Ali Shah, Arid Agriculture University Rawalpindi
Work Experience :	17 Year(s)
Research Interest :	<input type="checkbox"/> Phytoremediation and rhizosphere microbiology <input type="checkbox"/> Eco-Health and global change assessment <input type="checkbox"/> Urban ecology and GIS analysis
Projects: 2013-14	2 (on-going)
Students supervised (2013-14)	M.Sc./ M.Phil.= 15 PhD = 2
Papers presented at national/international level (2013-14)	7
Total Publications :	20
Publications 2013-14	
<ol style="list-style-type: none"> Kamal, A. and Rashid, A. (2014). Benzene exposure among auto-repair workers from workplace ambience: a pioneer study from Pakistan. <i>International Journal of Occupational Medicine and Environmental Health</i>, 27(5):830–839. Naseem, A., Rashid, A., Kureshi, N., (2014). E-health: effect on health system efficiency of Pakistan. <i>Annals of Saudi Medicine</i>. 34, 59-64. Amjad, M.S., Arshad, M., Rashid, A., Chaudhari, S.K., Malik, N.Z., Fatima, S., Akrim, F. (2014). Examining relationship between environmental gradients and Lesser Himalyan forest vegetation of Nikyal valley, Azad Jammu and Kashmir using ordination analysis. <i>Asian Pacific Journal of Tropical Medicine</i>, 7(1): S610-S616. Kamal, A., Ali, U., Ramey, M.I., Younas, S.M.Z., Sumbul, S., Malik, R.N., Rashid, A. (2013) Principle component analysis of flue gas exhaust from a functional incinerator in the vicinity of Rawalpindi Pakistan. <i>Arabian Journal of Chemistry</i>. (Accepted: available online 24 August 2013). Din, I.U., Rashid, A., Mahmood, T. and Khalid, A. (2013) Effect of land use activities on PAH contamination in urban soils of Rawalpindi and Islamabad, Pakistan. <i>Environmental Monitoring & Assessment</i>, 185(10): 8685–8694. Mehmood, F., Rashid, A., Mahmood, T. and Dawson, L. (2013) Effect of DTPA on Cd solubility in soil, accumulation and subsequent toxicity to lettuce. <i>Chemosphere</i>. 90: 1805–1810. Rehman, M.S. Saif, A., Rashid, A. and Mahmood, T. (2013) Chemometric classification of advanced oxidation processes for the degradation of pharmaceuticals and personal care products. <i>Environmental Engineering and Management Journal</i>. 12: 475–481. 	

Faculty Resume-4

Dr. Shahid Mahmood	
Assistant Professor	
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Work Experience :	5 Year(s)
Research Interest :	<input type="checkbox"/> Wastewater Treatment <input type="checkbox"/> Toxicology
Total Publications :	12
Publications 2013-14	
<ol style="list-style-type: none"> 1. Khalid, A. and S. Mahmood. 2015. The biodegradation of azo dyes by Actinobacteria. p. 1-18. In: S.N. Singh (Ed.). Microbial degradation of synthetic dyes in wastewaters. Springer, Switzerland. DOI 10.1007/978-3-319-10942-8_13 2. Mahmood, S., A. Khalid, M. Arshad, T. Mahmood and D.E. Crowley. 2014. Detoxification of azo dyes by oxido-reductase enzymes. Critical Reviews in Biotechnology (Accepted). 3. Mahmood, S., A. Khalid, M. Arshad and Riaz Ahmad. 2014. Effect of trace metals and electron shuttle on simultaneous reduction of Reactive Black 5 azo dye and hexavalent chromium in liquid medium by Pseudomonas sp. Chemosphere (Accepted) 4. Khalid, A., J. Arshad, S. Mahmood, I. Aziz and M. Arshad. 2014. Effect of chromium forms on the biodegradation of reactive lack-5 azo dye by Psychrobacter and Klebsiella species. International Journal of Agriculture and Biology (Published online). 5. Mahmood, S., A. Khalid, T. Mahmood, M. Arshad and R. Ahmad. 2013. Potential of newly isolated bacterial strains for simultaneous removal of hexavalent chromium and reactive black-5 azo dye from tannery effluents. Journal of Chemical Technology and Biotechnology 88: 1506-1513. 6. Shahzadi, I., A. Khalid, S. Mahmood, M. Arshad, T. Mahmood and I. Aziz. 2013. Effect of bacteria containing ACC deaminase on growth of wheat seedlings grown with chromium contaminated water. Pakistan Journal of Botany 45: 487-494. 7. Khaliq, S., A. Khalid, B. Saba, S. Mahmood, M.T. Siddique and I. Aziz. 2013. Effect of ACC deaminase bacteria on tomato plants containing azo dye wastewater. Pakistan Journal of Botany 45: 529-53. 	

Faculty Resume-5

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Lecturer	
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Work Experience :	7 Year(s)
Research Interest :	<input type="checkbox"/> Drinking water Quality <input type="checkbox"/> Heavy metal and other Contaminants in drinking and irrigation water <input type="checkbox"/> Waste water toxicology
Students supervised (2013-14)	M.Sc./ M.Phil. = 9
Total Publications :	14
Publications 2013-14	
<ol style="list-style-type: none"> 1. Nafeesa, S., Aniq Batool, S. S. Kazmi, S. Imad, M. A. Ghufuran, M. Shafqat, T. Mahmood. 2014. Quality assessment of natural springs of Margalla Hills Islamabad Zone-III for drinking purpose. <i>Applied Water Science</i>. (Under Review) 2. Nousheen, R., Aniq Batool, M.S.U. Rehman, M.A. Ghufuran., M.T. Hayat, T. Mahmood. 2014. Fenton-biological coupled biochemical oxidation of mixed wastewater. <i>Journal of the Taiwan Institute of Chemical Engineers</i>, 45: 1661–1665. (IF: 2.637) 3. Qadeer S., Aniq Batool, A.Rashid, A.Khalid, N. Samad, M.A. Ghufuran. 2014. Effectiveness of biochar in soil conditioning under simulated ecological conditions. <i>Soil Environment</i>. 33(2): 149-158. 4. Rashid, A., T. Mahmood, F. Mehmood, A. Khalid, B. Saba, Aniq Batool, and A. Riaz. (2014) Phytoaccumulation, competitive adsorption and evaluation of chelators-metal interaction in Lettuce plant. <i>Environmental engineering and Management Journal</i>. 13(10) (IF 1.435). 5. Mehmood, C. T., Aniq Batool and Qazi I. A. 2013. Combined Biological and Advanced Oxidation Treatment Processes for COD and Color Removal of Sewage Water. <i>International Journal of Environmental Science and Development</i>. 4 (2) 6. Mukhtar Uddin, M.A. Ghufuran, M. Idrees, M. Irshad, S. Jabeen, W. Ahmad, I. Malook, Aniq Batool, A. Rashid, M. Arshad and R. Naeem. (2012) Antibacterial Activity of Methanolic Root Extract of <i>Asparagus racemosus</i>, <i>Journal of Public Health and Biology</i>, 1(2): 32-35 	

Faculty Resume-6

Ms. Beenish Saba	
Lecturer	
M.S (Environmental Engineering) National University of Sciences & Technology.	
Department of Environmental Sciences	
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Email :	beenishsaba@uair.edu.pk
Address :	Department of Environmental Sciences, Pir Mehr Ali Shah, Arid Agriculture University Rawal
Work Experience :	5 Year(s)
Research Interest :	<input type="checkbox"/> Toxicology <input type="checkbox"/> Physicochemical processes for wastewater 3 M.Sc. 2 M.Phil students produced.
Projects: 2013-14	1 (on-going)
Students supervised (2013-14)	M.Sc./ M.Phil.= 8
Papers presented at national/international level (2013-14)	4
Total Publications :	15
Publications 2013-14	
<ol style="list-style-type: none"> 1. Saba. B., Jabeen. M., Aziz. I., Khalid, A., and Christy, A. D., (2014) Role of agro-waste based activated biochar and microbes in reactive black dye degradation from microcosm constructed wetlands. International Journal of phytoremediation. (In press). (IF 1.466) 2. Saba. B., (2014). Potential treatment options for hydro fracking return fluids. Journal of Chemical and Biological Engineers. 1(6), 1-8. 3. Rashid, A., T. Mahmood, F. Mehmood, A. Khalid, B. Saba, A. Batool and A. Riaz (2014). Phytoaccumulation, competitive adsorption and evaluation of chelators-metal interaction in Lettuce plant. Environmental Engineering and Management Journal. 13(10). (In press) (IF 1.258). http://omicron.ch.tuiasi.ro/EEMJ/accepted.htm 4. Saba, B., B. Zaman., T. Mahmood., and S. Jamal Khan., (2014) Treatment of wastewater with a high c/n ratio in sequencing batch bioreactor (SBBR) containing biocarriers. Environmental Engineering and Management Journal. (In press) (IF 1.258). 5. Saba, B., Jabeen, M., Mahmood, M., and Aziz. I., (2014). Treatment comparison efficiency of microbial amended agro-waste biochar constructed wetlands for reactive black textile Dye. IPCBEE 65 (3), 13-16. 6. Saba, B., A. Khalid, A. Nazir, H. Kanwal and T. Mahmood. (2013). Reactive black-5 azo dye treatment in suspended and attach growth sequencing batch bioreactor using different co-substrates. International Bioter and Biodeger J. 85,556-562. (IF=2.235) http://dx.doi.org/10.1016/j.ibiod.2013.05.007. 	

7. Saba, B., T. Mahmood., B. Zaman., A. Khalid and S. Jamal Khan., (2012) Treatment of high strength wastewater in sequencing batch bioreactors (SBBRs) using suspended and attached growth configuration. *International Journal of Agriculture and Applied Sciences* 4(1) 1-7.
8. Rafique, U., B. Saba and A. Bashir., (2012), Identification, risk assessment and analysis of anionic surfactants in car wash effluents. *International Journal of Agriculture and Applied Sciences* 4(1) 63-68.
9. Khaliq, S., A. Khalid, B. Saba, S. Mahmood, M. T. Siddique. (2013). Effect of ACC deaminase bacteria on tomato plants containing azo dye wastewater. *Pakistan Journal of Botany*, 45(S1) 529-534 (IF 1.207) [http://www.pakbs.org/pjbot/tcontents/tcontent45\(S1\)71-80.html](http://www.pakbs.org/pjbot/tcontents/tcontent45(S1)71-80.html)