Pir Mehr Ali Shah

ARID AGRICULTURE UNIVERSITY RAWALPINDI

Self-Assessment Report 2010-12 (3rd cycle)

Degree Programme: M.Sc.

DEPARTMENT OF ENVIRONMENTAL SCIENCES

Program Team

1. Prof. Dr. Tariq Mahmood (Coordinator)

2. Dr. Azeem Khalid (Member)

3. Dr. Audil Rashid (Member)

Table of Contents

Introduction

The department of Environmental Sciences was established in May 2007 at University of Arid Agriculture, Rawalpindi. The Department 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 understand 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 Sciences (MSc) and Master of Philosophy (M. Phil) is a two year degree program including research work leading to their interest along with their 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 full range of environmental professions, particularly in areas relating 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 understanding the 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 eight criteria.

Criteria 1

PROGRAM MISSION, OBJECTIVES AND OUTCOMES

CRITERIA 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 Department of Environmental Sciences is to provide quality education and train manpower through innovative research for the management sustainability of environment.

Objectives

1) Identification of community problems with reference to environmental health and interventions through effective teaching and state of the art curriculum designing for Environmental Science.
2) Grooming of students to understand inter-relationship between sustainable development and environmental protection.
3) Building capacity of students to conduct research on emerging challenges in the field of environmental science.
4) Enable the students to carry out pollution assessment inquiries caused by industrial effluents, gaseous emissions and solid wastes and develop innovative strategies through research to protect our environments.

Main elements of strategic plan to achieve mission and objectives

 Development of efficacious teaching program for degree awards

 Curriculum designing and upgradation involving proposition of new courses, organizing 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

 Development of collaborative research linkages with international universities

Table.1.1. Program Objectives assessment

S. No	Objectives	How measured	When measured	ıprovement identified	ovement made
1	Development of effective teaching and state of the art 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 cisis, renewable energy and conservation are included.
2	Grooming of students for environment protection	Discussion and presentation by the students on crucial aspects of the environment. Conferences and workshops are also organized by the department almost each 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.	Several initiatives were taken to indulge students in seminar, workshops in which responsibility was given to them. Students are strongly encouraged to participate in the conferences. 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	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. Students of PhD are asked to prepare research proposals according to the Profroma of HEC and also present their work in the conferences.
4.	Enable the students to carry out pollution assessment inquiries and develop innovative strategies through research	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

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

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

Program Assessment Results:

Teacher's evaluation

There are six teachers in the department namely:

1. Prof. Dr. Tariq Mahmood — Professor
2. Dr. Azeem Khalid — Associate Professor
3. Dr. Audil Rashid — Assistant Professor
4. Ms. Aniqa Batool — Lecturer
5. Ms. Beenish Saba — Lecturer
6. Dr. Tahir Malik — Assistant Professor (Interim)

Table 1: Courses offered and evaluated during fall semester 2010-2011 (M.Sc. 1st).

S. No.	Course Code	Course title	Name of instructor
1	ENV-701	Introduction to Environmental Sciences	Miss Aniqa Batool
2	ENV- 702	Environmental Chemistry	Miss Beenish Saba
3	ENV-703	Environmental Microbiology	Dr. Azeem Khalid
4	ENV-704	Research Planning and report writing	Prof. Tariq Mahmood

Table 2: Courses offered and evaluated during fall semester 2010-2011 (M.Sc. 3rd).

S. No.	Course Code	Course title	Name of instructor
1	ENV-706	Environmental Impact and Risk Assessment	Dr. Audil Rashid
2	ENV- 709	Bioremediation of Environmental Contaminants	Dr. Azeem Khalid
3	ENV-710	Solid and Hazardous Waste Management	Miss Beenish Saba
4	ENV-712	Environmental Law and Policy	Miss Aniqa Batool

Table 3: Courses offered and evaluated during spring semester 2011 (M.Sc. 2nd)

S. No.	Course Code	Course title	Name of instructor
1	ENV-705	Environmental Analytical Techniques	Miss Aniqa Batool
3	ENV-715	Public Health and Human Ecology	Dr. Audil Rashid
4	ENV-723	Physico-Chemical Processes for Wastewater	Miss Beenish Saba

Table 4: Courses offered and evaluated during spring semester 2011 (M.Sc. 4th)

S. No.	Course Code	Course title	Name of instructor
1	ENV-799	Research and thesis	

Table 3: Courses offered and evaluated during fall semester 2011-12 (M. Sc. 3rd)

S. No.	Course Code	Course title	Name of instructor
1	ENV-706	Environmental Impact and Risk Assessment	Dr. Audil Rashid
2	ENV-710	Solid Waste Management	Miss Beenish Saba
3	Env-712	Environmental Law and Policy	Miss Aniqa Batool

Table 4: Courses offered and evaluated during spring semester 2012 (M. Sc. 4th)

S. No.	Course Code	Course title	Name of instructor
1	ENV-713	Climatology	Dr. Tariq Mahmood
2	ENV-799	Research and Thesis	----------

Teachers Evaluation

Performa 10

There are five teachers in the department and their names are mentioned in the graph. The teachers were evaluated by the students at the end of the semester in accordance with Performa 10.The results are graphically presented in Fig-1. The overall compiled results showed that Dr. Tariq Mehmood is on the top scoring 4.9 points out of 5 while Miss Aniqa Batool and Miss Beensh Saba are on the bottom scoring 4.54 points. The grading of the other teachers can be seen from the graph.

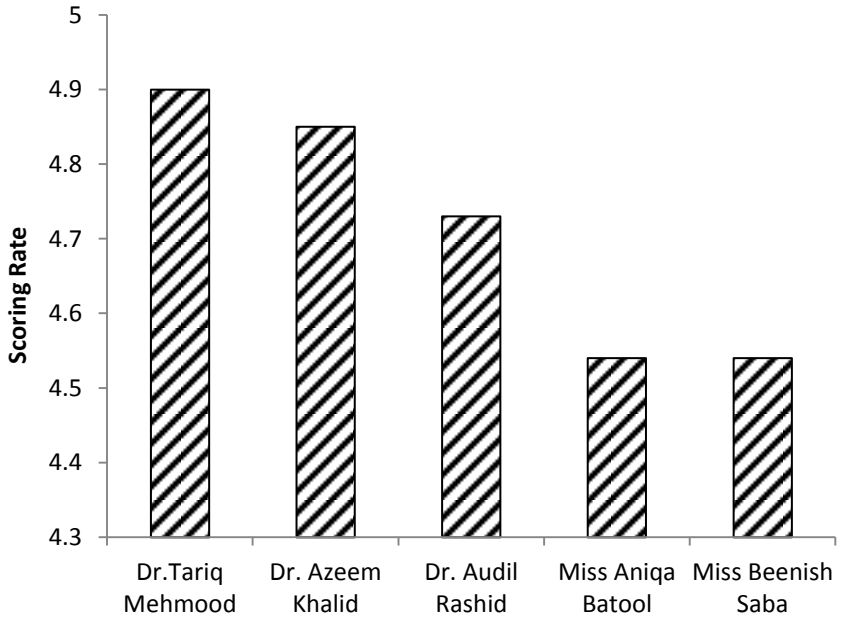


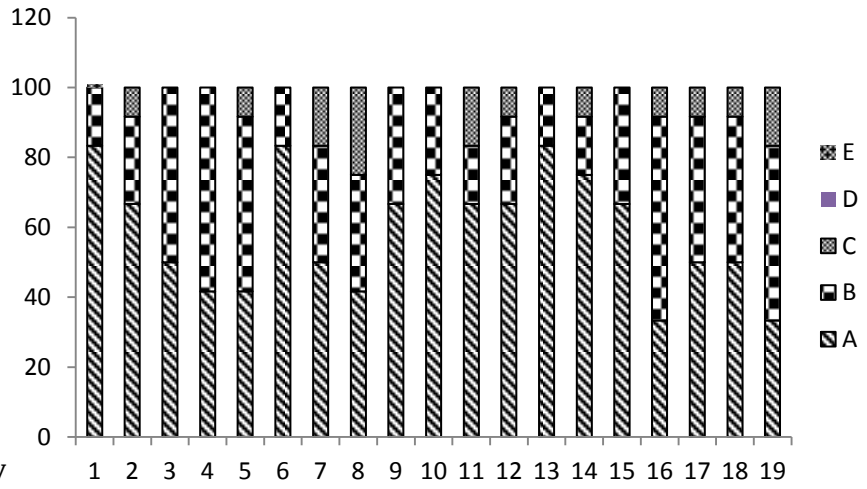
Fig.1. Students' evaluation of teachers for courses offered during last four semesters, fall 2010-spring 2012.

Detail of individual performance of each teacher is obvious from the bar graphs given below.

Miss Aniqa Batool (ENV-701)

The greatest achievement was the preparedness for the class where 62.5% of students reported excellent preparedness of instructor for the class. Only 10 % of the students reported that relevance of course contents of Pakistani perspective is not highlighted.

Course Title: Introduction to Environmental Sciences



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

General Comments of the Students about this Teacher

Weakness:

- Assignments were not returned on time.

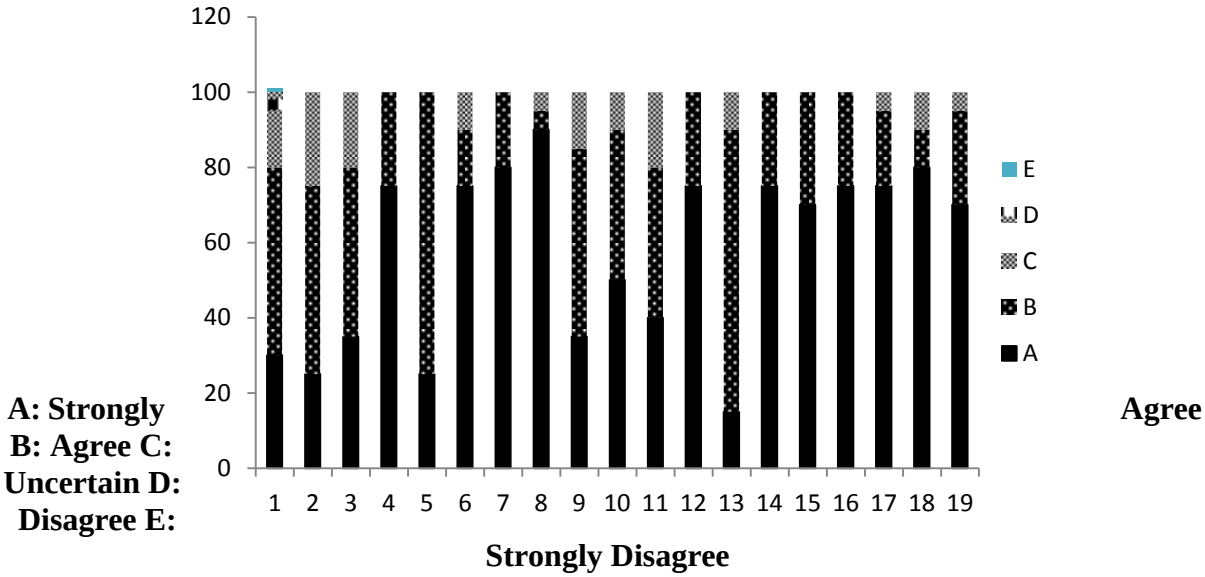
Strengths:

- Class participation is highly appreciated.

Miss Beenish Saba (ENV-702)

Around 56.25% of the respondents showed excellent performance of the instructor in most of the subject categories. 50 % of the students repotred that the course integrates theoretical course concepts with real-world applications

CourseTitle: Environmental Chemistry



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

General Comments of the Students about this Teacher

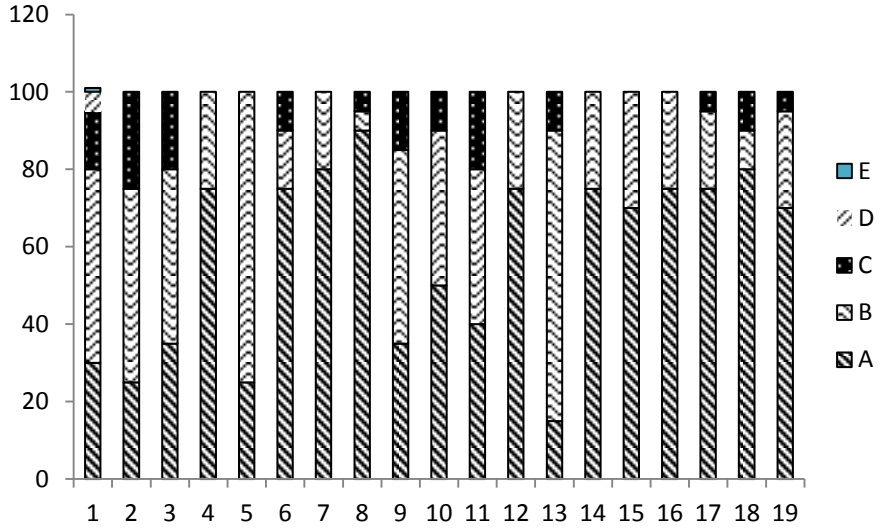
Strength:

Instructor was rated as hardworking, fair for all the students, have good knowledge of the subject, honest, punctual.

Dr. Azeem Khalid (ENV-703)

Most of the responses were obtained in either excellent or good category. Above 62% students reported excellent preparedness of the instructor for the class. Where above 80% reported good assessment mechanism.

Course Title: Environmental Microbiology



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

General Comments of the Students about this Teacher

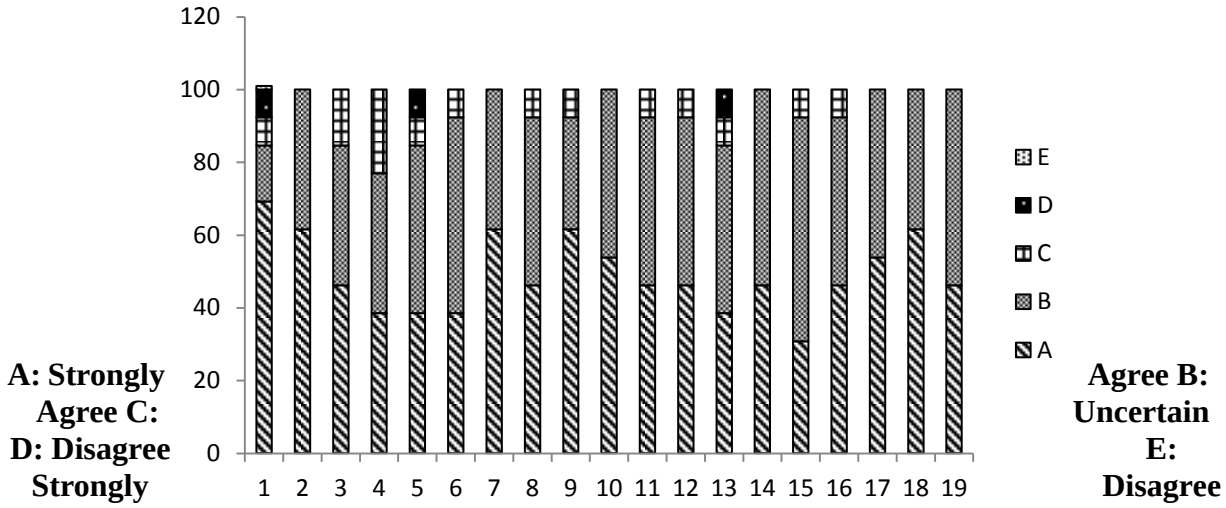
Strengths:

- Class participation is highly appreciated.
- Assignments were graded and returned on time.

Dr. Tariq Mehmood (ENV-704)

Most of the respondents were agree or strongly agree with the teaching method of the instructor. The best part of the course was relevance to Pakistani perspective and more than 90 % responses were obtained in this perspective. 60 % of the students reported that the Instructor was available during the specified office hours and for after class consultations.

Course Title: Research Planning and Report Writing



General Comments of the Students about this Teacher

Strengths:

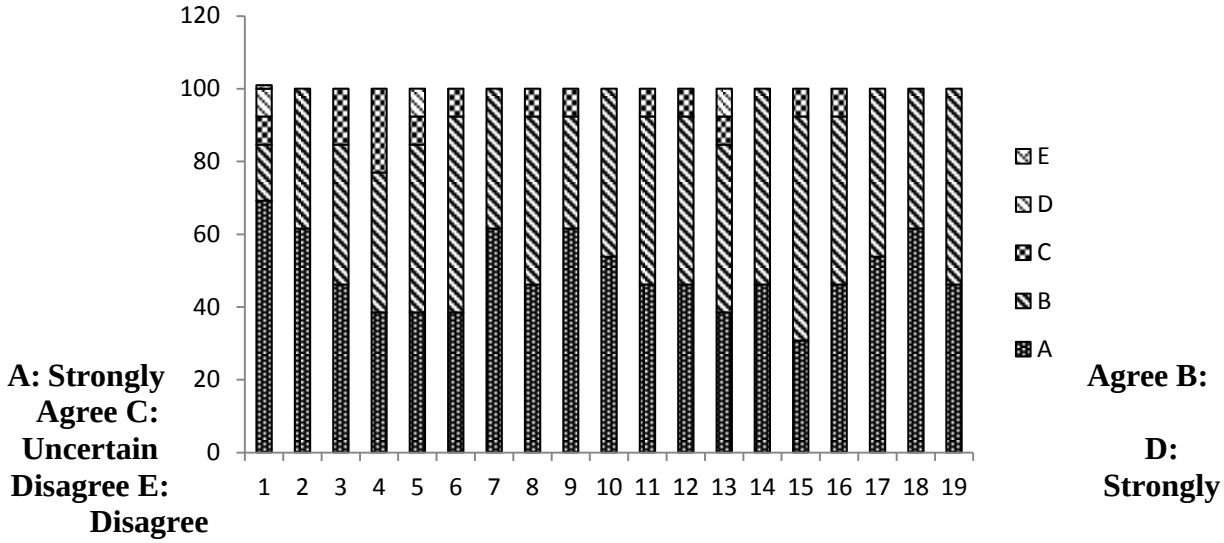
- Instructor provided course related to Pakistani perspective.
- Class participation is highly appreciated.

Dr. Audil Rashid (ENV-706)

Overall the behavior and response of the instructor was effective. 60 % of the students

reported that the Instructor provides additional material apart from the textbook. About 75 % of the students were strongly agreed that the instructor communicates the subject matter effectively.

Course Title: Environmental Impact and Risk Assessment



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

General Comments of the Students about this Teacher

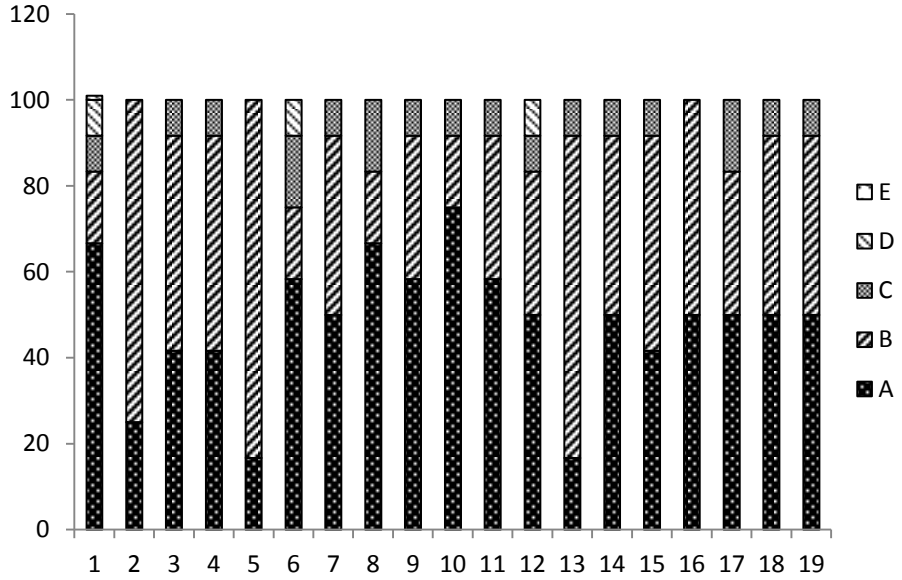
Strength:

- Class discussion is appreciated.

Dr. Azeem Khalid (ENV-709)

66 % of the students reported that the teacher was prepared for each class and he delivered the knowledge very effectively. 58 % of the students were strongly agreed that the course material was up to date. 50 percent of the students reported that the syllabus cleared the course objectives.

Course Title: Bioremediation of Environmental Contaminants



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

General Comments of the Students about this Teacher

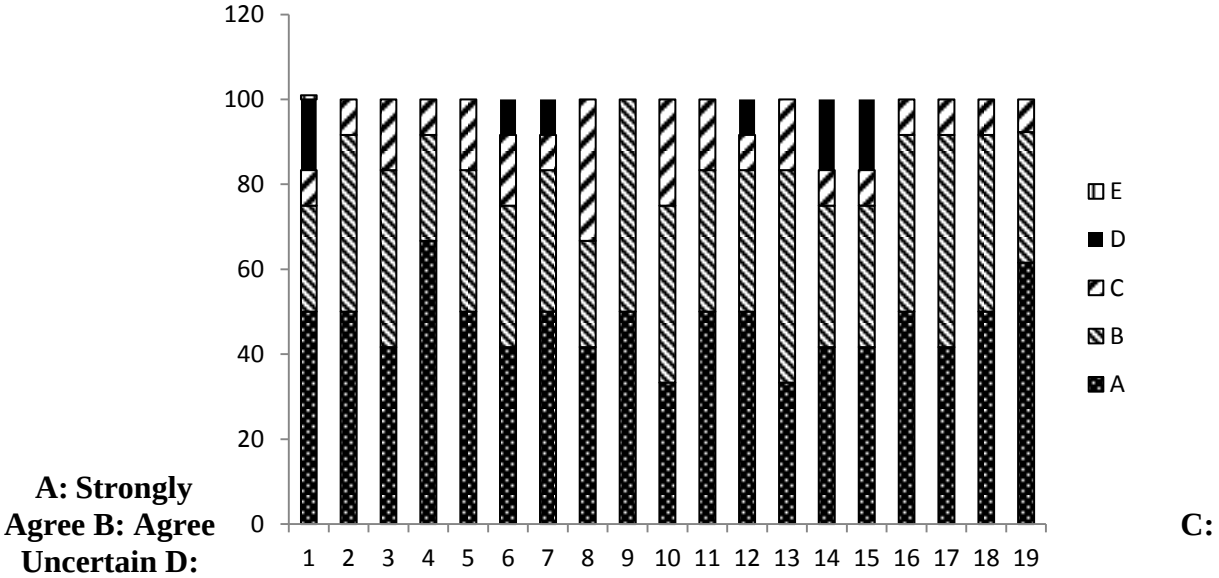
Strength:

- Course material was up to date
- Course objectives were clear

Miss Beenish Saba (ENV-710)

50 % of the students reported that the Instructor shows respect towards students and encourages class participation. Similarly 50 % of the students were strongly agreed about preparedness of instructor for class.

Course Title: Solid Waste Management



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

General Comments of the Students about this Teacher

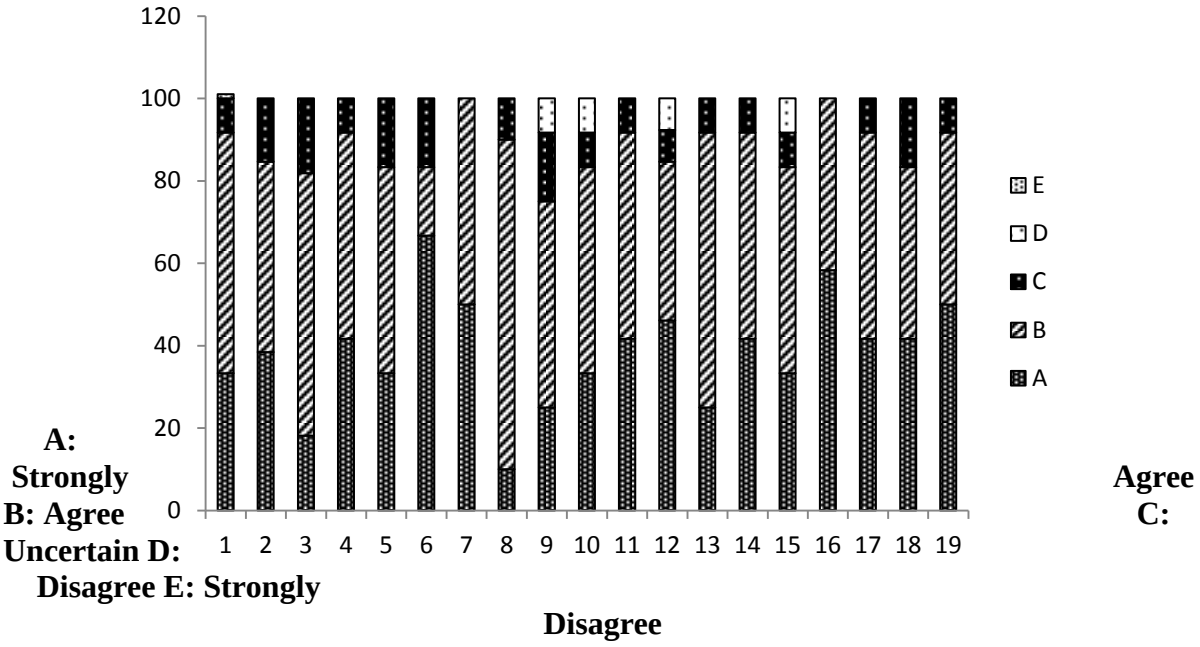
Strengths:

- Class participation is highly appreciated by the instructor.
- Instructor provided up-to-date material.

Miss Aniqa Batool (ENV-712)

46% of the students reported that instructor demonstrate the subject matter effectively. The clarity of the knowledge was the greatest strength of the course with 67% responses in excellent category reported by the students. 66 % of the students reported that the Instructor was available during the specified office hours and for after class consultations.

Course Title: Environmental Law and Policy



General Comments of the Students about this Teacher

Weakness:

- Material provided by the instructor was not up-to-date.

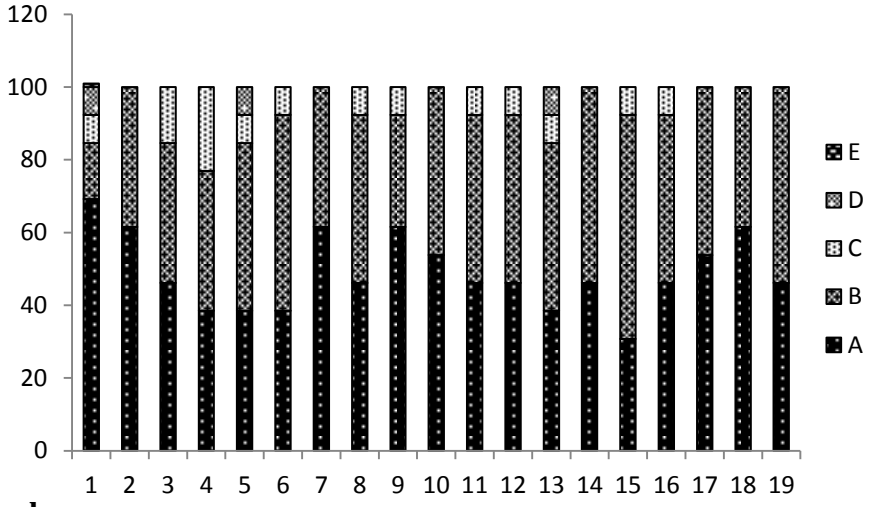
Strengths:

- Assignments were graded and returned on time.
- Method of teaching is appreciated.

Miss Aniqa Batool (ENV-705)

60 % of the students were agree that the Instructor gave citations regarding current situations with
reference to Pakistani context. 8 % of the students reported that the course material was not up to date.

Course Title: Environmental Analytical Techniques



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

General Comments of the Students about this Teacher

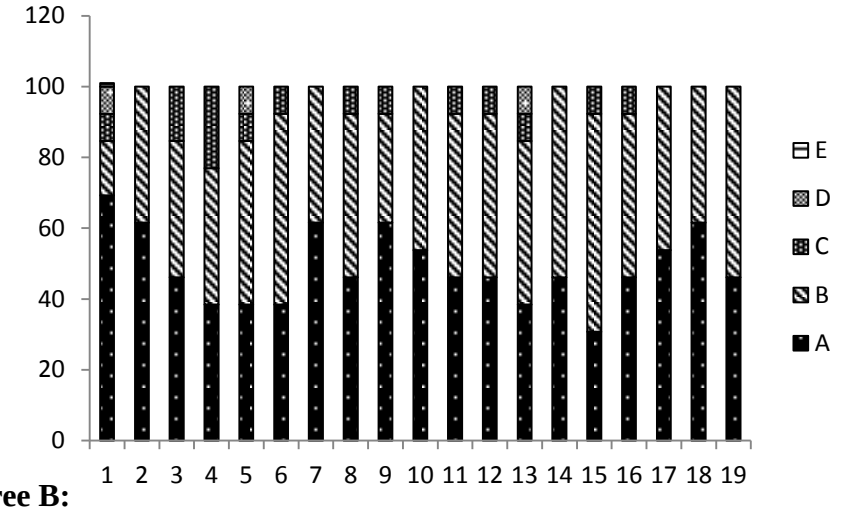
Weakness: 8 % of the students reported that course material was not up date.

Dr. Audil Rashid (ENV-715)

69 % of the students were strongly agreed that the instructor was well prepared for the class. 61 % of the students reported that the Instructor demonstrates knowledge of the subject

effectively. 63 % of the students were agreed that the course material was up date. 23 % of the students were uncertain that the instructor returns the graded scripts etc. in a reasonable amount of time

Course Title: Public Health and Human Ecology



A: Strongly Agree B: Agree

C: Uncertain D: Disagree E: Strongly Disagree

General Comments of the Students about this Teacher

Weakness:

- Instructor was very strict to class.

Strengths:

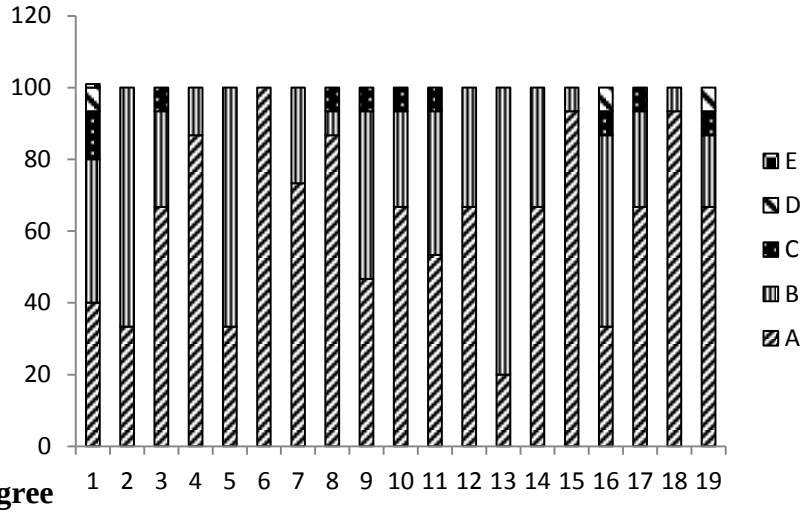
- Method of Assessment was timely.
- Class participation is highly appreciated by the instructor.

Miss Beenish Saba (ENV-723)

86 % of the student's reported that the instructor maintains an environment that is conducive to learning. 93 % of the students reported that instructor dealing with subject Physico-Chemical processes

for Wastewater treatment significantly increased their knowledge by introducing efficient Wastewater treatment procedures.

Course Title: Physico-Chemical Processes for Wastewater Treatment



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

General Comments of the Students about this Teacher

Weakness:

- Instructor should organize more field visits.

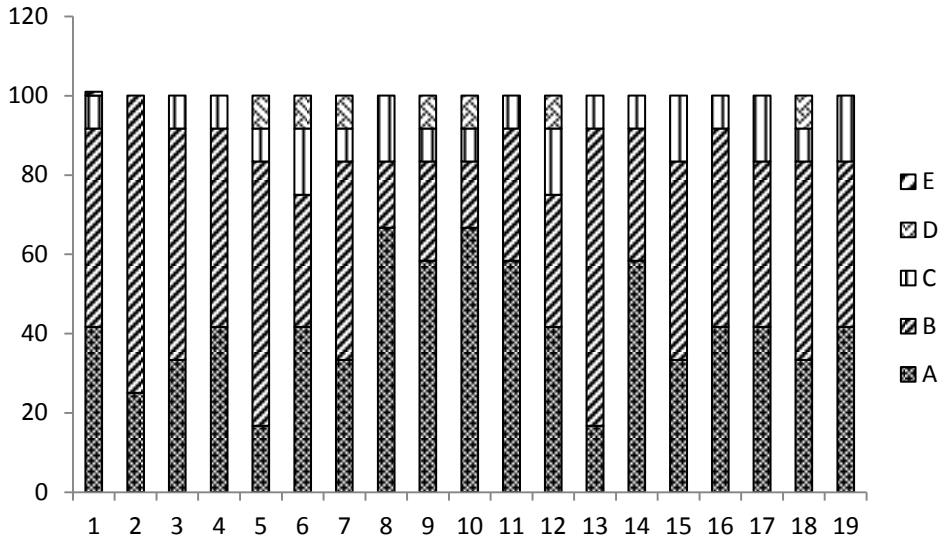
Strengths:

- Material provided by instructor was informative.

Dr. Audil Rashid (ENV-706)

41 % of the students were strongly agreed that the subject matter significantly increased their knowledge. Similarly 66 % of the students reported that assignments were graded and returned on time.

Course Title: Environmental Impact and Risk Assessment



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

General Comments of the Students about this Teacher

Weakness:

- Instructor is strict to class.

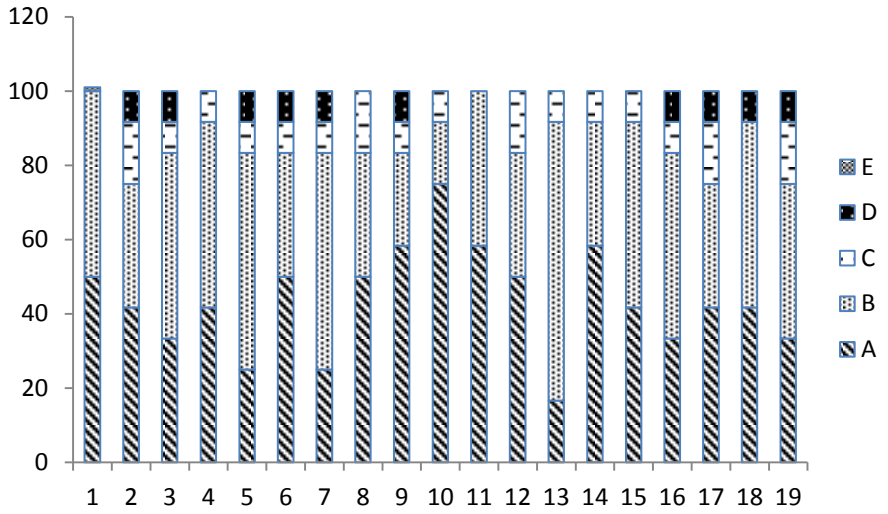
Strengths:

- Material provided by instructor was informative.
- Method of assessment was good.

Miss Beenish Saba (ENV-710)

50 % 0f the students reported that the teacher was prepared for each class and he communicate the subject matter very effectively. 50 % of the students were agreed that the teacher highlighted the course contents relevance to Pakistani perspective.

Course Title: Solid Waste Management



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

General Comments of the Students about this Teacher

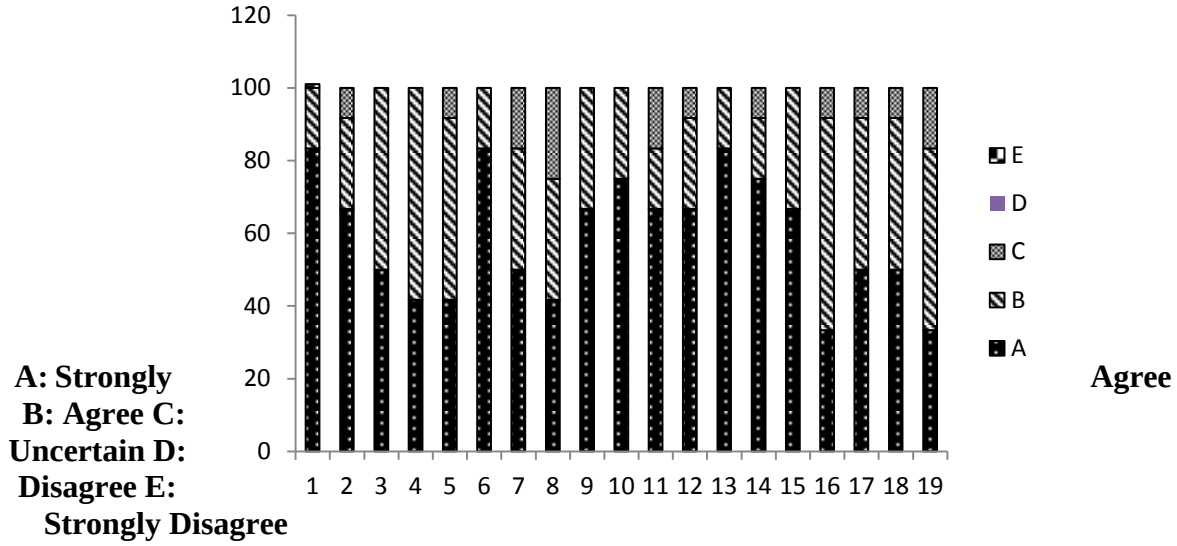
Strengths:

- The teacher provided the course relevant to Pakistani perspective.
- The teacher provided up to date course material.

Dr. Tariq Mehmood (ENV-713)

Instructor presented course work effectively with maximization of up-to-date information and class participation.46 % students reported that instructor was well prepared for each class.

Course Title: Climatology



General Comments of the Students about this Teacher

Weakness:

- More practical's should be added.

Strengths:

- Instructor was polite to class.
- Instructor provide informative course.

Course Evaluation

Performa 1

The courses of the respective teachers were evaluated through Performa 1 and the results are shown in fig given below. It is clear from the graph that the two courses; ENV-703 and ENV-709 taught by Teacher-2 are on the top by having 4.8 and 4.7 points respectively. The course ENV-723 taught by teacher 5 is at lower rank as per student evaluation by scoring 4.01 points. The position of other courses can be seen from the graphs below.

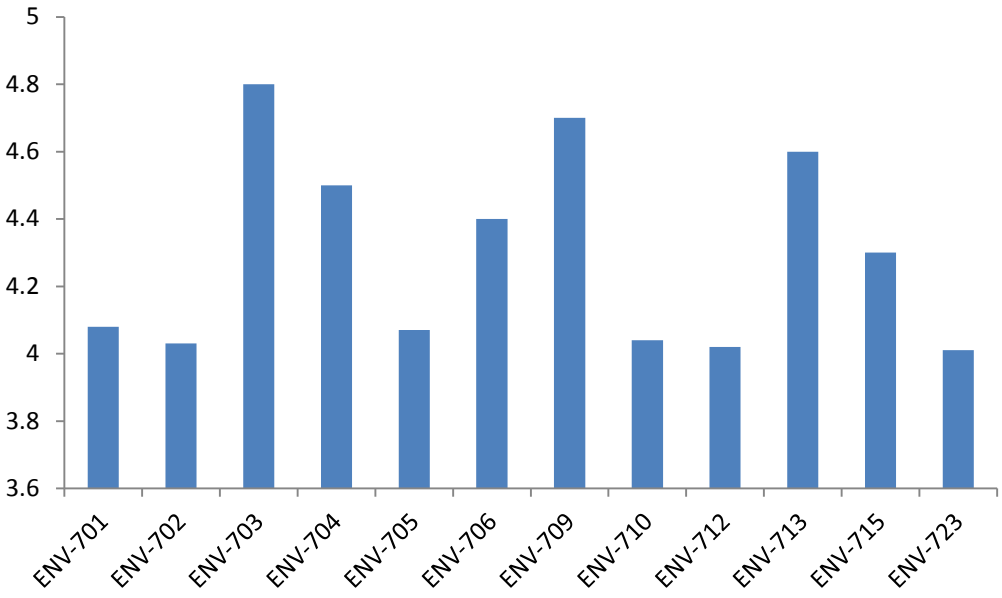
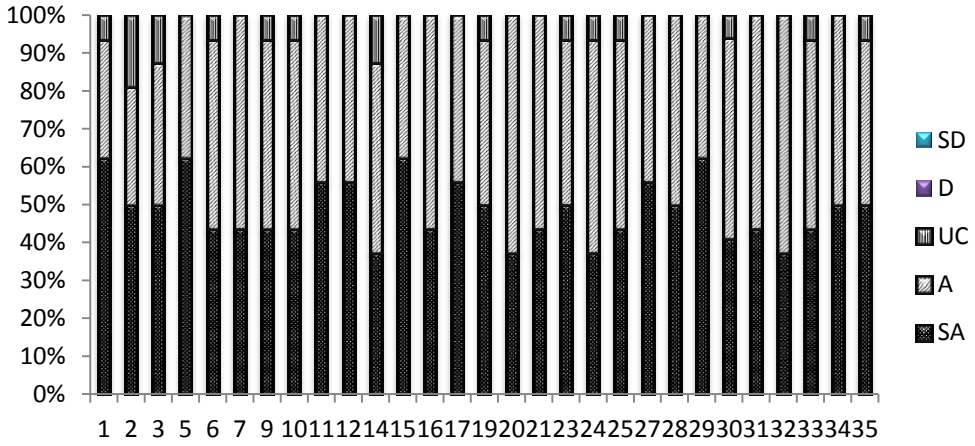


Fig. Students' evaluation of courses offered during last four semesters; Fall-2010-Spring-2012.

ENV-701 (Miss Aniqa Batool)

62.5% of the students strongly agreed with the clarity of course contents, their active participation and responsive behavior of the instructor. However 18.75% were uncertain about the workload of the course whereas in the same category 50% students showed their strong agreement to the manageable workload.

Course Title: Introduction to Environmental Sciences



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

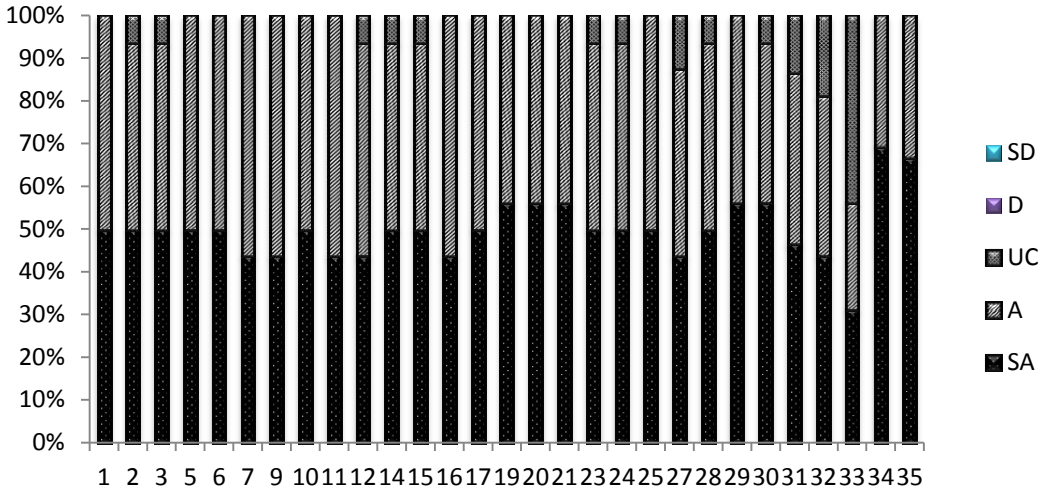
Strengths:

- The material was well organized and course contents were clear.
- The material in the practical's was useful.

ENV-702 (Miss Beenish Saba)

Most of the students either agreed or strongly agreed with the course content, mode of presentation and their progress in the courses with placing more than 50% responses in both options.50 % of the students placed their progress in course in good category.

Course Title: Environmental Chemistry



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

Weakness:

- Material provided was not up-to-date.

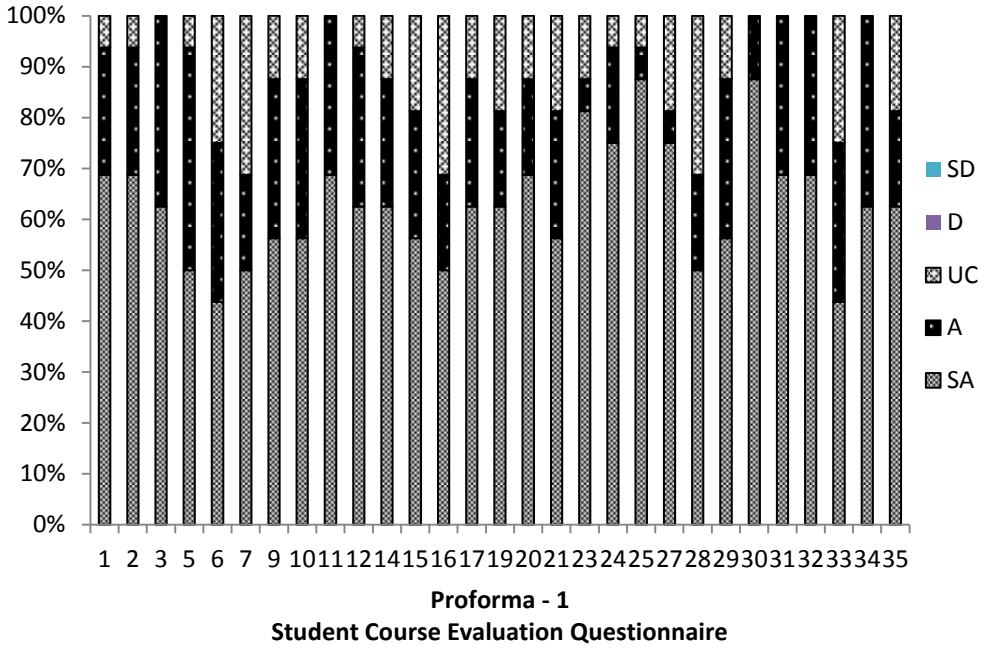
Strengths:

- The overall environment in the classroom was conductive for learning.
- Provision of learning resource on the web was adequate.

ENV-703 (Dr. Azeem Khalid)

The key achievements of the course were manageable workload, helpful assessments and clarity of objectives where placing around 68.75% responses in the satisfied category. The best part evaluated was helpful assessments placed highly satisfied by 87.5% of the students.

Course Title: Environmental Microbiology



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

General Comments of the Students about the Course

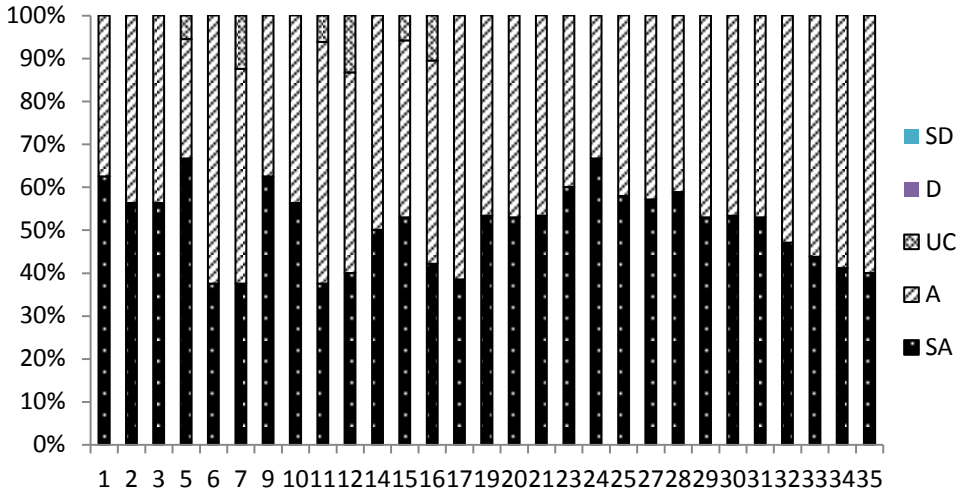
Strengths:

- The pace of the course was appropriate.
- Course material was upgraded.
- The material was well organized and presented.

ENV-704 (Dr. Tariq Mehmood)

62.5 % of the students strongly agreed with the clarity of course objectives, whereas similar number of the students agreed with their active participation in the course work.

Course Title: Research Planning and Report Writing



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

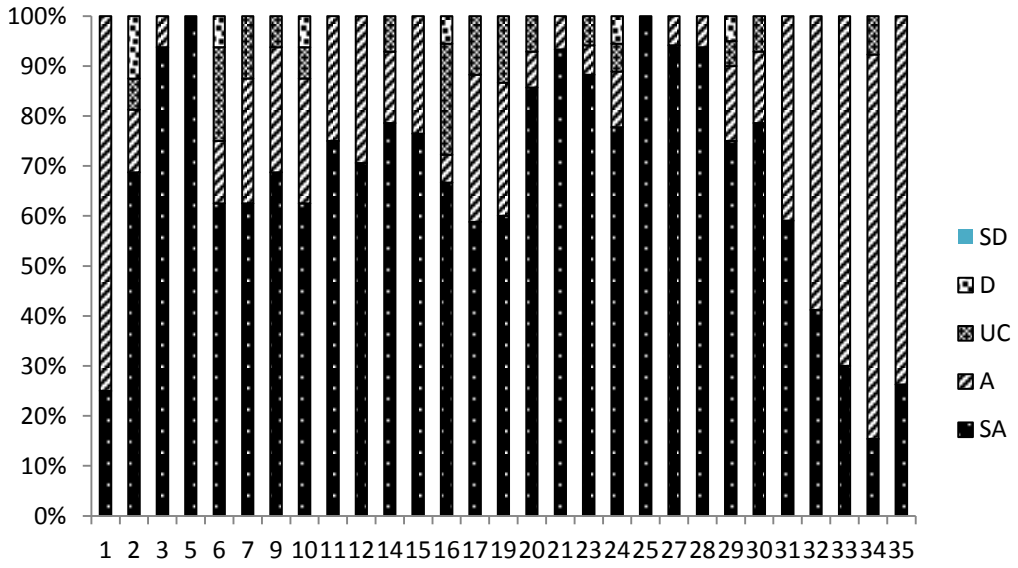
Strengths:

- The material provided in the practicals was useful.
- The course enhanced the students writing skills.

ENV-706 (Dr. Audil Rashid)

Students reported that they highly understood the course (100%). The behavior of the instructor and response towards students was also excellent (>90%). The uncertainties are still their related to course organization and up-to-date material.

Course Title: Environmental Impact and Risk Assessment



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

Weakness:

- Course was not well organized.

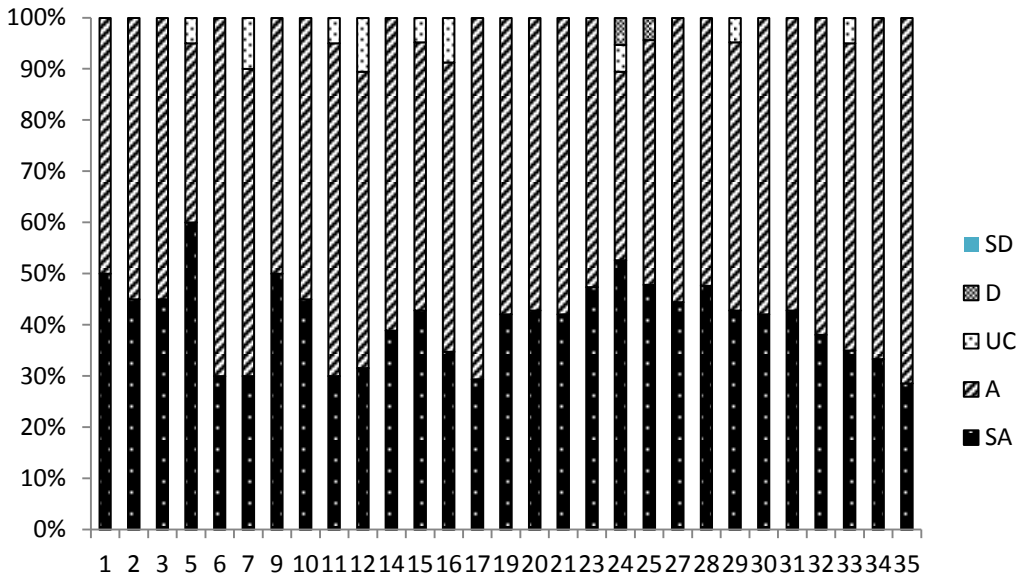
Strengths:

- Instructor effectively deals with students problems.
- Course was informative.

ENV-709 (Dr. Azeem Khalid)

Students were satisfied with the organization, presentation and management of course work. The concerns were shown by 12% students in provision of reading material in library and class durations.

Course Title: Bioremediation of Environmental Contaminants



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

Weakness:

- The provision of learning resource in the library was inadequate.

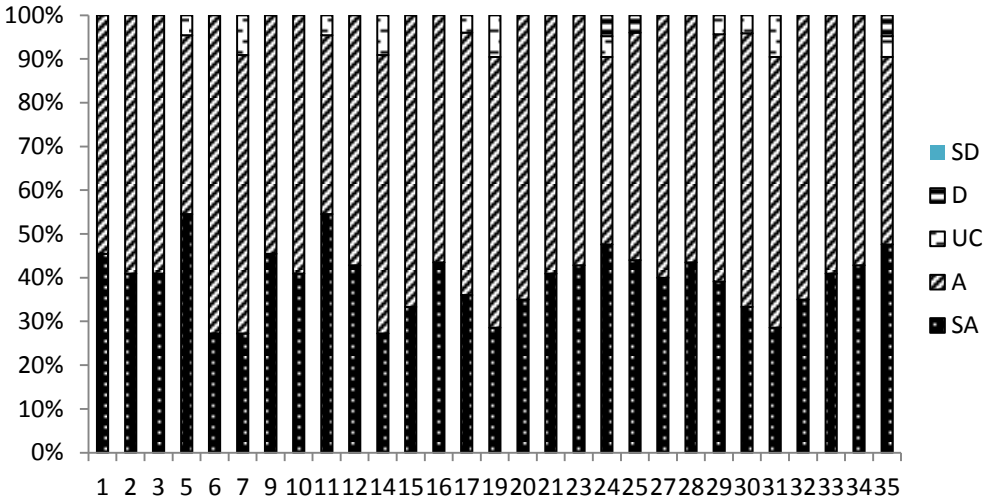
Strengths:

- Idea and concepts were presented clearly.
- The material in the tutorial was very useful.
- Recommended reading books were relevant and appropriate.

ENV-710 (Miss Beenish Saba)

75% students strongly agreed with the relevance of learning material being provided, further same percentage reported their maximum attendance in the class. While feedback assessments and their timely provision was disagreed by 6% of the students.

Course Title: Solid Waste Management



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

Weakness:

- Students did not indicate any weakness.

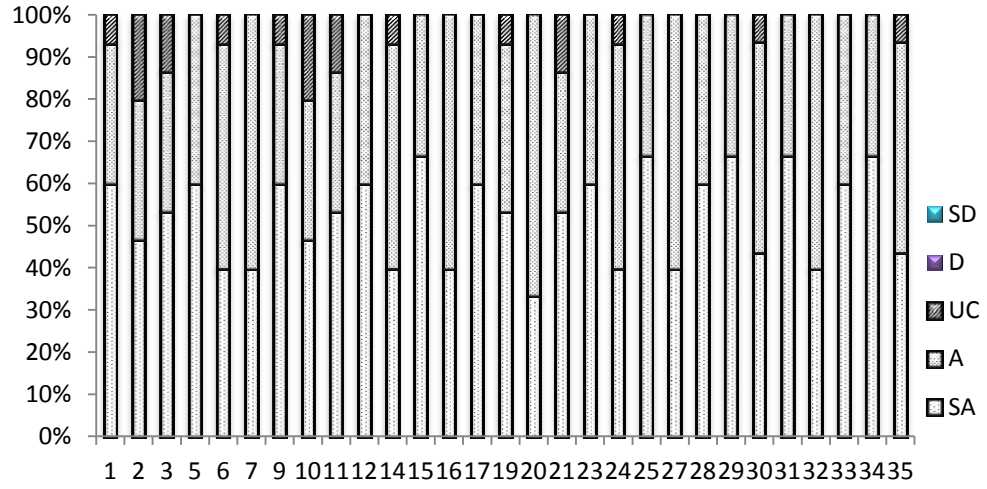
Strengths:

- Objectives of the course were clear.
- Course was well structured to achieve the course outcomes.

ENV-712 (Miss Aniqa Batool)

Overall the contribution of course in providing good piece of knowledge was good. However 13% uncertainties related to student's attendance and ideas being presented and 6% regarding course objective, clarity of knowledge and presented knowledge were still there.

Course Title: Environmental Law and Policy



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

Weakness:

- Course objectives were not clear.

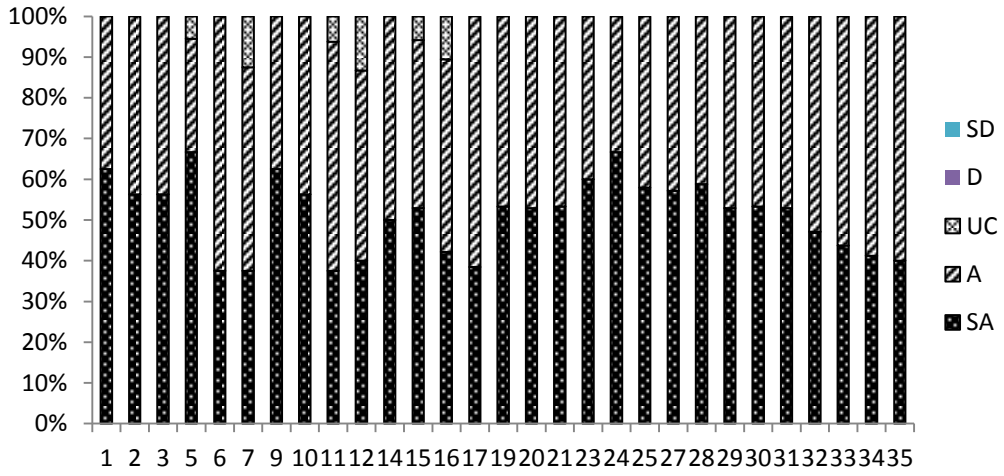
Strengths:

- Feedback on assessment was timely.

ENV-705 (Miss Aniqa Batool)

The students showed great satisfaction related to course contents and provision of knowledge; however the uncertainty related to progress in course and reading material was shown by 13% and 20% students respectively.

Course Title: Environmental Analytical Techniques



Proforma - 1
Student Course Evaluation Questionnaire

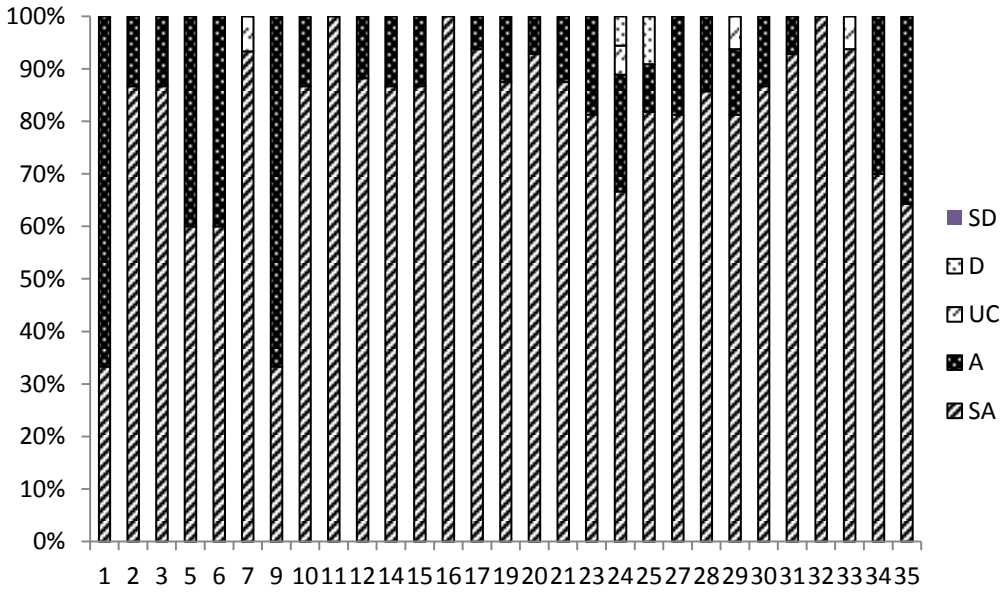
A: Strongly Agree, B: Agree, C: Uncertain, D: Disagree, E: Strongly Disagree

General Comments of the Students about the Course
Weakness:
Students did not indicate any weakness about the course.

ENV-715 (Dr. Audil Rashid)

Couse evaluation showed high satisfaction of the students by placing most of the responses in strongly agreed and agreed category. Around 6% of the students were uncertain about their progress in course and feedback assessments.

Course Title: Public Health and Human Ecology



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

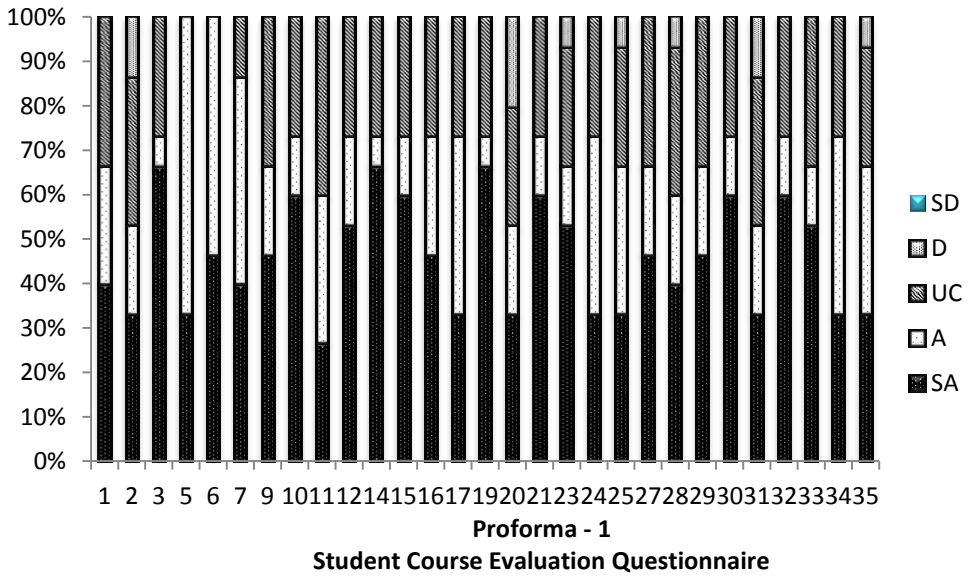
Strengths:

- Provision of learning resource in the library was appropriate.
- The course stimulated students interest in the subject area.
- Course material provided was useful and informative.

ENV-723 (Miss Beenish Saba)

66.6% strongly agreed with the relevance of the course material, organization of the course pace and reported raised interest in the subject matter. Still 13.3% were uncertain about their assessment results.

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 the Course

Weakness:

- Method of assessment was not reasonable.

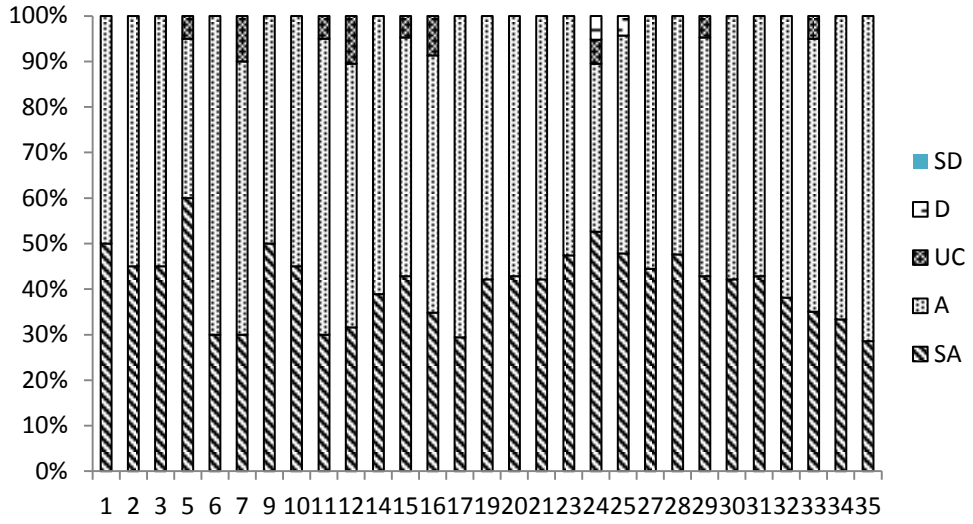
Strengths:

- Class participation is appreciated.
- Learning material was relevant and useful.

ENV-706 (Dr. Audil Rashid)

46 % 0f the students were strongly agree that the course was well organized and 69 % 0f the students reported that the pace of the course was appropriate. 46 % of the students reported that the method on assessment was timely and reasonable.

Course Title: Environmental Impact and Risk Assessment



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

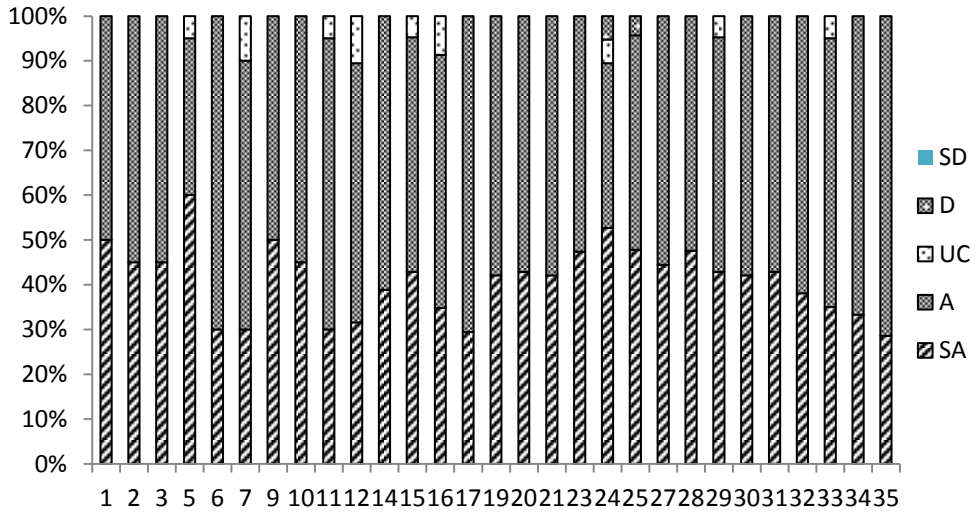
Strengths:

- The material in the tutorials was useful.
- Ideas and concepts were presented clearly.
- Learning material was relevant and useful.

ENV-710 (Miss Beenish Saba)

50 % of the students were agreed that the learning and teaching methods encouraged participation. Similarly 50 % 0f the students were strongly agree that the course material was relevant and useful and overall environment in the classroom was condusive for learning.

Course Title: Solid and Hazardous Waste Management



Proforma - 1
Student Course Evaluation Questionnaire

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

General Comments of the Students about the Course

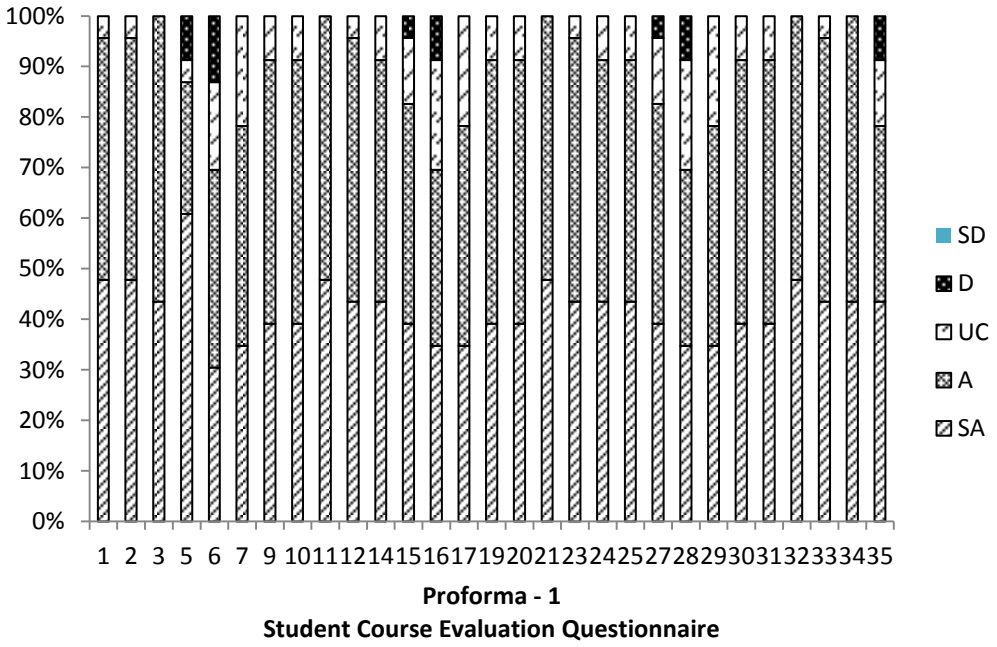
Strengths:

- Recommended reading Books etc. were relevant and appropriate.
- The provision of learning resources in the library was adequate and appropriate.
- Learning material was relevant and useful.

ENV-713 (Dr. Tariq Mehmood)

Overall course structure, clarity and presentation of subject matter were effectively reported in either agreed r strongly agreed category by 50-60% of the students. As shown only few students were uncertain about organization and proficiency of subject matter.

Course Title: Climatology



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

General Comments of the Students about the Course

Weakness:

- Recommended reading books were not relevant.

Strengths:

- Course was well structured.
- Learning materials were relevant and useful.

Performa 2: Faculty course review report

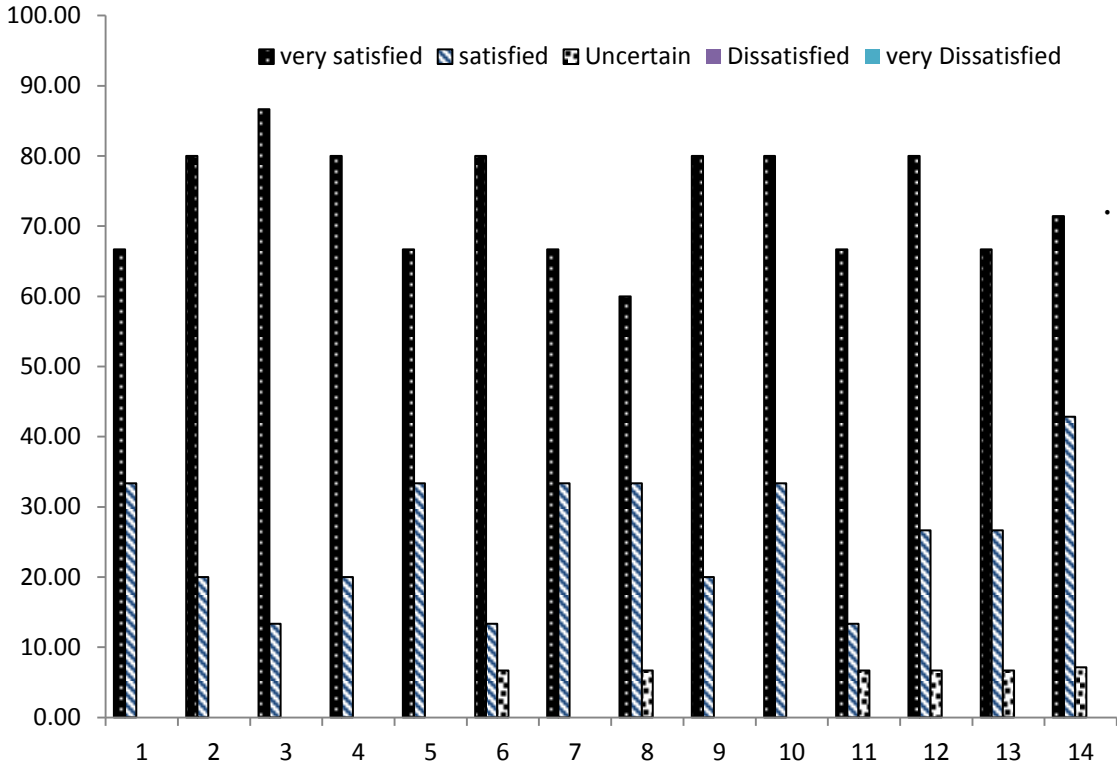
Questionnaire for the evaluation of faculty course review has been filled and analyzed. It was observed from evaluation that the faculty is satisfied with curriculum. The evaluation was done through mid and final term examinations for all courses offered by department. Some courses are lengthy and teachers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

Table: Faculty course review report

Course code	Title	Credit value	Assessment methods	No of students	Comments on curriculum	Any change in future in course	Semester	Course Instructor
ENV-706	Environmental Impact and Risk Assessment	3(0-0)	Midterm and final	12	Lengthy	Course contents shoud be simplified	fall	Dr. Audil Rashid
ENV-712	Environmental Law and Policy	3(0-0)	Midterm and final	15	Good	Course material shoud be updated	fall	Miss Aniqa Batool
ENV-703	Environmental Microbiology	3(2-2)	Midterm and Final	20	Course was intresting	Should be divided	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
- Helping attitude of the chairperson for all students in research and extra-curricular activities
- Commencement of workshops and international workshops
- Study programs in collaboration

Weaknesses:

- There is need for the faculty to get foreign training for the discipline of toxicology and treatment techniques
- Laboratory equipment needs up gradation
- Computational facilities needs extension

Performa 4: Research Students Progress Review

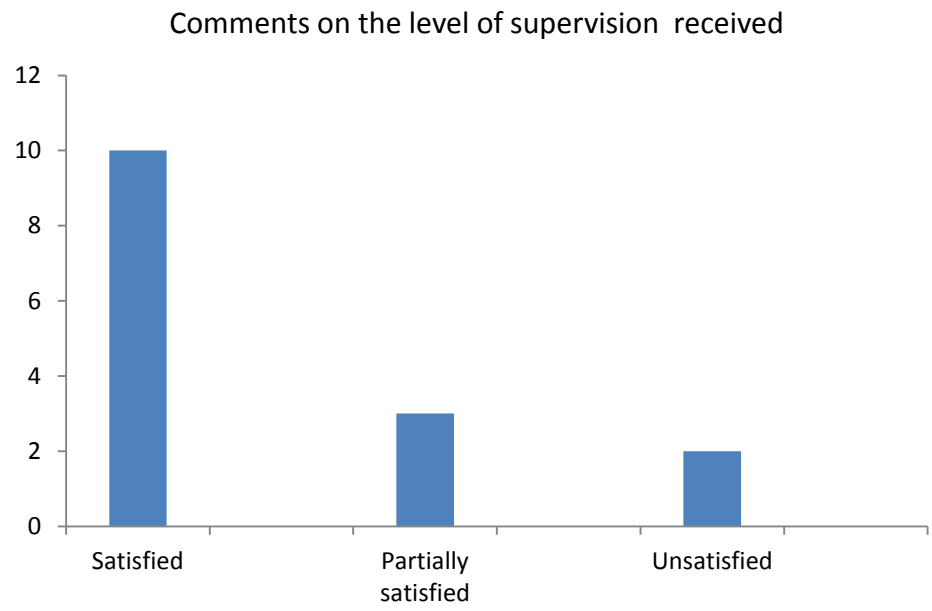


Fig. Comments on the level of supervision received by M.Sc students

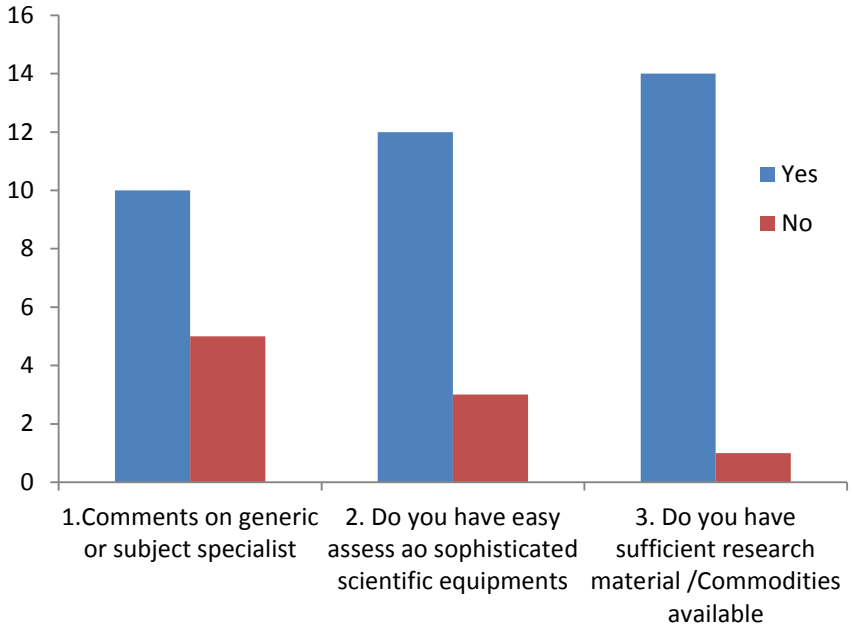


Fig. Responses of M.Sc students on some Misc. Issues

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 are satisfied with their job clarity about promotion process. However, most of the faculty members reported that they are higly satisfied with the admisintritaive support.

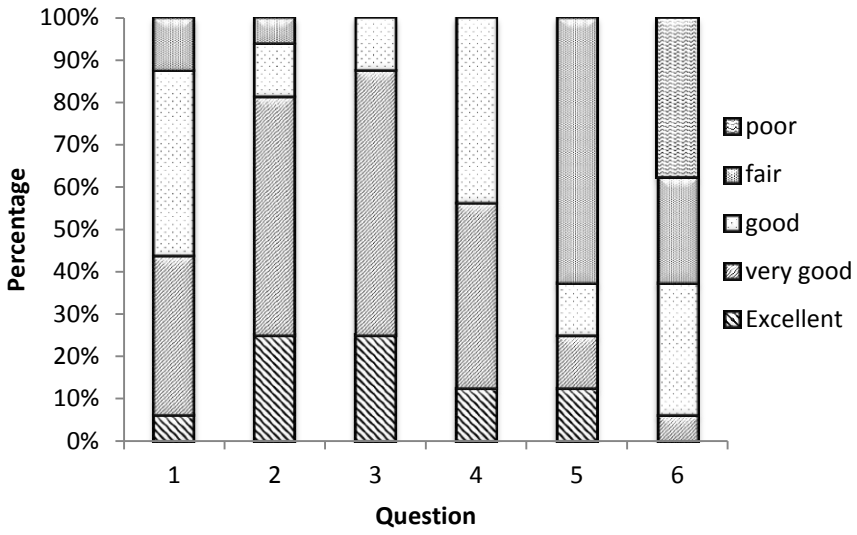
	Dr. Tariq Mahmood	Dr. Azeem Khalid	Dr. Audil Rashid	Miss Aniqa Batool	Miss Beenish Saba
Your mix of research, teaching and community service	A	A	B	B	B
The intellectual stimulation of your work	B	A	A	B	A
Type of teaching / research you currently do.	A	A	B	B	B
Your interaction with students	A	A	A	A	A
Cooperation you receive from colleagues.	B	B	A	B	A
The mentoring available to you.	B	B	B	B	B
Administrative support from the department.	B	B	B	B	B
Providing clarity about the faculty promotion process.	A	B	B	B	B
Your prospects for advancement and progress	A	A	B	B	B

Performa 7: Alumni Survey Results

Department of Environmental Sciences was established in 2007. 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.

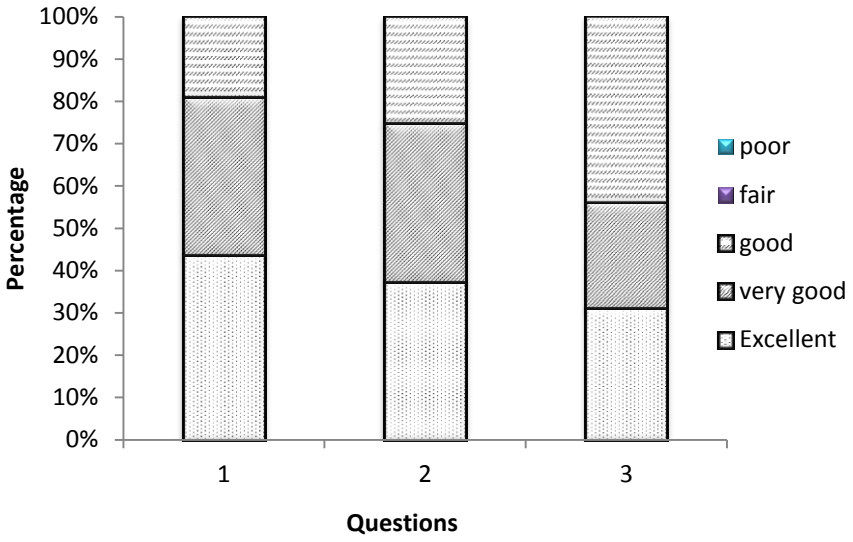


Questions: I: Knowledge

Majority of the Alumni have rated the knowledge imparted by the department at grade B (very good). About 56 % of the students placed the problem solving skills of the department in very good category.

***Questions: II: Communication Skills**

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



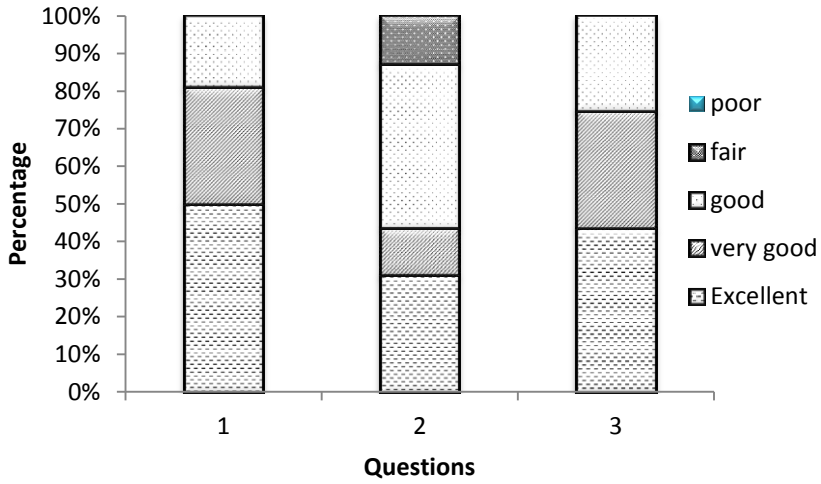
Questions: III:

Interpersonal Skills

1. Ability to work in teams

2. Independent thinking

3. Appreciation of ethical values



Questions: II: Communication Skills

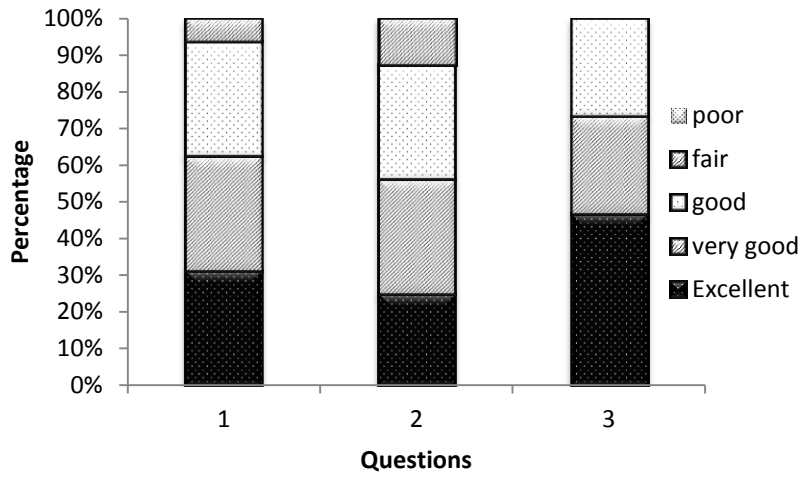
Interpersonal skills have been graded A by majority of the Alumini. Ability to work in team was placed in excellent category by 50 % of the students.

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

1. Resource and Time management skills

2. Judgment

3. Discipline



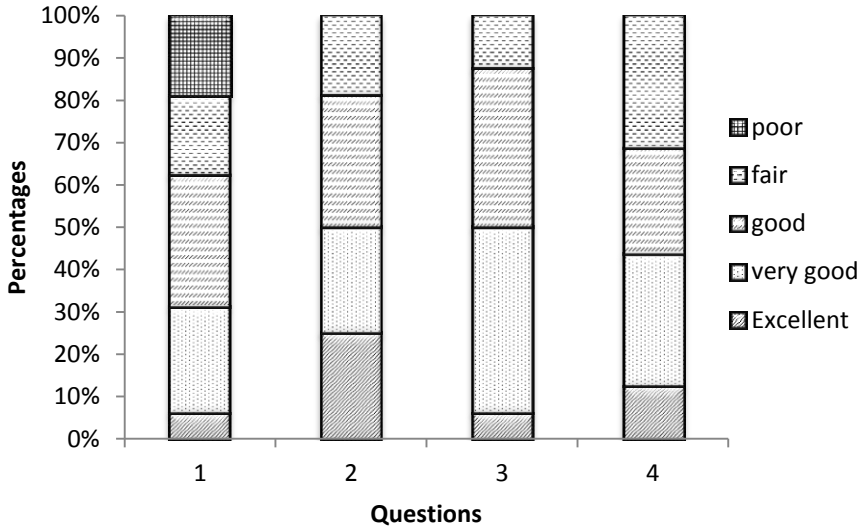
Regarding to management and leadership skills majority of the alumini rated the responses at grade A and B. Resource and time management skills were placed in good category by 31 % of the students.

V: General comment

Vii: General comments

VII: Department Status

- 1. Infrastructure
- 2. Faculty
- 3. Repute at National level
- 4. Repute at international level



Regarding to faculty 25 % of the students placed the responses in excellent category. Similarly regarding to department infrastructure 31 % of the responses were placed in good category.

Performa 8: Employer Survey

As there are no graduating students working in the department by the end of spring semester 2012 performa 8 was sent to students working in several other organizations and their feedback was recorded. Students are working under different organizations including Punjab information technology board, International Union for Conservation of Nature, Bahria University and Fatima Jinnah University. They are satisfied with the problem solving skills of the department. Thay are satisfied with all parameters regarding time management skills, ability to work in team as well as appreciation of ethical values etc. Some of the students highlighted that department should provide more research facilities.

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 experts in their fields. Their work has been published 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

Advanced teaching and research is being handicapped due to lack of enough lab facilities and equipment. Latest literature and reviews are hardly available. There is a need for short term foreign training to young faculty members. Green-house facilities are not enough for students. Lecture rooms, 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.

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 48 research papers, 64 other publications and 7 projects during the year 2011-12. The department has organized one national science conference in 2012 and the faculty has presented several papers at national and international conferences.

Year 2010-12

Faculty	Publications	Projects	Others(Abstracts, reports etc)
Dr. Tariq Mahmood	14	2	7
Dr. Azeem Khalid	19	2	43
Dr. Audil Rashid	4	2	10
Miss Aniqa Batool	3	---------	--------
Miss Beenish Saba	8	1	4

Criterion 2: CURRICULUM DESIGN AND ORGANIZATION

Degree Title: M. Sc

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:
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.

A candidate seeking admission to the Course for the Degree of M. Phil in full and partial residence:

I. 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.

II. The admission is offered on open merit basis with equal opportunity for male and female students.

III. 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.

II. 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**
1st	1.50
2nd	1.75
3rd	2.00
4th	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
	ENV–701 Introduction to Environmental Sciences	3(3–0)
	ENV–702 Environmental Chemistry	3(2–2)
	ENV–703 Environmental Microbiology	3(2–2)
	ENV–704 Research Planning and Report Writing	3(2–2)
	ENV–705 Environmental Analytical Techniques	3(2–2)
	ENV–706 Environmental Impact and Risk Assessment	3(3–0)
	ENV–707 Pollution Control Technologies	3(2–2)
	ENV–708 Remote Sensing and GIS Applications in Environment	3(3–0)
	ENV–709 Bioremediation of Environmental Contaminants	3(3–0)
.	ENV–710 Solid Waste Management	3(3–0)
.	ENV–711 Agricultural Pollution Management	3(3–0)
.	ENV–712 Environmental Law and Policy	3(3–0)
.	ENV–713 Climatology	3(2–2)
.	ENV–714 Eco-Health Management and Safety Approaches	3(3–0)
.	ENV–715 Public Health and Human Ecology	3(3–0)
.	ENV–716 Global Environmental Changes	3(3–0)
.	ENV–717 Wastewater Treatment Process Design	3(3–0)
.	ENV–718 Toxic Organics and Trace Metals in Ecosystem	3(2–2)
.	ENV–719 Special Problem	1(1–0)
.	ENV–720 Seminar – I, II	1(1–0)
.	ENV–721 Cleaner Production Technology	3(3–0)
.	ENV–722 Waste Reuse and Recycling	3(3–0)
.	ENV–723 Physico-Chemical Processes for Wastewater	3(2–2)
.	ENV–724 Advanced Processes for Wastewater Treatment	3(3–0)
.	ENV–725 Environmental Management Systems	3(3–0)
.	ENV–726 Environmental Biotechnology	3(2-2)
.	ENV–727 Impact of Natural Disasters on Global Environment	3(3-0)
.	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

Table2.2: Shows that the curriculum of the department is consistent with the program objectives

Courses	1	2	3	4
Env-701, 702, 703,704, 709,	++	++	++	+++
Env-706, 707, 707, 710,716,713, 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

	Env-701	Introduction of Environmental Sciences
Problem Analysis	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
	Env-726	Environmental Biotechnology
Solution Design	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-725	Environmental Management Systems
	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:

- One computer and I.T. course (3 credit hours) is under discussion in Academic council to be included in the curriculum to fulfill the I.T. requirements for the students of M.Sc, M.Phil and PhD.

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.

- Assignments are given to M.Sc, MPhil and Ph.D. students on specific titles (part of the course) which are presented orally and are submitted as written report, to increase their oral and written communication skills.
- Project presentations and Competitions are held to improve communication skills and presentation abilities.

CRITERION 3

LABORATORIES AND COMPUTING FACILITIES

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 kindly devoted enough space to upload the information about the departments therefore, the Department of Environmental Sciences has capitalized this opportunity and constructed a detailed webpage of the department 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 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.

Laboratory manuals for each subject (wastewater treatment, solid waste analysis, water analysis) are not available. In nutshell there are no proper arrangements and no security plan is available in case of emergency. The laboratories are not specious and inadequate. The equipments are not sufficient.

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

Only one laboratory attendant is available to maintain laboratory, equipment, glassware, chemicals, material etc. One laboratory attendants assist the students in practicals, cleaning and washing. The laboratory attendants do not have the relevant knowledge and training. There is need of one Lab and 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 internet facilities should be available to postgraduate students

CRITERION 4

STUDENT SUPPORT AND ADVISING

Criterion 4: Student Support and Advising

In order to provide guidance and information regarding various educational and social issues, the staff of the Department has been directed to take the following steps:

a. To keenly observe the behavioral and study patterns of the students and to identify and resolve any issues that may have the potential to hamper their studies.
b. To expand the mental horizons of the students beyond the class room by arranging tours/visits to facilities and places related to their course work.
c. 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.

a. 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 graduate level. The same policy is followed for M.Sc., M.Phil., and Ph.D. classes. However, for the Masters' level and beyond, the number of courses offered is dependent upon the teaching staff and facilities available to the Department.
b. The criteria laid down by the HEC are strictly followed during the teaching of every course.
c. 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

At the Environmental Sciences Department, 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 involvement 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 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 Department of Environmental Sciences fully realizes the importance of the availability

of proper educational guidance to the students and its role in shaping their future careers. The following steps have been taken to ensure the access of all students to qualified educational advice:

1. 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 enroll in this Department. As a consequence, students often need qualified advice from their teachers regarding the choice of courses.
2. The teaching staff has also been directed to keep abreast of the changes taking place in the job market and to provide this information to their students periodically.

CRITERION 5
PROCESS CONTROL

CRITERION 5: PROCESS CONTROL

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

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 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.
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 national level 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 andtwo 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 student evaluation procedures followed by the Department have been laid down by University authorities and 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. The additional evaluations (for example), surprise tests, special problems, presentations, seminars, etc.) are 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

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 member 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. Recently, one member has inducted in the department under HEC interim placement program. 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	Mis. Aniqa	Miss 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?	Cooperative attitude of staff and the students	Favorable academic/ research and writing environment	Cooperative Atmosphere	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	Research group establishment	Performance and merit based promotion.	Lab facilities improvement	More funding and facilitati	Lab facilities

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

CRITERION 7
INSTITUTIONAL FACILITIES

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. They also have access to the internet. However the department has the following shortcomings/problems:
- Breach of power intermittently, due to which research and academic work both are suffered.
- Untrained supporting staff.
- 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 some 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 a stock of few recently published books stored in cabins and these books are available to students for their assignments and learning. However, there is no separate library at the department level due to limited space available to the department.

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

Currently the class room is not enough for the all department degree programs and lab is also used for classes which affects the research activities. Practical lab space is not sufficient as only one lab that is used both for research and practical's. This affects the quality of teaching and research. 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

Criterion 8: Institutional Support

The university administration has been struggling hard to strengthen all the departments, upgrade them 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.

At present department is having a insufficient financial resource to maintain the present needs of the department. Individual research grants for students and faculty are mainly supporting the departmental research activities. There is a need for increasing the financial resources allocated to the department to establish a departmental library, laboratories and computer facilities.

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 2011-12 is about Rs. 70000, which hardly fulfills the departmental needs particularly for the purchase of chemicals for laboratories for practical purpose and books for the department library. Although faculty has some project and meets chemical requirements through research project but still a reasonable budget is required to meet the urgent needs of the department such as chemicals.

SUMMARY AND CONCLUSION

The self-assessment report of the Department of Environmental Sciences, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, presents a brief description of department its activities and ongoing steps to improve academics. Department of Environmental Sciences was established initiating M.Sc. and M.Phil. Degree Programmes in 2007. Since then, the discipline has progressed remarkably and made significant contribution in several aspects mainly, the monitoring of water quality and urban health areas of twin cities. The department now provides degree with specialization in climate change and plant physiology, environmental microbiology and biotechnology, GIS and public health and producing environmentalists who work in various universities, research institutes and private organizations.

The discipline deals with delicate issues of environment its mission is 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. These 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 improvement have been suggested.

Curriculum design, development and organization are based upon set, well defined and approved criteria. Pre-requisites are fully observed, examinations are conducted as per schedules and academic schemes are fully prepared in advance. The number of courses, along with their titles and credit hours are mentioned. Degree programmes are fully planned. Their efficacy 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, communication, meetings, tours, students-teacher interaction etc. They are well informed of relevant scientific societies, job opportunities and other such activities. 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. Other teacher is pursuing her PhD studies in the department. Teacher's performance is highly satisfactory during 2011-12, 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/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. Previously funds were allocated for the renovation of lab, the renovation is pending for the last one year.
- 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

Prof. Dr. Tariq Mahmood

Professor / Chairman	
Ph.D. (Heavy Metal Stress in Plants) University of Edinburgh, Scotland, UK	
Department of Environmental Sciences	
Phone :	+92-51-9290058
Mobile :	+92-322-5316115
Fax :	+92-51-9290160
Email :	tariq.mahmood@uaar.edu.pk; environment@uaar.edu.pk
Address :	Department of Environmental Sciences, Pir Mehr Ali Shah, Arid Agriculture University Rawalpindi
Work Experience :	22 Year(s)
Research Interest :	• Climate Change • Carbon sequestration/stocking/Biochar • Heavy Metal Toxicity
Projects: 2011-12	2 (on-going) 1 (submitted)
Students supervised (2011-12)	M.Sc./ M.Phil. = 10 PhD +04 (in progress)
Papers presented at national/international level (2011-12)	7
Total Publications :	40

Publications 2011-12

Anjum, M., A. Khalid, **T. Mahmood** and M. Arshad. 2012. Co-digestion of municipal solid organic waste with melon residues to enhance biodegradability and biogas production. Journal of Material Cycles and Waste Management. 14: 388-395.

Rashid, A., **T. Mahmood**, F. Mahmood, A. Khalid, B. Saba, A. Batool and A. Riaz. 2012. Phytoaccumulation, competitive adsorption, and evaluation of chelators metal interaction in lettuce plant. Environmental Engineering and Management Journal. (Revision submitted).

Rehman, M. S., A. Khalid, S. Liaquat, C. M. Tahir, **T. Mahmood** and S. Mahmood.2012. Color and COD Removal from Poultry Litter Leachate Employing Ozonation Process. Environmental Engineering and Management Journal. 11(8):1467-14-76.

Khalid, A., F. Kausar, M. Arshad, **T. Mahmood** and I. Ahmad 2012. Accelerated decolorization of reactive azo dyes under saline conditions by bacteria isolated from Arabian seawater sediment. Applied Microbial Biotechnology, 96(6):1599-1606.

Rashid A, S, Siddique and **T. Mahmood**. 2012. Environmental interpolation model of vegetation distribution pattern and ecological restoration of degraded lands. Pakistan Journal of Botany 44:171-176 (Special Issue March 2012)

Khalid, A., M. Arshad, M. Anjum, **T. Mahmood** and L. Dawson.2011. The anaerobic digestion of solid organic

waste. Waste Management, 31:1737-1744.
Khalid, A., A. S. Khan, Z.H. Nazli, **T. Mahmood**, M. T. Siddique., S. Mahmood and M. Arshad. 2011. Post-treatment of Aerobically Pretreated Poultry Litter Leachate using Fenton and Photo-Fenton Processes. International Journal of Agriculture & Biology., 13(4): 439-449.
Saba, B., **T. Mahmood**, B. Zaman, and I. Hashmi.2011. Reuse of treated wastewater using sequencing batch bioreactor for the improvement of wheat growth. Journal of Water Reuse and Desalination.1(1):179-184.
Javed, H., A. Mohsin, M. Aslam, M. Naeem, M. Ahmad and **T. Mahmood**. 2011. Relationship between morphological characters of different aubergine cultivars and fruit infestationby Leucinodes orbonales guenee. Pakistan Journal of Botany. 43(4):2023-2028.
Aziz, I., M. Ashraf, **T. Mahmood** and K.R. Islam. 2011. Crop rotation impact on soil quality. Pakistan Journal of Botany., 43(2): 949-960.
Khalid, A., S. Sultana, M. Arshad, S. Mahmood, **T. Mahmood** and M.T. Siddique. 2011. Performance of auxin producing rhizobacteria for improving growth and yield of wheat and rice grown in rotation under field conditions. International Journal of Agriculture and Applied Sciences, 3(1): 44-50.
Saba, B., S. Sultana, M. Arshad, S. Mahmood, **T. Mahmood** and M.T. Siddique. 2011. Performance of auxin producing rhizobacteria for improving growth and yield of wheat and rice grown in rotation under field conditions. International Journal of Agriculture and Applied Sciences (Accepted).
Mahmood, S., M. Arshad, A. Khalid, Z. H. Nazli and **T. Mahmood**. 2011. Isolation and screening of azo dye decolorizing bacterial isolates from dye contaminated textile wastewater. Soil and Environment., 30(1):7-12.
Rehman, M.S., F. Aziz, A. Saif, A. Batool, **T. Mahmood**.2011. Color and COD Reduction of Biotreated Complex Wastewater using Ozonation Process. Journal of the Pakistan Institute of Chemical Engineers, 39 (1) 83-89.

Faculty Resume-2

Dr. Azeem Khalid

Associate Professor	
Ph.D. (Soil Microbiology) University of Agriculture, Faisalabad, Post-Doc Japan, USA	
Department of Environmental Sciences	
Phone :	+92-51-4420827
Mobile :	
Fax :	+92-51-9290160
Email :	azeemuaf@yahoo.com, azeem@uaar.edu.pk
Address :	Department of Environmental Sciences, PMAS- Arid Agriculture University Rawalpindi
Work Experience :	15 Year(s)
Research Interest :	• Plant-microbe interactions • Environmental microbiology & biotechnology
Projects: 2011-12	2 (on-going) 2 (submitted)
Students supervised (2011-12)	M.Sc./ M.Phil.= 13 PhD +04 (in progress)
Papers presented at national/international level (2011-12)	27
Total Publications :	90

Publications (2011-12)

Khalid, A., F. Kausar, M. Arshad, T. Mahmood and I. Ahmed. 2012. Accelerated decolorization of reactive azo dyes under saline conditions by bacteria isolated from Arabian seawater sediment. **Applied Microbiology and Biotechnology** 96: 1599-1606.

Anjum, M., **A. Khalid,** T. Mahmood and M. Arshad. 2012. Co-digestion of municipal solid organic waste with melon residues to enhance biodegradability and biogas production. **Journal of Material Cycles and Waste Management** 14: 388-395.

Rehman, M.S.U., **A. Khalid**, S. Liaquat, C.M. Tahir, T. Mahmood and S. Mehmood. 2012. Color and COD removal from poultry litter leachate employing ozonation process. **Environmental Engineering and Management Journal**: 11(8): 1467-1474.

Baig, K.S., M. Arshad, B. Shaharoona and **A. Khalid**, I. Ahmed. 2012. Comparative effectiveness of *Bacillus* spp. possessing either dual or single growth-promoting traits for improving phosphorus uptake, growth and yield of wheat (*Triticum aestivum* L.). **Annals of Microbiology** 62: 1109-1119.

Khalid, A., A.S. Khan, Z.H. Nazli, T. Mahmood, M.T. Siddique, S. Mahmood and M. Arshad. 2011. Post-treatment of Fenton and photo-Fenton processes on aerobically pretreated poultry litter leachate. **International Journal of Agriculture and Biology** 13: 439-443.

Saba, B., T. Mahmood, B. Zaman, **A. Khalid** and S.J. 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.

Ahmed H., M.T. Siddique, S. Ali, **A. Khalid** and N.A. Abbassi. 2012. Mapping of Fe and impact of selected physico-chemical properties on its bioavailability in the apple orchards of Murree region. **Soil and Environment** 31(1): 100-107.

Khalid, A., S. Sultana, M. Arshad, S. Mahmood, T. Mahmood and M.T. Siddique. 2011. Performance of auxin producing rhizobacteria for improving growth and yield of wheat and rice grown in rotation under field conditions. **International Journal of Agriculture and Applied Sciences** 3(1)**:** 44-50.

Khan, T.M., **A. Khalid**, U. Habib, M.I. Ramay, U. Ali and N. Samad. 2011. Aerobic treatment for recycling kitchen wastewater. **International Journal of Agriculture and Applied Sciences** 3(1): 1-8.

Khalid, A., S. Batool, M.T. Siddique, Z.H. Nazli, R. Bibi, S. Mahmood and M. Arshad. 2011. Decolorization of Remazol Black-B in soil by fungi. **Soil and Environment** 30: 1-6.

Mahmood, S., M. Arshad, **A. Khalid,** Z.H. Nazli and T. Mahmood. 2011. Isolation and screening of azo dye decolorizing bacterial isolates from dye-contaminated textile wastewater. **Soil and Environment** 30: 7-12.

Zia-ul-hassan, M. Arshad and **A. Khalid**. 2011. Evaluating potassium-use-efficient cotton genotypes using different ranking methods. **Journal of Plant Nutrition** 34: 1957-1972.

Shaharoona, B., M. Arshad, R. Waqas and A. **Khalid**. 2012. Role of ethylene and plant growth-promoting rhizobacteria in stressed crop plants. p. 429-446. In: B. Venkateshwarulu et al. (eds.)**. Crop Stress and Its Management: Perspectives and Strategies**. Springer, The Netherlands.

Khalid A., M. Arshad, M. Anjum, T. Mahmood and L. Dawson. 2011. The anaerobic digestion of solid organic waste. **Waste Management** 31: 1737-1744.

Shaharoona, B., M. Imran, M. Arshad and **A. Khalid**. 2011. Manipulation of ethylene synthesis in roots through bacterial ACC deaminase for improving nodulation in legumes. **Critical Reviews in Plant Sciences** 30: 279-291.

Saba B., T. Mahmood and **A. Khalid** (Eds.). 2011. Laboratory Skills in Water and Wastewater Analysis: Laboratory Manual. VDM Publishing Corporation, Germany. 124p.

Khalid, A., M. Centritto and T. Mahmood (Eds.). 2011. Plant Conservation & Reversing Desertification: Away Forward. PMAS Arid Agriculture University, Rawalpindi, Pakistan. 109p.

Faculty Resume-3

Dr. Audil Rashid

Assistant Professor	
Ph.D. (Environmental Biology) Quaid-i-Azam University, Islamabad.	
Department of Environmental Sciences	
Phone :	+92-051-9290058
Mobile :	
Fax :	+92-51-9290160
Email :	audil@uaar.edu.pk
Address :	Department of Environmental Sciences, Pir Mehr Ali Shah, Arid Agriculture University Rawal
Work Experience :	15 Year(s)
Research Interest :	• Phytoremediation and rhizosphere microbiology • Eco-Health and global change assessment • Urban ecology and GIS analysis
Projects: 2011-12	2 (on-going)
Students supervised (2011-12)	M.Sc./ M.Phil.= 15 PhD +02 (in progress)
Papers presented at national/international level (2011-12)	17
Total Publications :	18

Publications 2011-12

Rashid, A., Siddique, S. and Mahmood, T. (2012) Environmental interpolation model of vegetation distribution pattern and ecological restoration of degraded lands. Pak. Journal of Botany, 44: 171–176.

Rehman, M.S. Saif, A., Rashid, A. and Mahmood, T. (2012) Chemometric classification of advanced oxidation processes for the degradation of pharmaceuticals and personal care products. Environmental Engineering and Management Journal. (Accepted)

Kamal, A., Malik, R.N., Fatima, N. and Rashid, A. (2012) Chemical Exposure in occupational settings and Related Health Risks: A Neglected Area of research in Pakistan. Environmental Toxicology and Pharmacology. 34, 46–58.

Kamal, A, Qayyum, M, Cheema, I.U. and Rashid, A. (2011) Biological Monitoring of Blood Naphthalene Levels as a Marker of Occupational Exposure to PAHs among Auto-Mechanics and Spray Painters in Rawalpindi. BMC Public Health, 11(467). doi:10.1186/1471-2458-11-467

Faculty Resume-4

Ms Aniqa Batool

Lecturer		
M.Phil (Environmental Biology), Quaid-i-Azam University, Islamabad		
Department of Environmental Sciences		
Phone :	+92-51-9290058	
Mobile :		
Fax :	+92-51-9290160	
Email :	aniqabatool@uaar.edu.pk	
Address :	Department of Environmental Sciences, Pir Mehr Ali Shah, Arid Agriculture University Rawal	
Work Experience :	4 Year(s)	
Research Interest :	• Drinking water Quality • Heavy metal and other Contaminants in drinking and irrigation water • Waste water toxicology	
Students supervised (2011-12)	M.Sc./ M.Phil. = 13	
Total Publications :	12	

Publications 2011-12

Rashid, A., T. Mahmood, F. Mehmood, A. Khalid, B. Saba, **A. Batool**, and A. Riaz. (2012) Phytoaccumulation, competitive adsorption and evaluation of chelators-metal interaction in Lettuce plant. *Environmental engineering and Management Journal*. Volume 11 (accepted) (IF 1.435).

Khan, S. M., H. Ahmad, Z. Iqbal, H. Ullah, M. A. Ghufran, **A. Batool**, and J. Z. K. Khattak. (2012) Ethnomedicinal appraisal in Dughalgay valley district Sswat, Pakistan. *Journal of Public Health and Biology* (accepted) (Manuscript No: 12/3-54 R2)

Mukhtar Uddin, M. A. Ghufran, M. Idrees, M. Irshad, S. Jabeen, W. Ahmad, I. Malook, **A. Batool,** A. Rashid**,** M. Arshad and R. Naeem. (2012) Antibacterial Activity of Methanolic Root Extract of *Asparagus racemosus, Journal of Public Health and Biology,* 1(2): 32-35

Faculty Resume-5

Ms. Beenish Saba

Lecturer **M.S (Environmental Engineering) National University of Sciences & Technology.** **Department of Environmental Sciences**		
Phone :	+92-051-9290058	
Mobile :		
1Fax :	+92-51-9290160	
Email :	beenishsaba@uaar.edu.pk	
Address :	Department of Environmental Sciences, Pir Mehr Ali Shah, Arid Agriculture University Rawal	

Work Experience :	1 Year(s)
Research Interest :	• Toxicology • Physicochemical processes for wastewater 3 M.Sc. 2 M.Phil students produced.
Projects: 2011-12	1 (on-going)
Students supervised (2011-12)	M.Sc./ M.Phil.= 6
Papers presented at national/international level (2011-12)	4
Total Publications :	13

Publications 2011-12

Saba, B., T, Mahmood, B. Zaman, V. Jegatheesan and M. I. Ali. (2012). Treatment of high strength wastewater in sequencing batch bioreactors (SBBRs) using suspended and attaché growth configuration and estimation of total economic cost (TEC). International Journal of Agriculture and Applied Sciences 4(1) (accepted)

Khaliq, S., A. Khalid, B. Saba, S. Mahmood, M. T. Siddique. (2012). Effect of ACC deaminase bacteria on tomato plants containing azo dye wastewater. Pakistan Journal of Botany, 45(S1) 529-534.

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) (accepted).

Saba, B., T. Mahmood. , B. Zaman and I. Hashmi. (2011). Reuse of treated wastewater using sequencing batch bioreactor for the improvement of wheat growth. Journal of Water Reuse and Desalination. 1(3)179-184.

Rashid, A., T. Mahmood, F. Mehmood, A. Khalid, B. Saba, A. Batool and A. Riaz (2012). Phytoaccumulation, competitive adsorption and evaluation of chelators-metal interaction in Lettuce plant. Environmental Engineering and Management Journal. Volume 11(accepted)

Saba, B., I. Hashmi, M. A. Awan, H. Nasir and S. J. Khan. (2012). Distribution, toxicity level and concentration of polycyclic aromatic hydrocarbons (PAHs) in surface soil and groundwater of Rawalpindi, Pakistan. Volume 50. Desalination and Water Treatment (accepted)

Saba, B., I. Hashmi., H. Nasir and A. Khalid. (2012). Determination of polycyclic aromatic hydrocarbons in agricultural and urban soils using Soxhlet and direct ultrasonic techniques in Pakistan. Journal of Chemical Society of Pakistan 34 (4).

Saba, B., U. Rafique and I. Hashmi. (2011). Adsorption Kinetics of phenanthrene and anthracene on different soils of Attock Refinery Limited (ARL) Rawalpindi Pakistan. Desalination and Water treatment 30: 333-338.