

Self Assessment Report

Of

Department of Forestry and Range Management

July 2011

(Under Graduate Program)



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Rawalpindi

Program Team

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Coordinator
Member
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CONTENTS

	Page
Introduction	03
Criterion 1	Program Mission, Objectives and Outcomes 05
Criterion 2	Curriculum Design and Organization 59
Criterion 3	Laboratories and Computing Facilities 64
Criterion 4	Students Support and advising 65
Criterion 5	Process Control 66
Criterion 6	Faculty 69
Criterion 7	Institutional Facilities 72
Criterion 8	Institutional Support 73
Summary & Conclusion	75

Annexure

Annexure I	Proforma 1. Student Course Evaluation Questionnaires
Annexure II	Proforma 2 .Faculty Course Review Report
Annexure III	Proforma 3. Survey of Graduating Students
Annexure IV	Proforma 4. Research Student Progress Review Form
Annexure V	Proforma 5. Faculty Survey
Annexure VI	Proforma 6. Survey of Department Offering Ph.D Programme
Annexure VII	Proforma 7. Alumni Survey Proforma
Annexure VIII	Proforma 8 .Employer Survey
Annexure IX	Proforma 9. Faculty Resume
Annexure X	Proforma 10. Teacher Evaluation Form
Annexure XI	Detailed Resume of the Faculty Members.
Annexure XII	Detailed Course Contents of fall Semester 2008-09 and Spring 2010 Under graduate Scheme of Studies

List of Tables

Table 1	Program Objective Assessment	6
Table 2	Programme Outcomes and their Relationship with Objectives	7
Table 3	The Internship Experience is Effective in Enhancing Professional Skills of the graduating students	53
Table 4	Present Performance Measures for Research Activities	56
Table 5	Short courses, Seminars, Workshops and conferences arranged by the deht-text	58
Table 6	Quantitative Assessment of the Department (Last three years)	58
Table 7	Scheme of Studies for B. Sc.(Hons.) Agriculture	61
Table 8	Courses vs. Program Outcome	62
Table 9	Detail of Courses Representing Theoretical Background, Problem Analysis and Solution Design	63
Table 10	Faculty Distribution by Program Areas in FRM	69
Table 11	Results of Faculty Survey	71
Table 12	Enrollment in Different Programs during 2009-10	74

List of Figures

Fig. 1	Teacher Evaluation	8
Fig. 2	Student Course Evaluation	25
Fig: 2a	Teacher`s Course Review	51
Fig. 3	Survey of Graduating Students	52
Fig. 4	Affectivity of Internship Experience	52
Fig.5a	Alumini survey for evalution of the degree programs offered	54
Fig. 5	Employer`s Survey for determining students skill level	54

Introduction

Department of Forestry & Range Management

The Department of Forestry & Range Management was established in the year 2002 at the University of Arid Agriculture Rawalpindi, prior to this the subject of Forestry and Range Management was taught as minor subject to the undergraduate students of Faculty of Crop and Food Sciences. Now the department is offering the degree of 34 student in B.Sc. (Hons.) Agriculture major in Forestry & Range Management at undergraduate level.

The department of Range Management & Forestry has initiated the academic programmes at B.Sc. (Hons) and currently has enrollment of 34 students in B.Sc. (Hons.) The department already has published 91 research papers since its establishment

The establishment of the department of Forestry & Range Management is a new addition to the University's expanding academic programmes. The establishment of the department has a mandate to carry teaching and research, suggesting remedial measures to improve the problems of land degradation, with special emphasis on problems of rangeland degradation, deforestation and proper management of natural resources of a regions of the country.

A new scheme of studies has been implemented as recommended by HEC under revised syllabus of Forestry undergraduate program. The courses includes core forestry, range management, biodiversity and climate change aspects. The scheme of studies is also supported by adding referenc text books and journals.

The initial practical facilities were established both in the lab as well as in the field. A range forage grass, shrubs and tree nursery has been established in the research farm of UAAR at Koont Chakwal for providing practical training to the students about major forage species particularly the drought tolerant range plants. Under the HEC funded project, new infrastructure including research laboratories and field laboratory has been established in university. A fair number of latest books on the subject have also been purchased and placed in the Library for ready reference to the students. Necessary laboratory equipment (both field and lab.) related to Forestry & Range Management research activities has been purchased under the HEC project. The major equipment include the wood quality testing machine, wood seasoning chamber, wood preservation unit, wood workshop and allied laboratory equipment to support research studies on range germplasm evaluation and Forest inventory.

The projects and internship is focused on forest biomass and productivity estimations, above and below ground carbon stocks estimations in natural forests, nutritional quality and carrying capacity in rangelands of Pakistan, Phytosociology and effect of fire on natural forests.

In Future internship studies of the Department would address land degradation issues (both forest and rangelands) as well as developing range improvement techniques aimed at combating land degradation and desertification in semi-arid and arid areas of the country collaborative activities/projects.

A number of seminars have also been organized to highlight the land degradation issues among various stakeholders. A consultative workshop on status implementation of NAP and UNCCD in Pakistan was organized by the University of Arid Agriculture, in collaboration with Ministry of Environment, Government of Pakistan. About fifty participants from various organizations participated in the workshop and finalized draft report to be submitted to UNCCD secretariat.

Currently three research projects are running by the faculty of the department funded both by university and United Nation Development Programme worth Rs. 2.023 m. These projects have been completed now.

The department is having five PhD and three non- PhD Teacher who are also enrolled in PhD both National and Foreign University.

Criterion 1: Program Mission, Objectives and Outcomes

The self assessment is based on a number of criteria. To meet each criterion several Standards have been established. This section describes how the standards of the Criterion 1 are met.

Standard 1-1: The program must have documented measurable objectives that support institution mission statements

Mission statement of Forestry & Range Management Department

The mission of the department is to deliver quality education and producing quality graduate in the field of Forestry, Range Management, Agro forestry, Watershed Management and Environmental forestry and forest degradation to ensure scientific management of the natural forests of the country to cope with the demand of wood at national level.

Objectives

1. To provide quality training and education in the field of Forestry and Range Management to produce educated and skilled manpower.
2. The extension of newly developed technologies in the field of Forestry & Range Management to relevant stakeholders in rain fed areas through workshops, seminars and field days. .
3. To establish linkages with national and international research institutions and with the industry for mutual benefit and progress in the field of Forestry & Rangeland Management.

Main elements of strategic plan to achieve mission and objective

- 1 Development of a sound teaching system based on the experience and vision gathered from world reviews, literature, innovations, proceedings, symposia etc. for the award of degrees.
- 2 Designing of curricula involving core subjects, elective subjects, specialized areas, internship programs and study tours.
- 3 Setting up of well equipped specialized laboratories for the students and researchers, depending upon the available resources.
- 4 Publication of scientific papers, books, manuals etc.
- 5 Implement of research projects funded by the Universities and other agencies.
- 6 Arranging field tours to impart first hand knowledge to the students about field and Forest Management Techniques.

The assessment of the program objectives through different criteria is presented in Table 1.

Table 1: Program Objective Assessment

S. #	Objective	How Measured	When Measured	Improvement Identified	Improvement made
1	To impart training and education in the field of Forestry & Range Management. To produce educated and skilled manpower	Back ground information and status of knowledge of students through previous academic qualification and students feedback	At the time of admission semester	Some basic courses to be included in the curriculum	Revision of curriculum made in year 2009 and 2010.
2	To extend newly developed technologies in the field of Forestry & Range Management. To relevant stakeholders in rainfed areas.	Through surveys, monitoring of forests, assess manpower, farmers feed back and potential farmers interaction	Continuous activity	Problematic areas being identified/ New courses to be included in curriculum, research on new problem	Approval of new curriculum integrated approaches/ research initiated on identified areas.
3	To establish linkages with national and Int. research inst.&with the industry for mutual benefit and progress in the field of F& RM.	Through visiting forestry based industries/ by collaborative projects.	Continuous activity	By visiting forest based industries.	Collaboration established/ Enhancement of knowledge and vision

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 outcome.*

Program Learning Outcomes

All the students in Forestry & Range Management should possess the ability of:

1. Communication skills through presentations, oral discussions, review articles, etc.
2. Preparation of projects based upon identification of problems. and use of new analytical techniques.

3. Identification of priority problems and their solution.
4. Enhancement of knowledge and vision.
5. Scientific writing and publication of research papers.

A number of survey based on the QEC questionnaires were conducted to assess the program outcomes of the department/graduates. Program outcomes are presented in Table2.

Table 2: Program Objectives VS Program Outcomes

Program Objectives	Program Outcomes				
	Develop communication skills	Developing Research Projects	Analytical & Problem solving skill	Develop of Knowledge & vision	Development of professionalism & Research
Education	++	++	+	+++	+++
Training	++	++	+++	+++	+++
Extension of Technologies	++	++	+	+++	+
Linkages with R&D institutions	++	++	+++	+++	+++

+ = Moderately satisfactory

++ = Satisfactory

+++ = Highly satisfactory.

Program Assessment Results

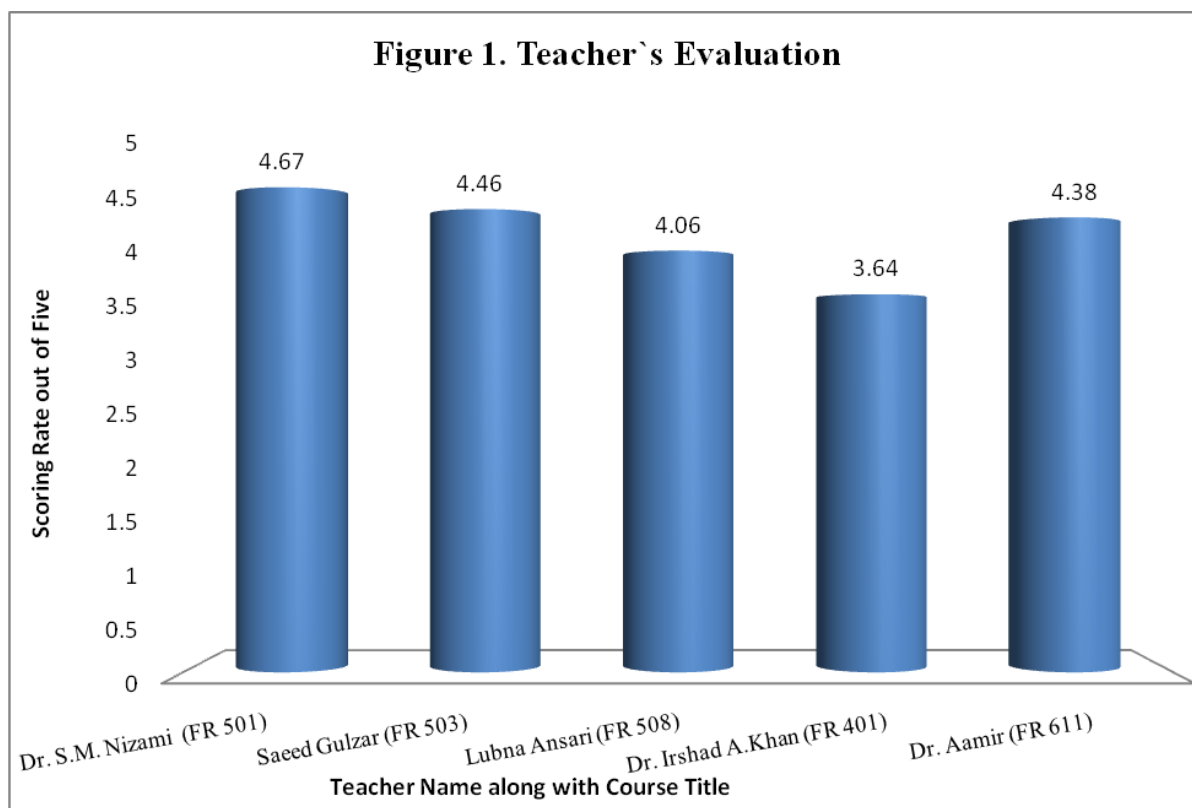
Teacher's evaluation

There are seven teachers in the department namely:

1. Prof. Dr. Sarwat N. Mirza Professor/ DEAN
2. Dr. Irshad A. Khan, Associate Professor/ Chairman
3. Dr. Syed Moazzam Nizami, Associate Professor
4. Dr. Abdul Khaliq, Assistant Professor (On study leave)
5. Dr. Aamir Saleem Lecturer (Leave Vacancy)
6. Mr. Saeed Gulzar, Lecturer
7. Ms. Lubna Ansari, Lecturer
8. Mr. Irfan Ashraf, Lecturer (on study leave)

All the teachers are involved in teaching of different subjects in the department. They were evaluated by the students at the end of the semester in accordance with proforma-10

(Annexure IX). The scoring rate were fixed between 1-5 i-e 5 for out standing performance, 4 for very good, 3 for good, 2 for fair and 1 for poor performance. On these bases the results were compiled from aforesaid proforma-10 (For fall 2009 and Spring 2010 Semester). Results are graphically presented in figure 1. The overall compiled result showed that top scoring in the department is 4.67 and lowest is 3.64. The grading of the teachers are showed in Figure 1.



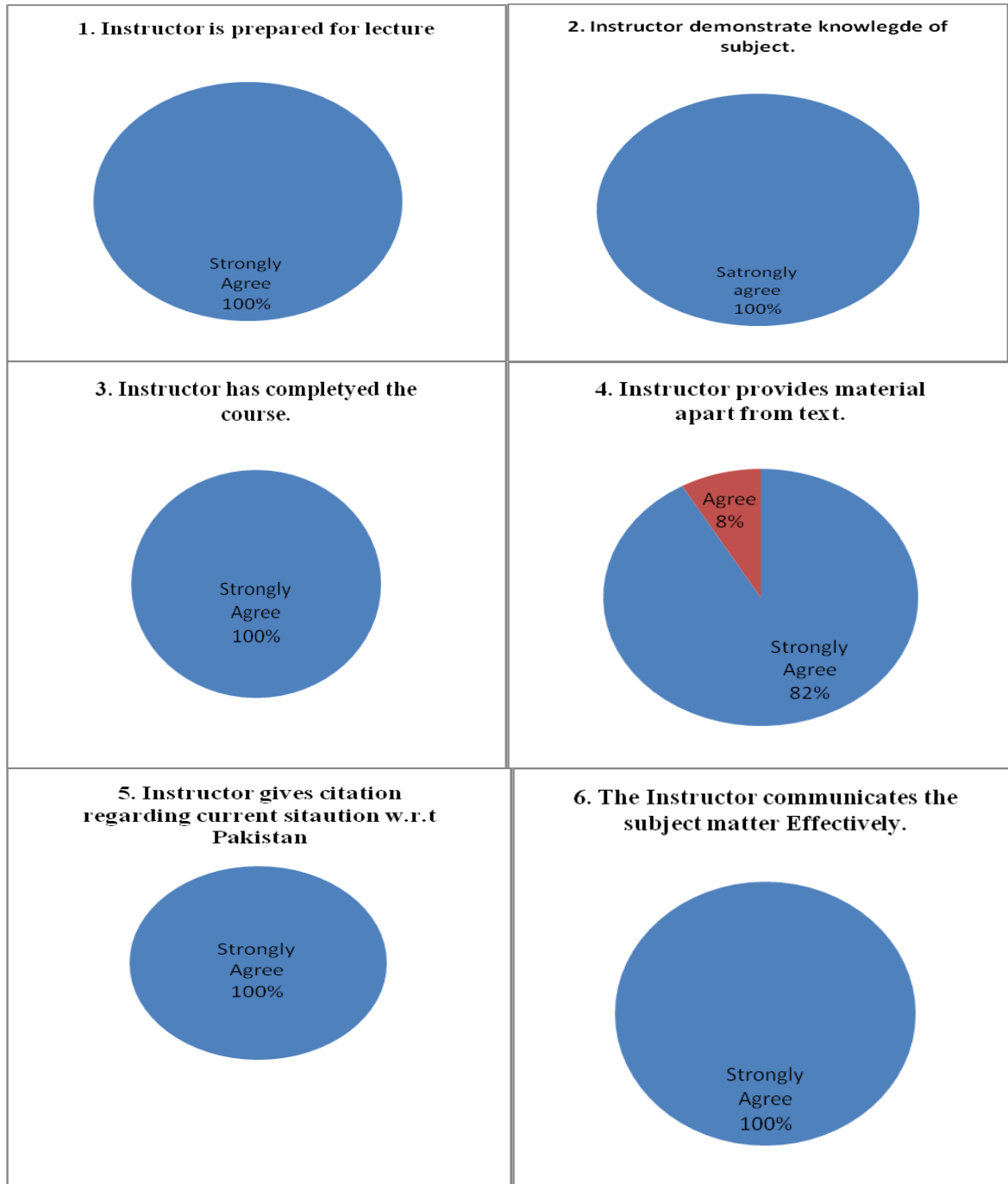
Note: Dr. Abdul Khaliq- Assistant Professor was on study leave for Post Doctorate Fellowship in Canada during Fall 2009 and Spring 2010 Semester.

Mr. Irfan Ashraf Lecturer was on Study Leave for PhD in Canada during Fall 2009 and Spring 2010 Semester.

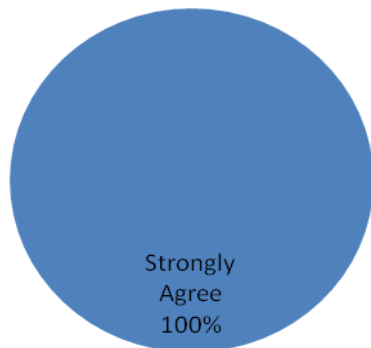
Detail of individual performance of each teacher is obvious from the Pie-charts given below:

Dr. Syed Moazzam Nizami- Assistant Professor (FR 501)

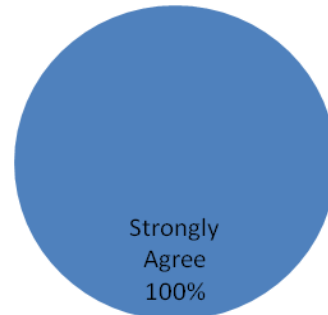
The pie charts shows that students were 100% satisfied with the teacher and are having view the teacher has demonstrated the knowledge very well.



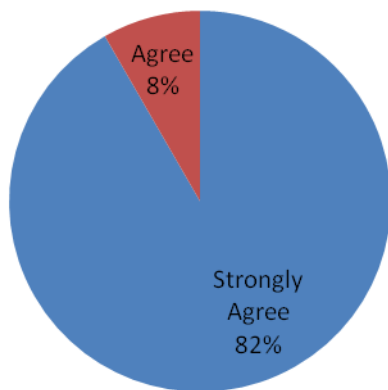
7. Instructor shows respect to students.



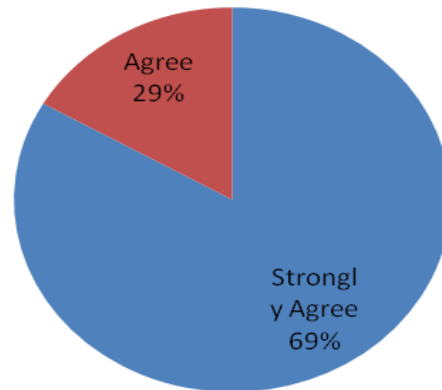
8. The Instructor maintains environment that is conducive learning



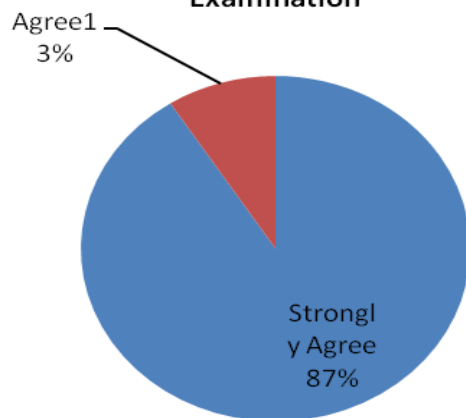
9. The instructor arrives on time



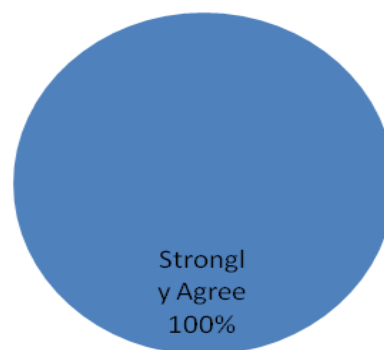
10. Instructor leaves on time.



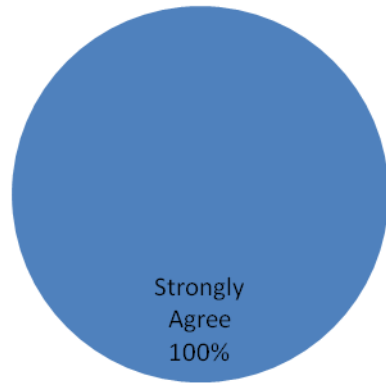
11. Instructor is fair in Examination



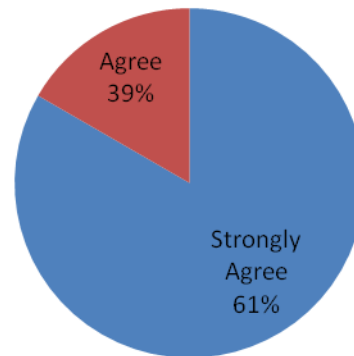
12. Instructor return the graded scripts



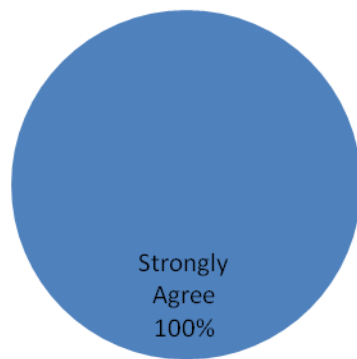
13. Instructor is available in off times



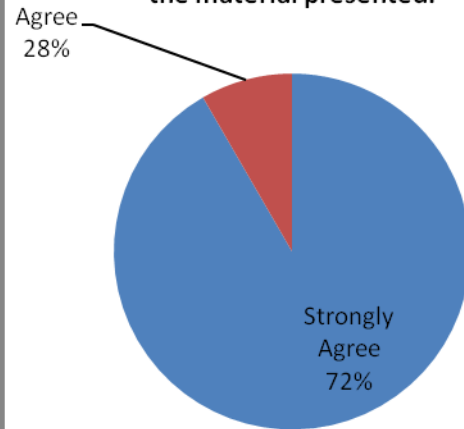
17. The course integrates the theory concepts with real world



15. The subject has increased the Knowledge

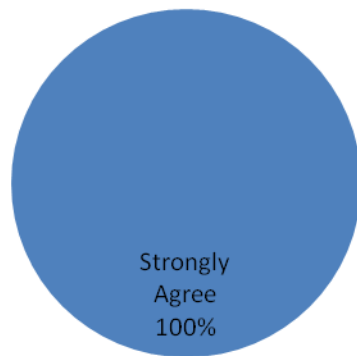


18. The Assignment & Exams cover the material presented.

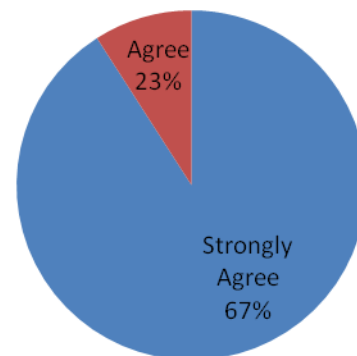


16. The syllabus clearly states the objectives

2
%

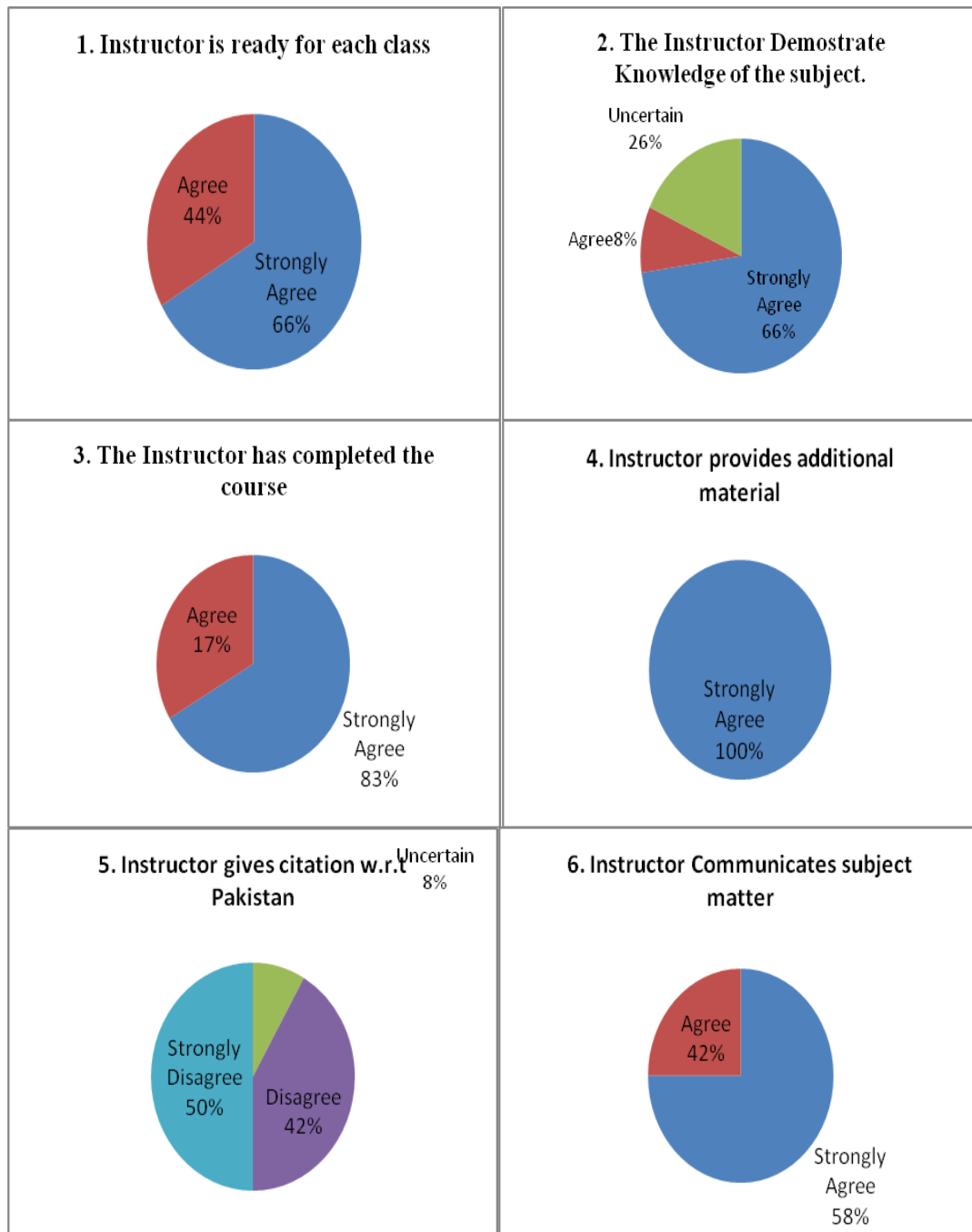


19. The course is modern & updated.

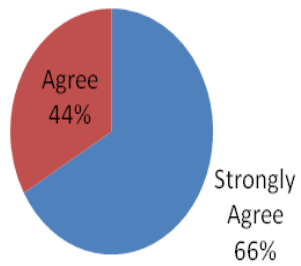


Dr. Irshad A. Khan (FR 401).

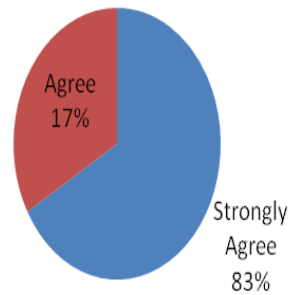
The pie charts show that the students were satisfied with the performance of the teacher. However more than 8 % students revealed that the teacher did not give citation regarding current situations with reference to Pakistani context. Similarly more than 8% students were not satisfied with teacher's respect towards student.



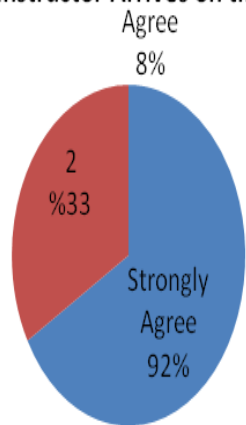
7. Instructor show respects to students.



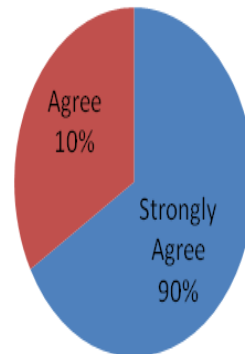
8. Maintains Enviroment Conducive to learning



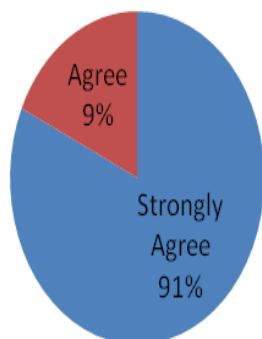
9. Instructor Arrives on time.



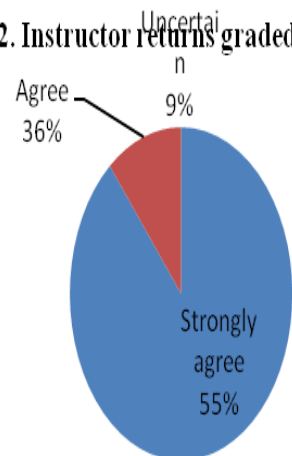
10. Instructor leaves on time

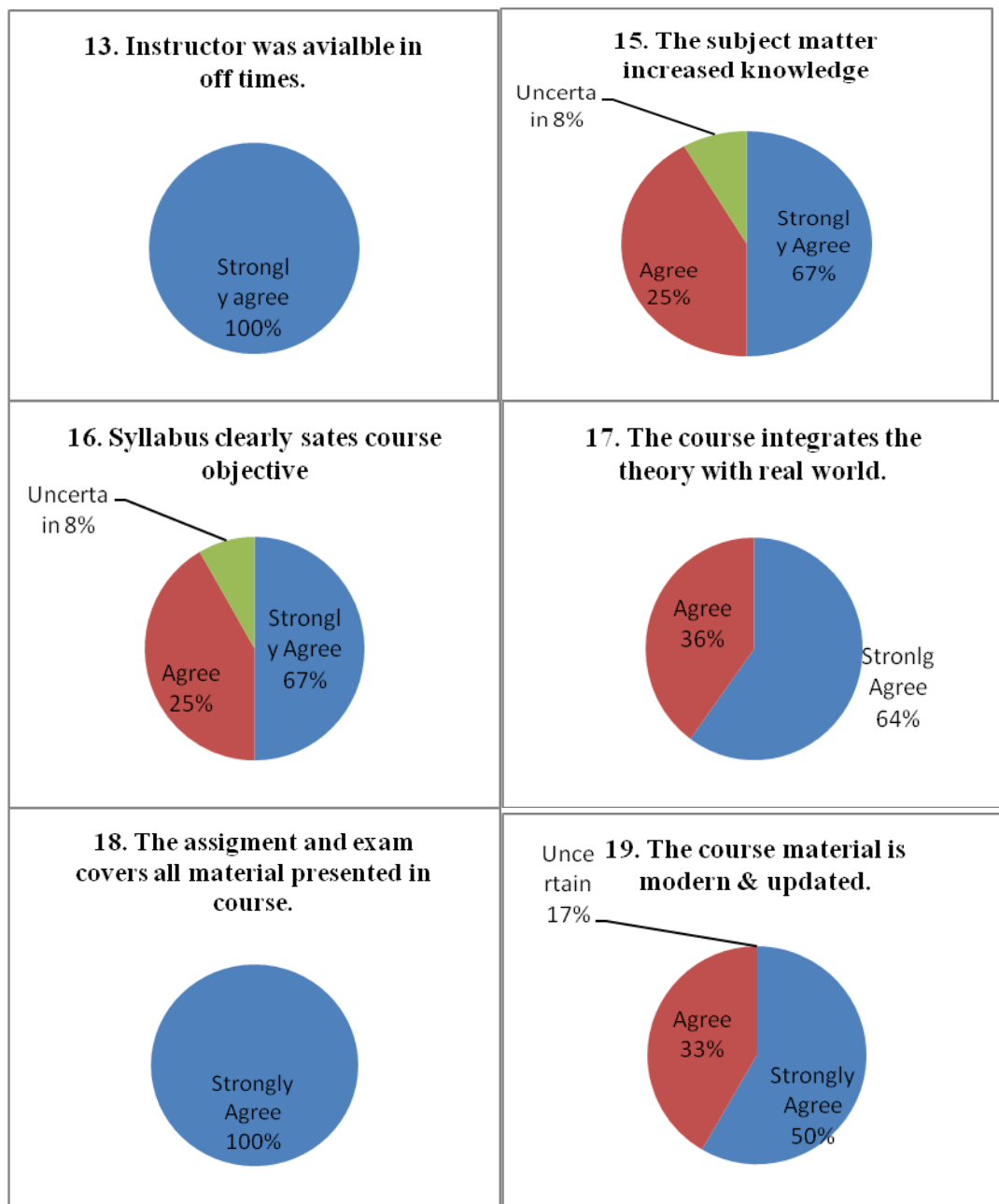


11. Instructor fair in examination



12. Instructor returns graded scripts.





General Comments of the Students about this Teacher

Weaknesses:

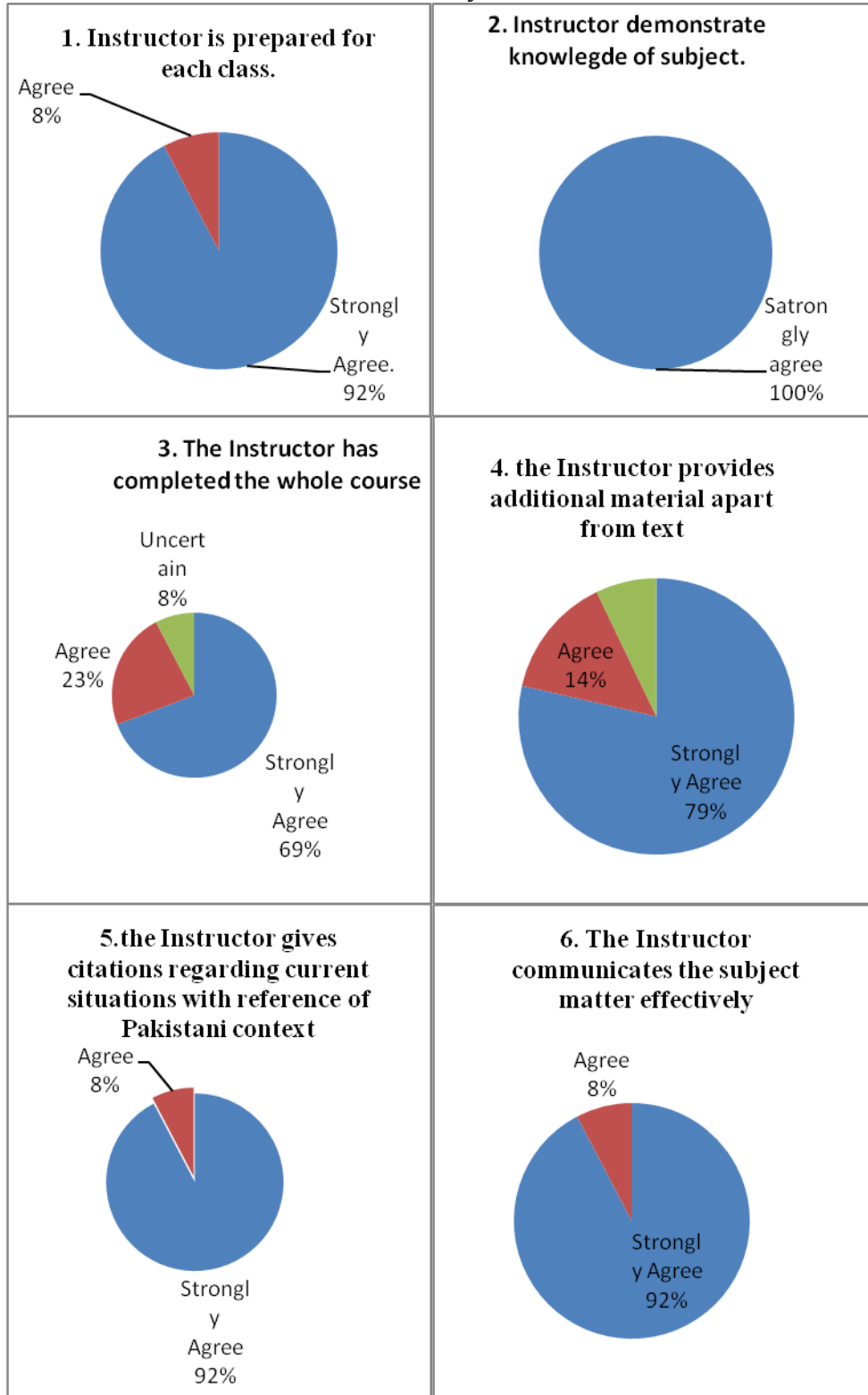
- Irrelevant topics should not be included in the syllabus by the tutor.
- Teacher should improve his teaching skills and should not dictate the lectures.
- Teacher should include modern concepts in his lectures.

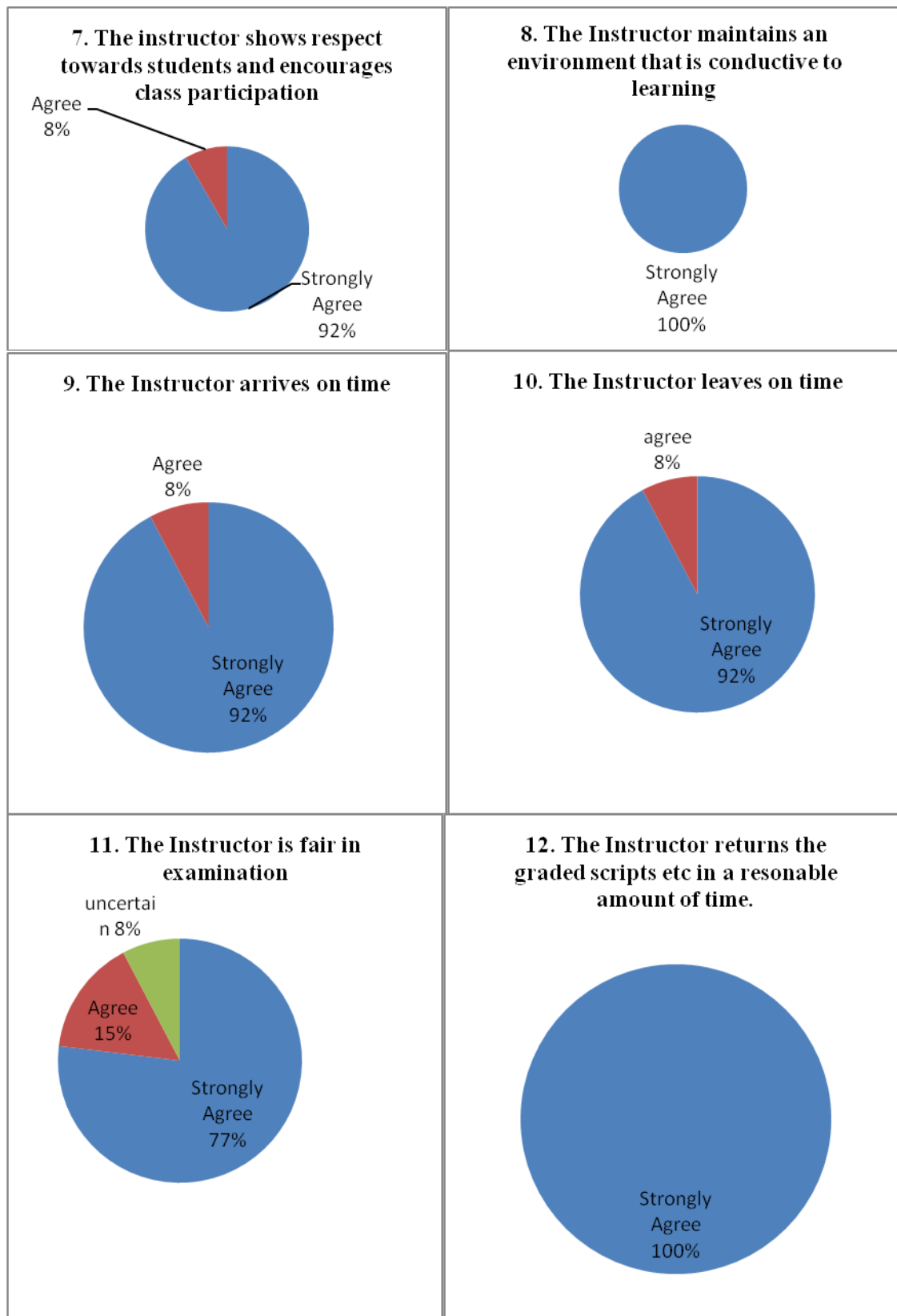
Strengths:

- Teacher was good in behavior and friendly.

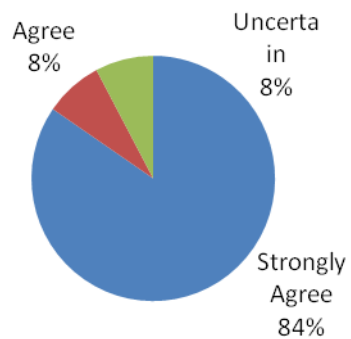
Dr. Aamir Saleem-Lecturer (FR 611)

The graph from the teacher's evaluation shows that this teacher has knowledge of the subject and can communicate it to students easily.

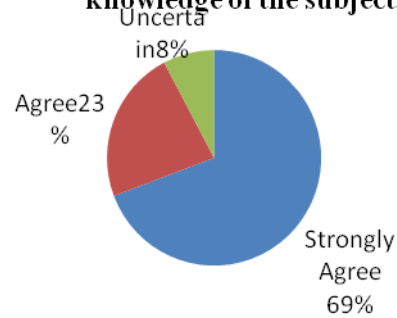




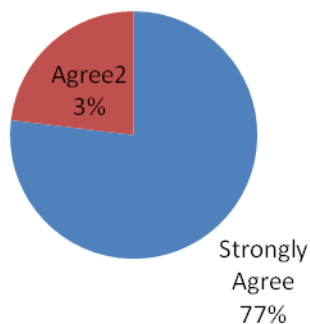
13. The Instructor was available during the specified office hours and for after class consultations.



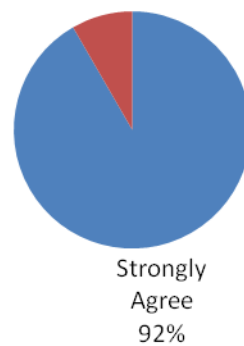
15. The subject matter presented in the course has increased your knowledge of the subject.



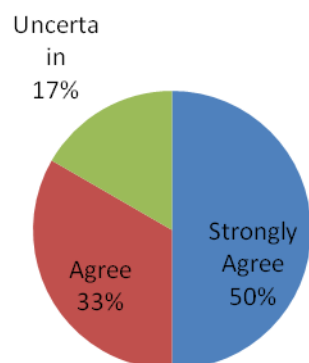
16. The syllabus clearly states course objectives requirements procedures and grading criteria.



17. The course integrates theoretical course concepts with real-world applications.



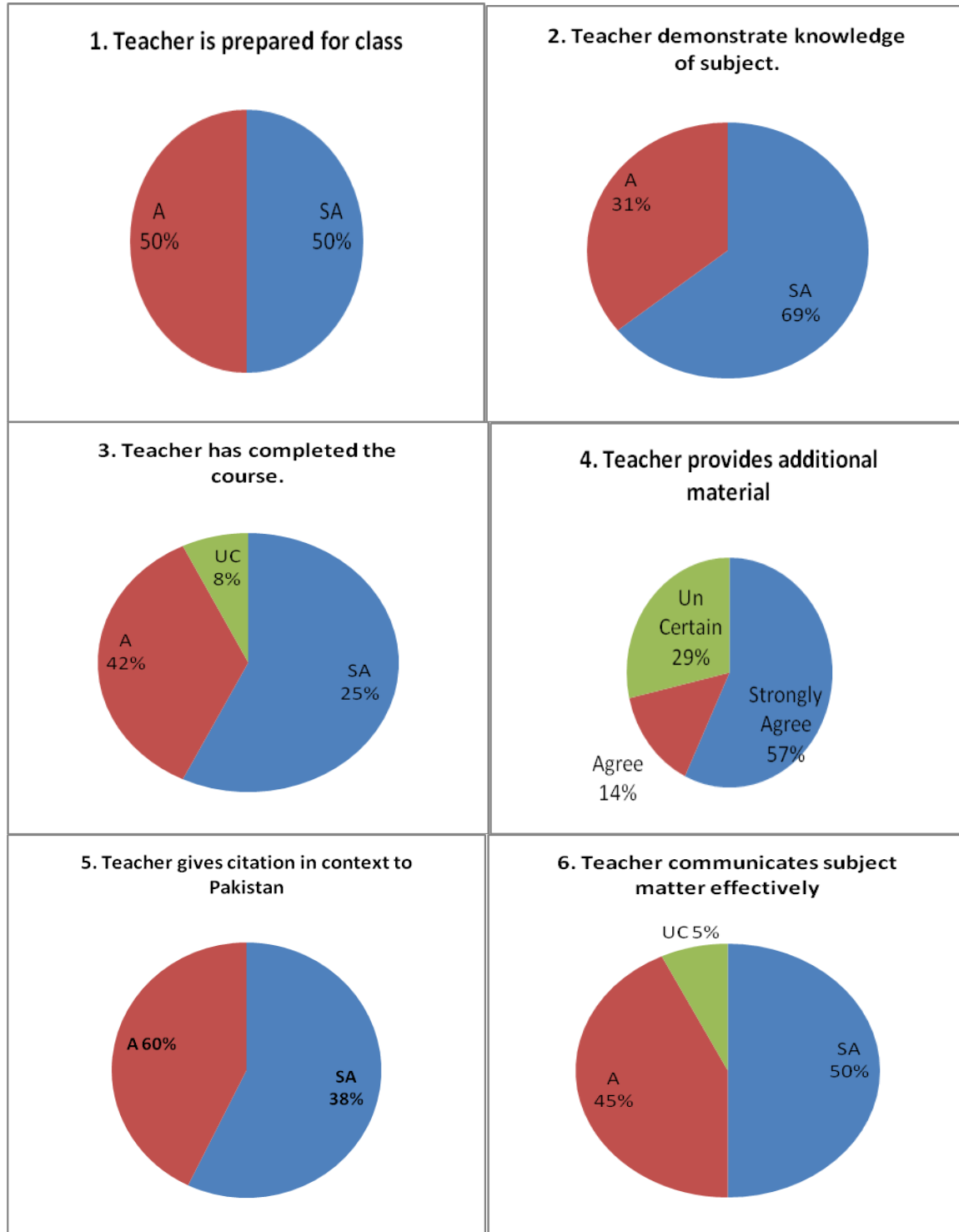
19. The course material is modern & Updated.



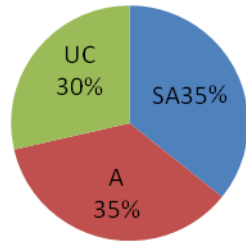
Students did not give any general comments on teacher.

Mr. Seed Gulzar- Lecturer(FR 503)

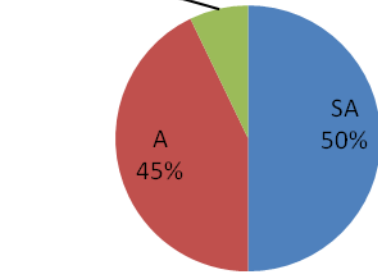
The evaluation of this teacher is presented in the following pie charts. In the following graphs students are having opinion that teacher is always prepared for the class and tell the things in context to Pakistan also. Fifty percent are agree with the provision of material by the teacher.



7. Instructor show respects to students.

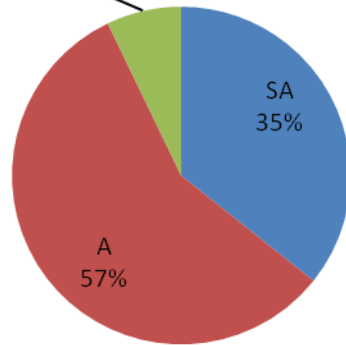


10. Instructor leaves on time.

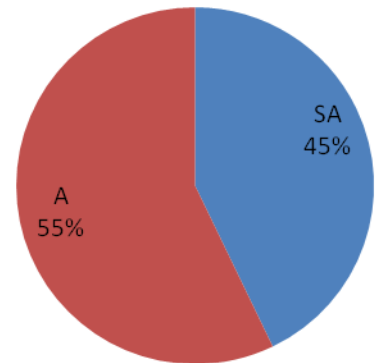


8. Instructor maintains conducive env. for learning

Un
Certain
18%

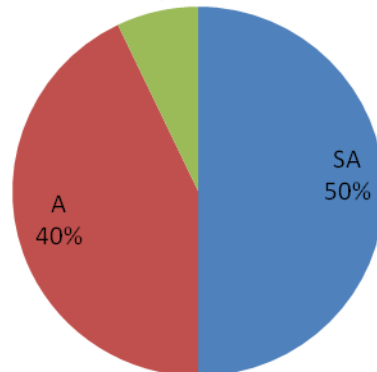


11. The instructor is fair in examination.

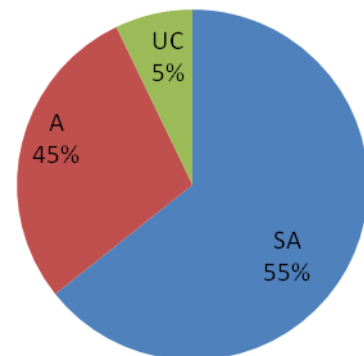


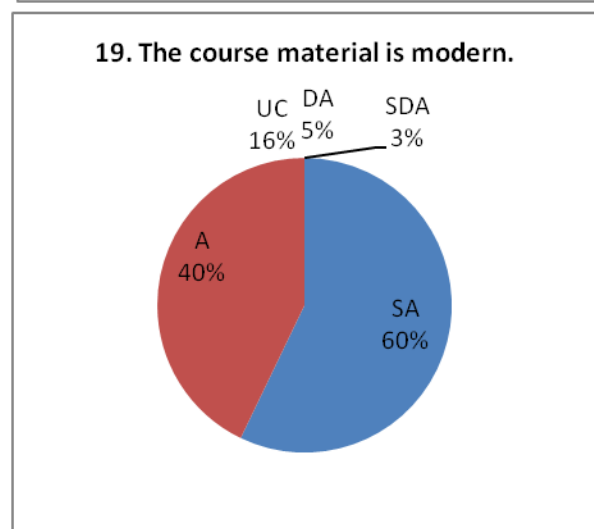
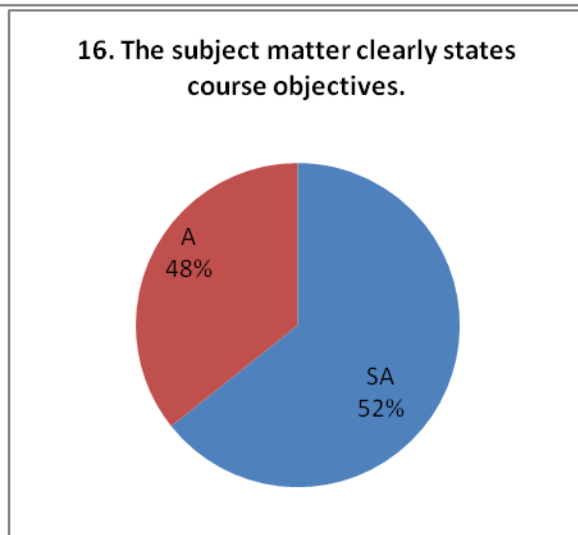
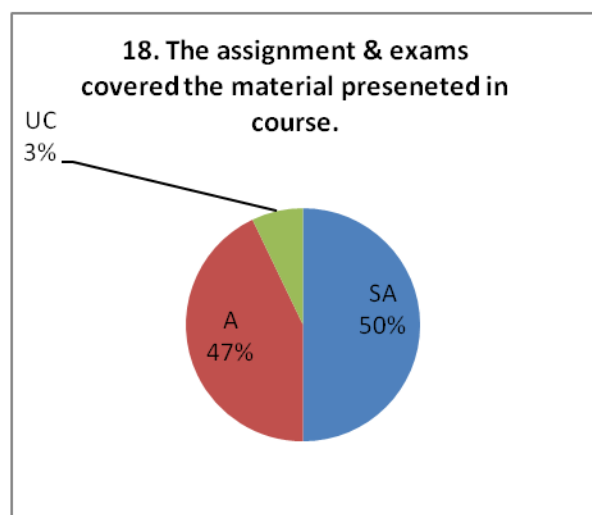
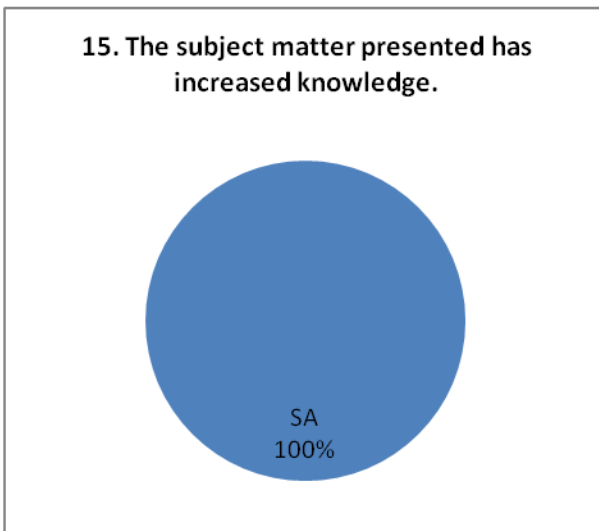
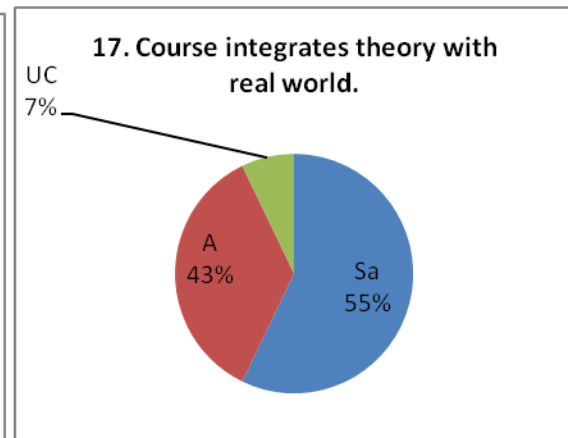
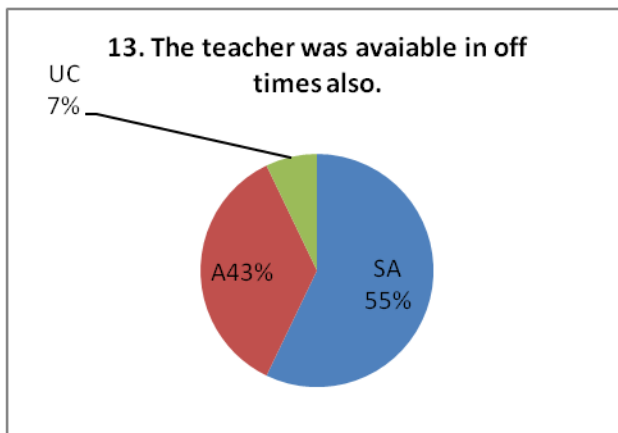
9. Instructor arrives on time.

UC 5%



12. The instructor returns graded scripts.

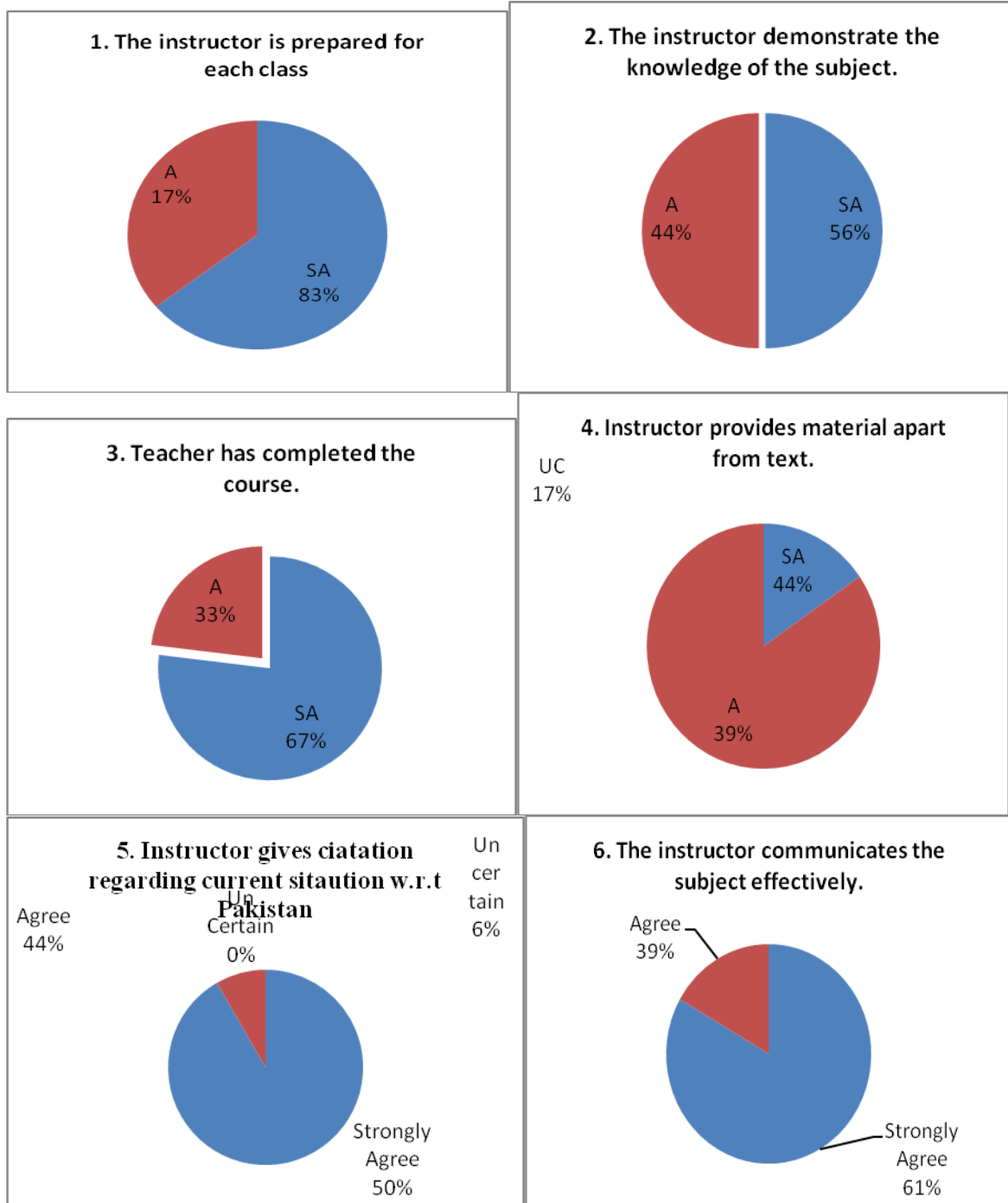




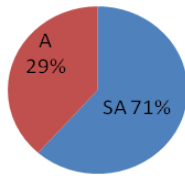
In general comments students are having perception that teacher is jolly but very strict. He provides knowledge and behaves very well.

Ms. Lubna Ansari (RF 508)

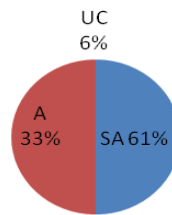
Following charts represents the evaluation of this teacher according to Performa 1. In the following graphs it is concluded that teachers is mostly prepared for the class and demonstrate the knowledge very well.



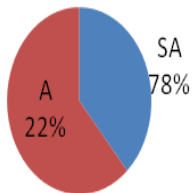
7. Teacher show respect towards student.



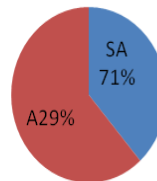
8. The instrcutor mainatains the environemnt conducive to learning



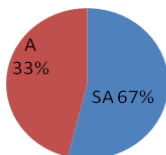
9. Teacher arrives on time.



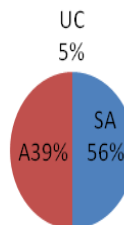
10. Instructor leaves on time.



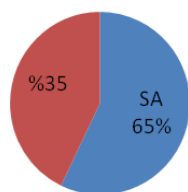
11. Instructor is fair in examination



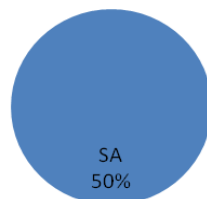
12. Instructor returns the graded scripts.



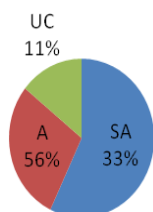
13. Instructor is available in offtimes also.



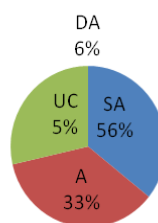
15. Subject has increased knowledge.



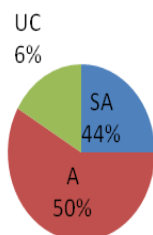
16. The syllabus clearly states the objectives.



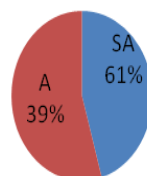
17. The course integrates the theory with real world



18. The assignemnt & Exams covered the material presented.



19. The course is modern & Updated.

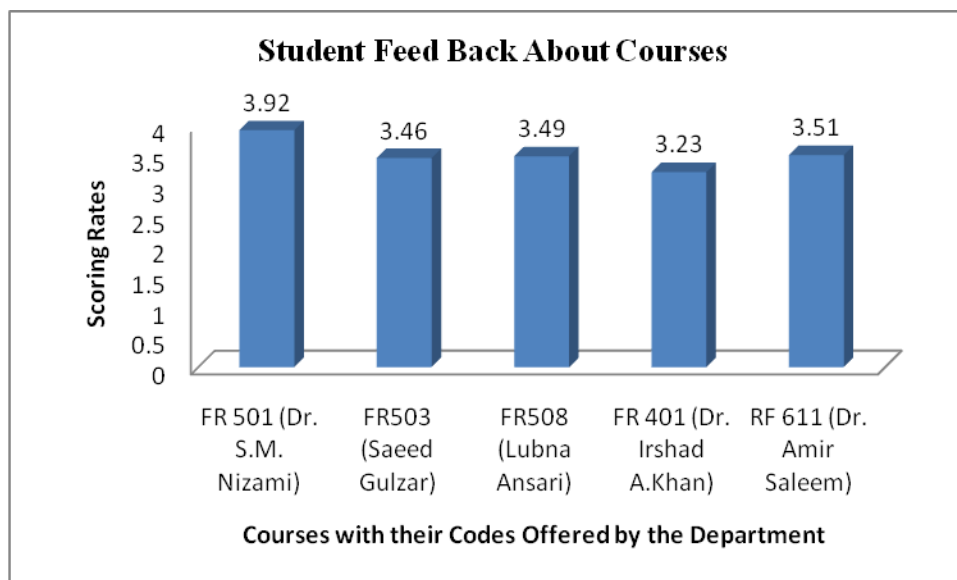


Student course evaluation

Following courses were offered by the department in the fall 2009-10 and spring 2010 Semester.

Course Title	Course Code	Teacher
Introduction to Agroforestry and watersheds	FR 401	Dr. Irshad A. Khan
General Silviculture	FR 501	Dr. S.M. Nizami
Forest Law and Policy	FR 611	Dr. Aamir Saleem
Principles of Agroforestry	FR 503	Mr. Saeed Gulzar
Range Vegetation and Livestock interactions	RF 508	Ms. Lubna Ansari

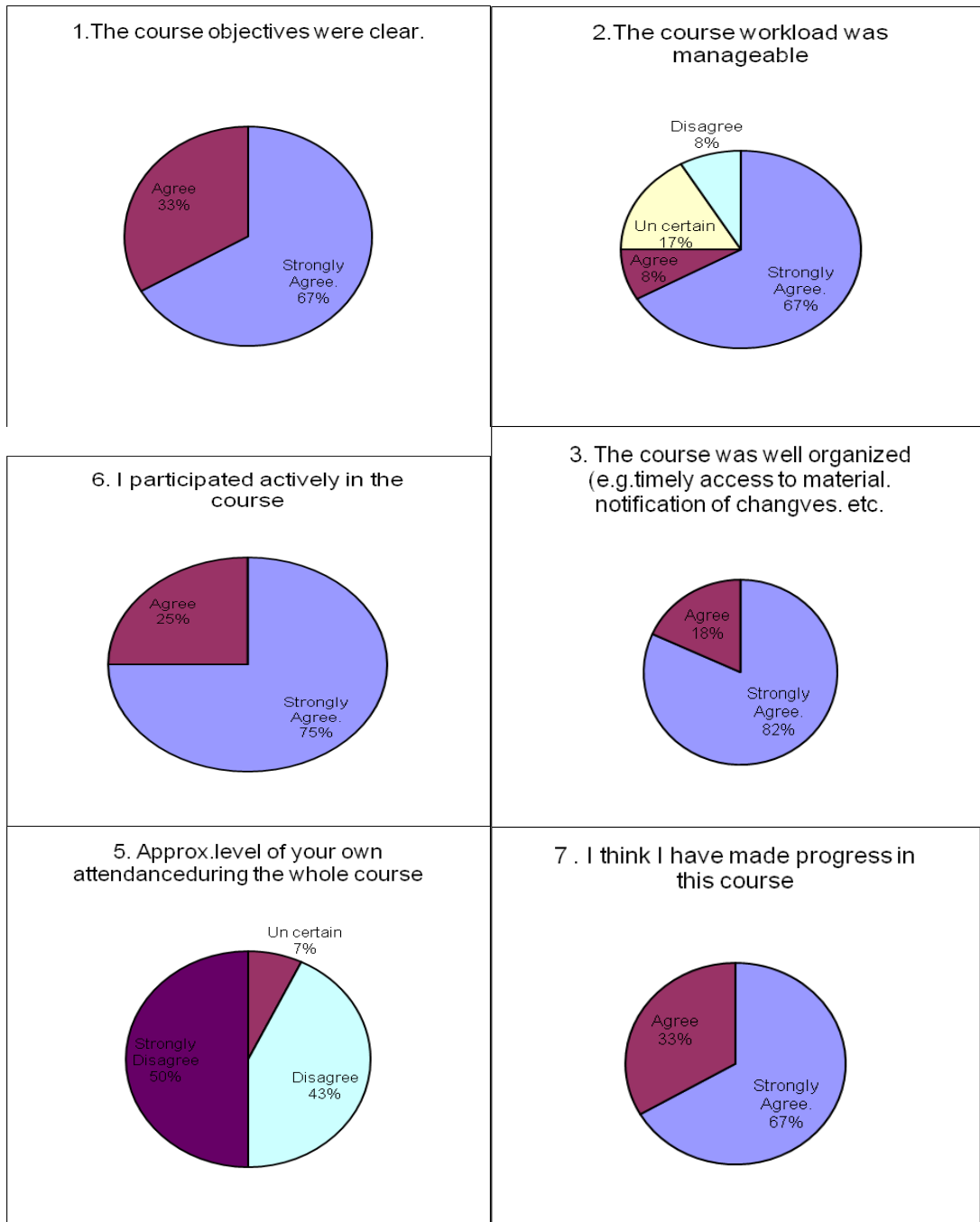
The courses of the respective teachers were evaluated per Performa 1 (Annexure II) and the results are shown in graphical form in the graph below. It is clear from the graph that the course number FR-501 is on the top and Course FR 401 is at lowest rank as per student evaluation. The position of other courses can be well judged from the graph below.



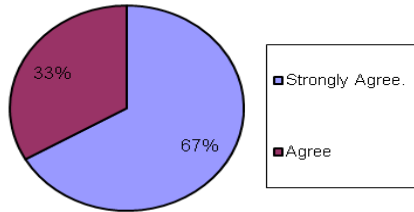
Assessment of each course is presented in the following pie charts:

Introduction to Agro forestry and Watersheds.(FR 401) Dr. Irshad A.

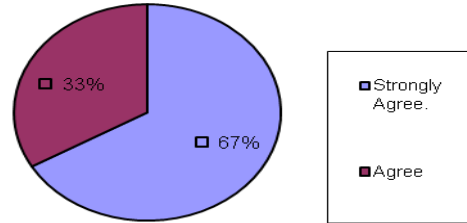
The course entitled “Introduction to Agro forestry and Watersheds” was taught by Dr. Irshad A. Khan and was evaluated by the students through proforma no: 1. The perception of the students for this course is well defined in the following pie charts.



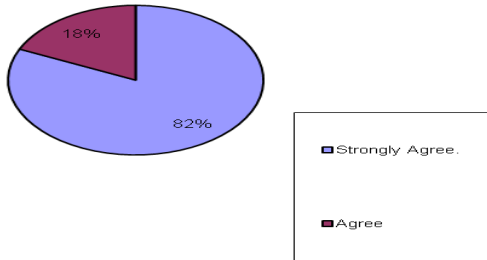
9. I think the course was well constructed to achieve the learning outcomes (there was good balance of lecture, tutorials, practical.)



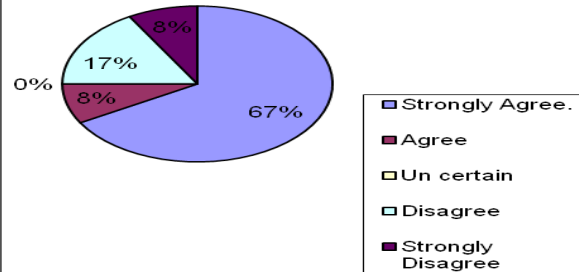
10. The learning & teaching method encouraged participation.



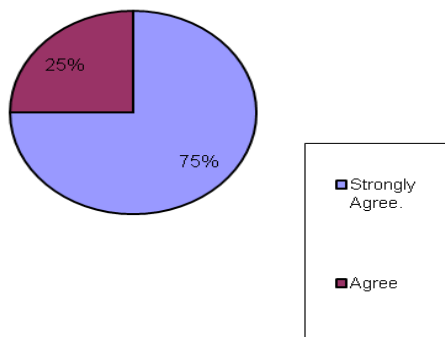
11. The overall environment in the class was conducive to learning



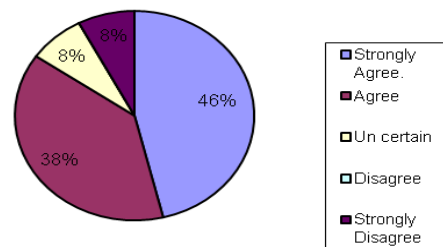
12. Classrooms were satisfactory



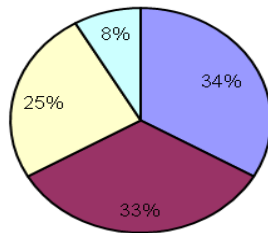
14. Learning materials (lesson plans, course notes etc.) were relevant and useful.



15. Recommended reading books etc. were relevant and appropriate.

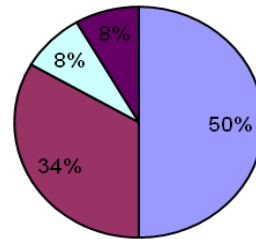


16 The provision of learning resources in the library was adequate and appropriate



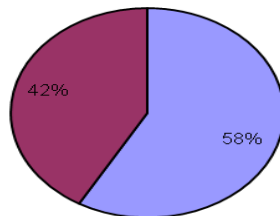
Strongly Agree.
Agree
Un certain
Disagree

17 The prvision of learning resources on the Web was adequate and appropriate (if relevant)



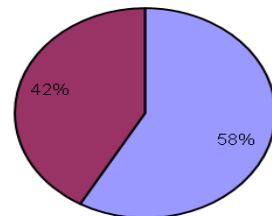
Strongly Agree.
Agree
Disagree
Strongly Disagree

19 The course stimulated my interest and through on the subject area.



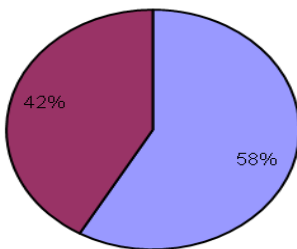
Strongly Agree.
Agree

20 The pace of the Course was appropriate



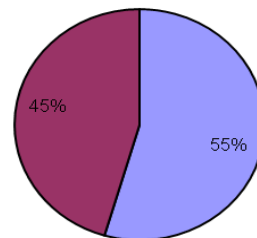
Strongly Agree.
Agree

21 Ideas and concepts were presented clearly

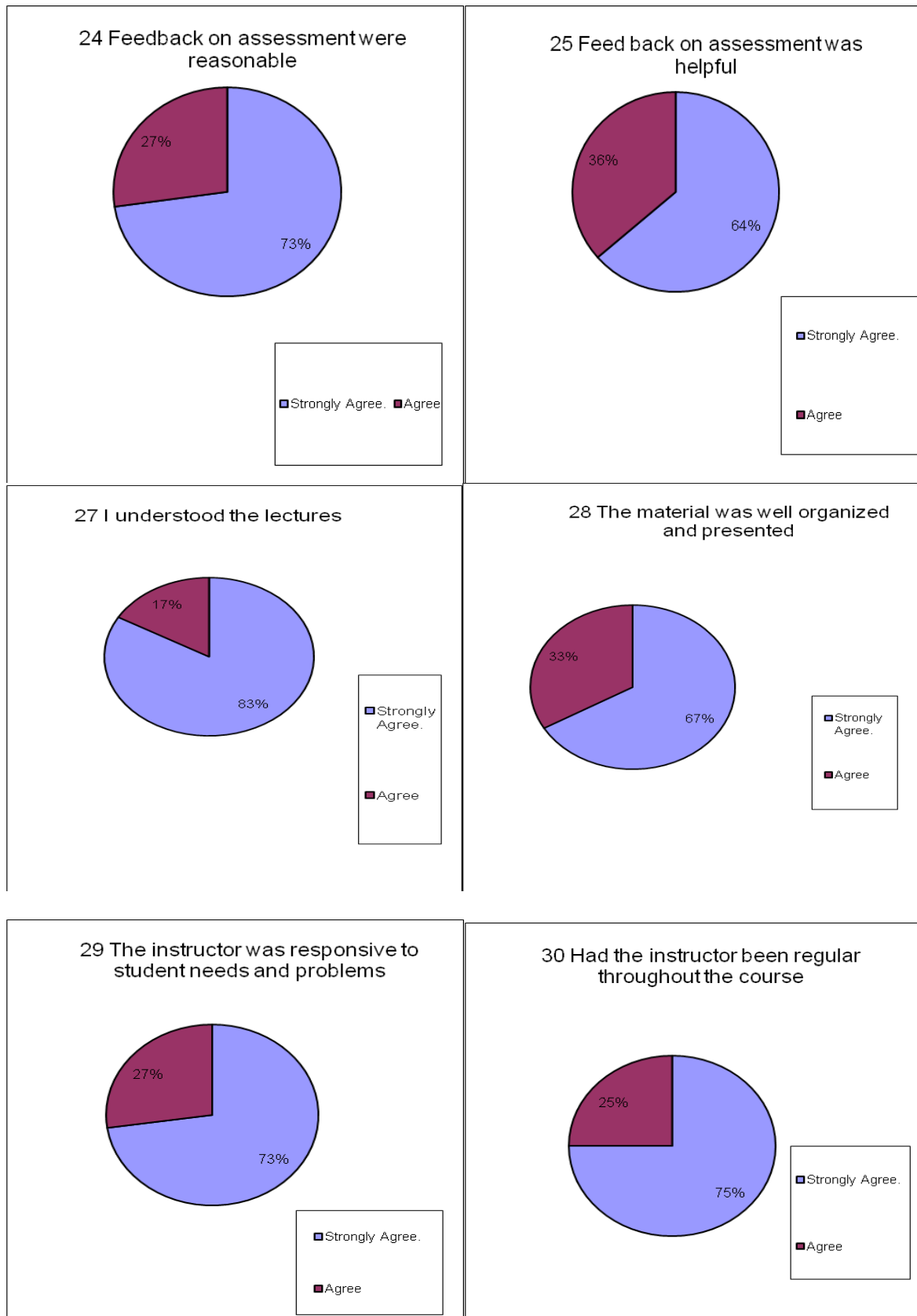


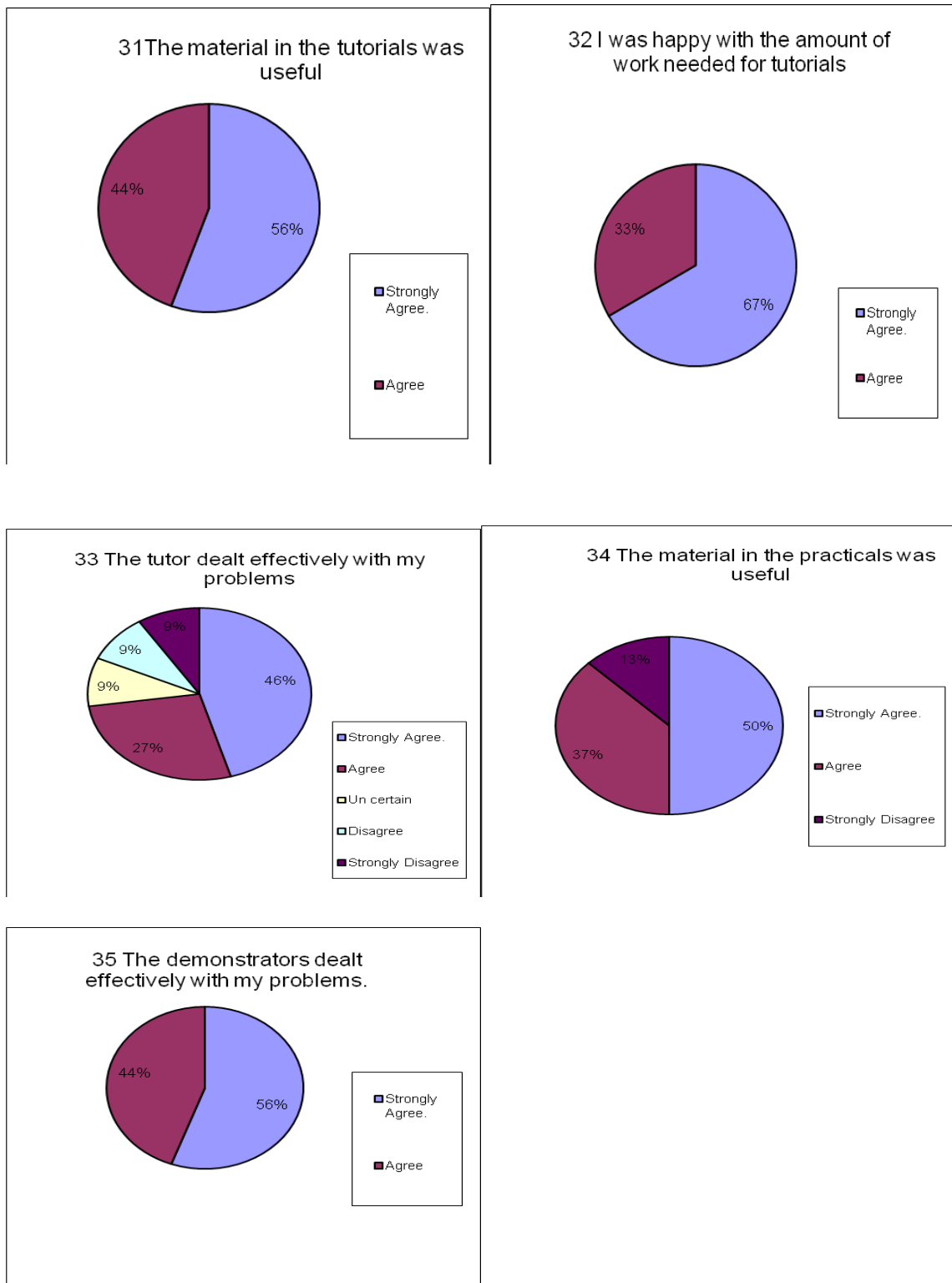
Strongly Agree.
Agree

23 The method of assessment were reasonable



Strongly Agree.
Agree



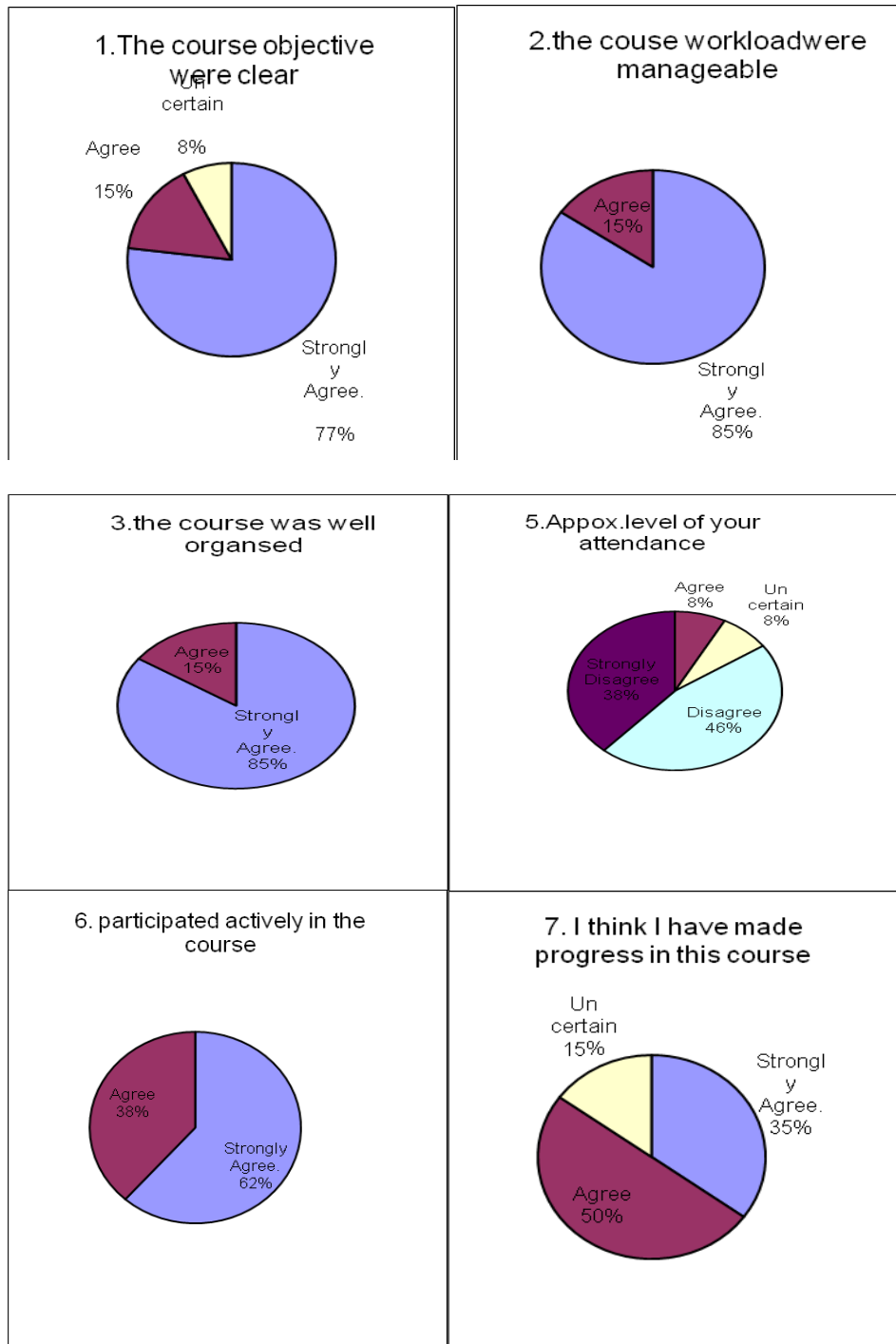


General Comments of the Students about the Course revealed that:

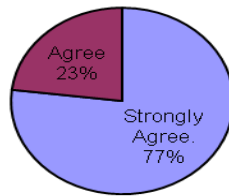
□ Practical durations should be increased, Course can be improved by adding more practicals and new techniques.

Forest Law & Policy FR 611 (Dr. Aamir Saleem)

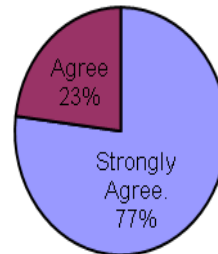
The course entitled “Forest Law & Policy” was taught by Dr. Aamir Saleem and was evaluated by the students through proforma no: 1. The perception of the students for this course is well defined in the following pie charts



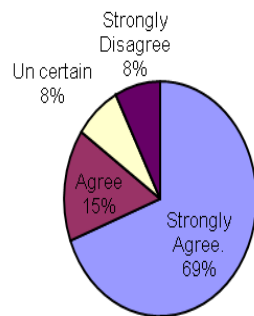
9. I think the course was well constructed to achieve the learning outcomes (there was a good balance of lecture, tutorials, practical etc.



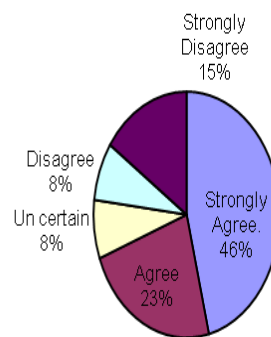
10. The learning and teaching methods encouraged participation



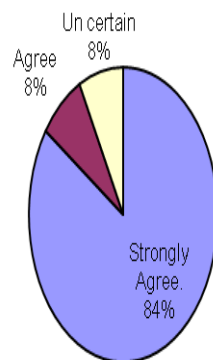
11 The overall environment in the class was conducive to learning



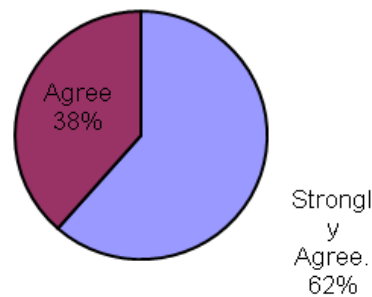
12 Class rooms were satisfactory



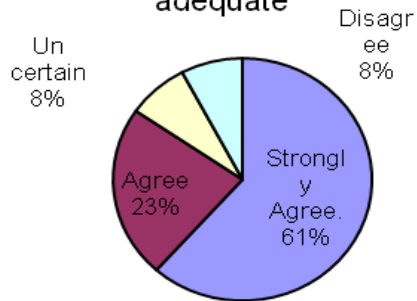
14 learning materials (lesson plans, course notes etc) were relevant and useful



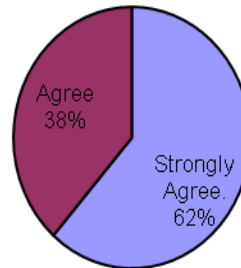
15 Recommended reading books etc were relevant and appropriate



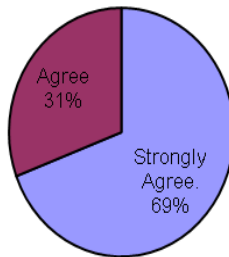
16 The provision of learning resources was adequate



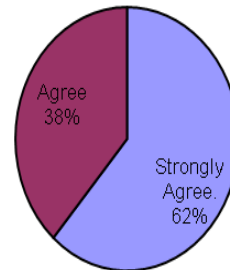
17 The Provision of learning resources on the web was adequate



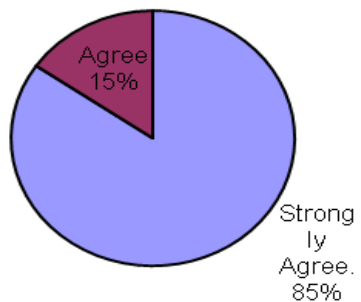
19 The course stimulated by interest and thought on the subject area



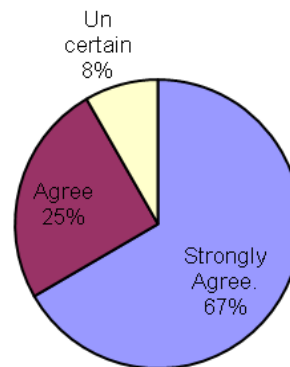
20 the pace of of the course was appropriate

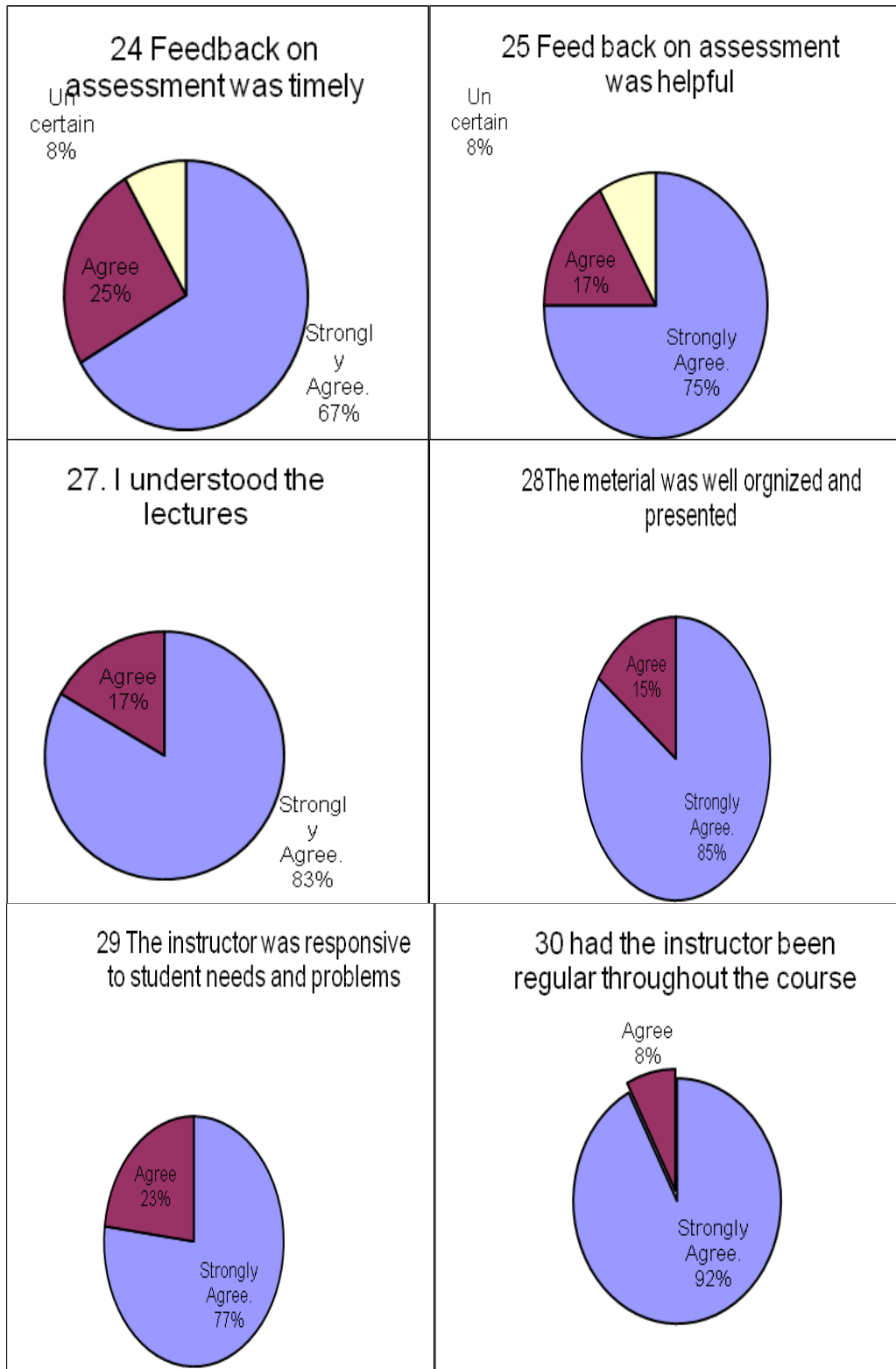


21 Ideas and concepts were presented clearly

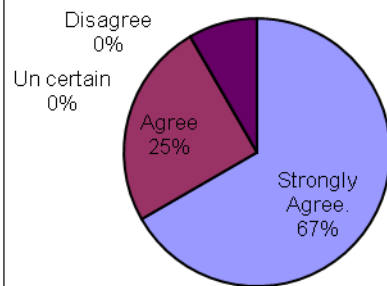


23 The method of assessment were reasonable

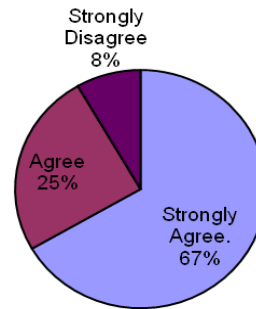




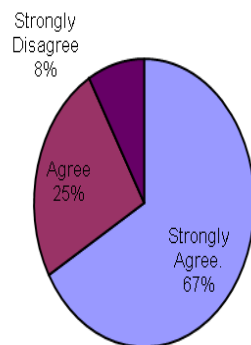
31. The material in the tutorial was useful



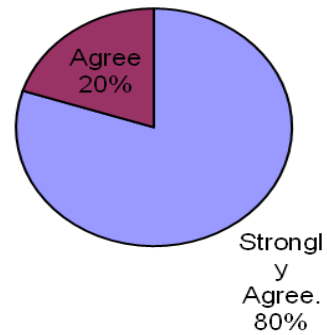
32. I was happy with ht amount of work needed of tutorials



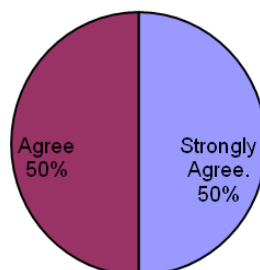
33 The tutor dealt effectively with my problems



34 The material in practicl was useful

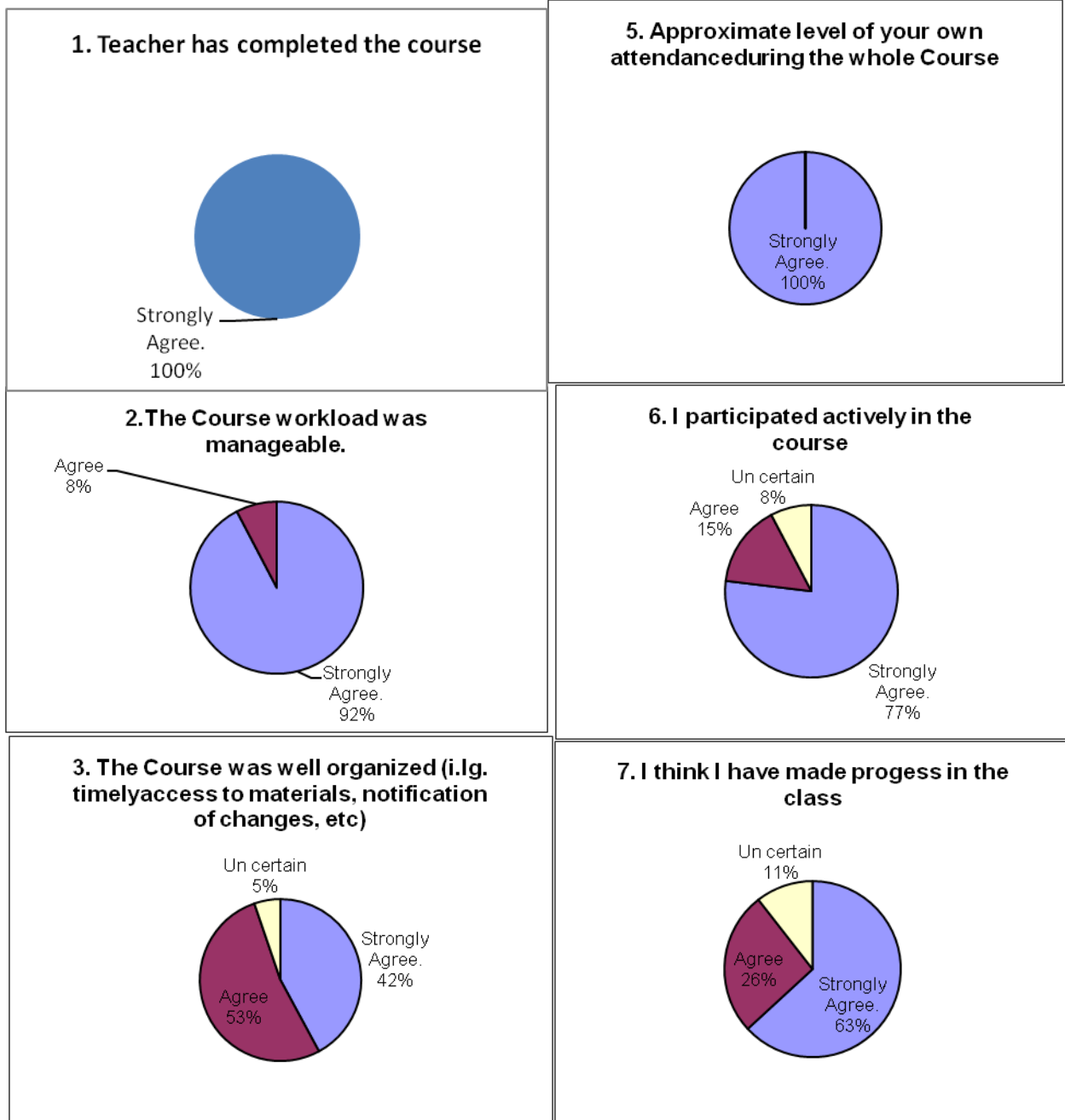


35 The demonstrators dealt effectively with my problems.

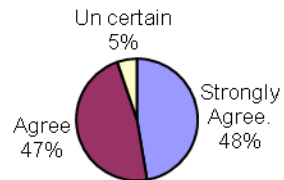


“General Silviculture” FR 501 Dr. S. M. Nizami

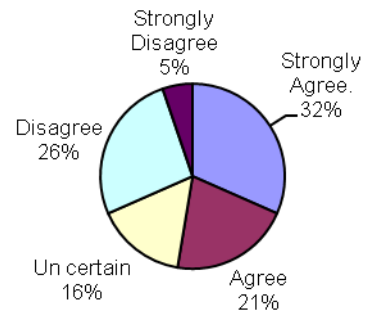
The course entitled “General Silviculture” was taught by Dr. Syed Moazzam Nizami and was evaluated by the students through proforma no: 1. The perception of the students for this course is well defined in the following pie charts.



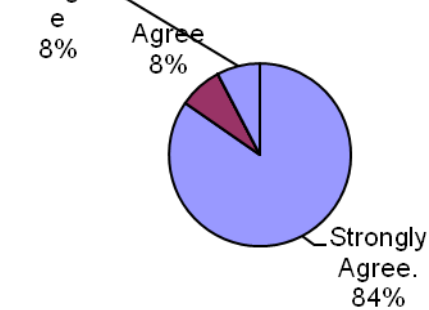
9. I think the Course was well structured to achieve the learning outcomes (there was a good balance of lecture, tutorial, practical etc.)



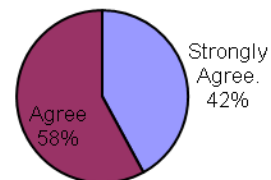
12. Classrooms were satisfactory



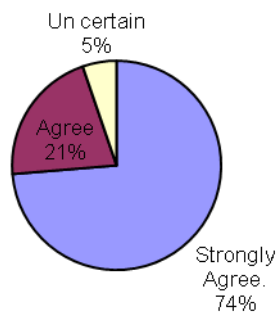
10. The learning and teaching methods encouraged participation.



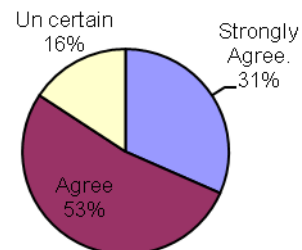
14. Learning materials (Lesson Plans, Course Notes etc) were relevant and useful.



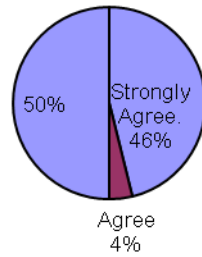
11. the overall environment in the class was conducive to learning.



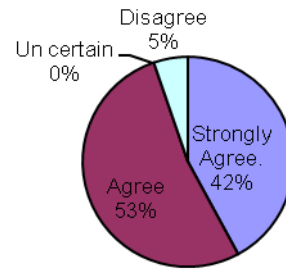
15. Recommended reading Books etc. were relevant and appropriate



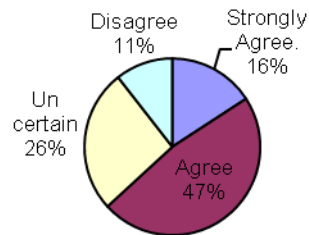
16. The Provision of learning resources in the library was adequate and appropriate



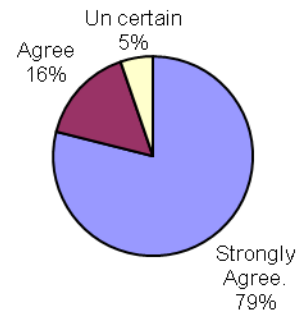
20 The pace of the Course was appropriate



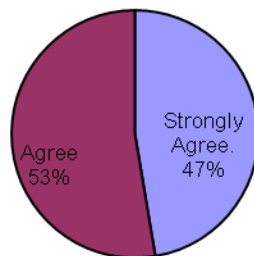
17 The provision of learning resources on the Web was adequate and appropriate (if relevant)



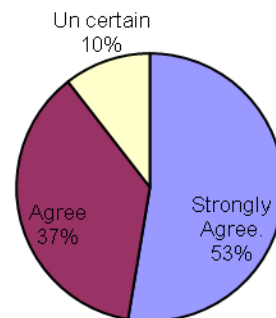
21. Ideas and concepts were presented clearly



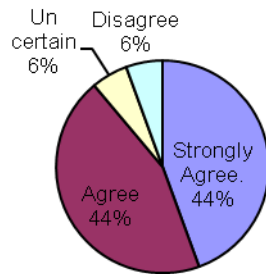
19. The Course stimulated my interest and thought on the subject area



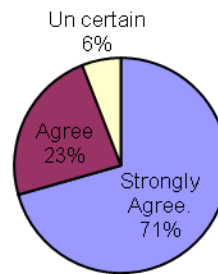
23. The method of assessment were reasonable



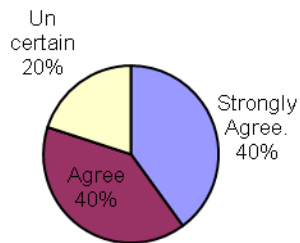
24. Feedback on assessment was timely



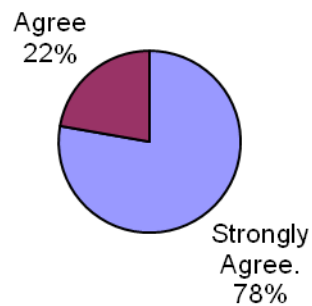
28. The material was well organised and presented



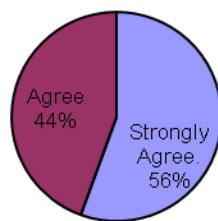
25. Feedback on assessment was helpful



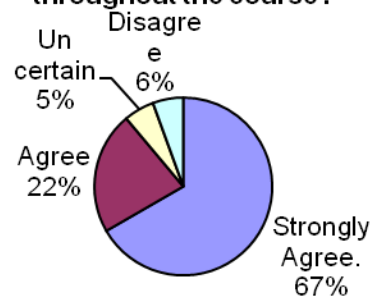
29. The instructor was responsive to student needs and problems



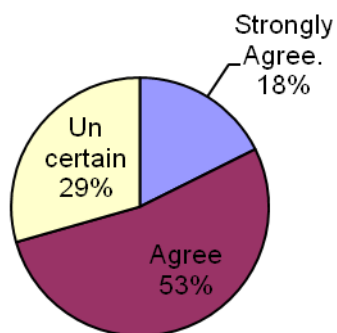
27. I understood the lectures



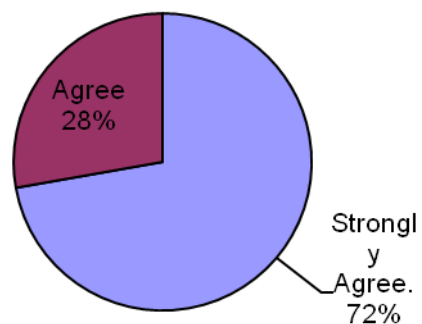
30. Had the instructor been regular throughout the course?



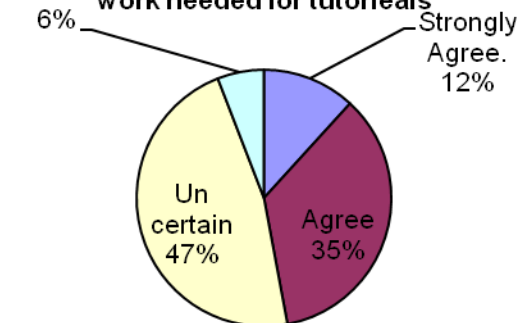
31. The material in the tutorials was useful



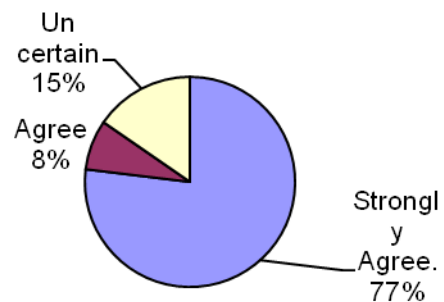
34. The material in the practicals was useful



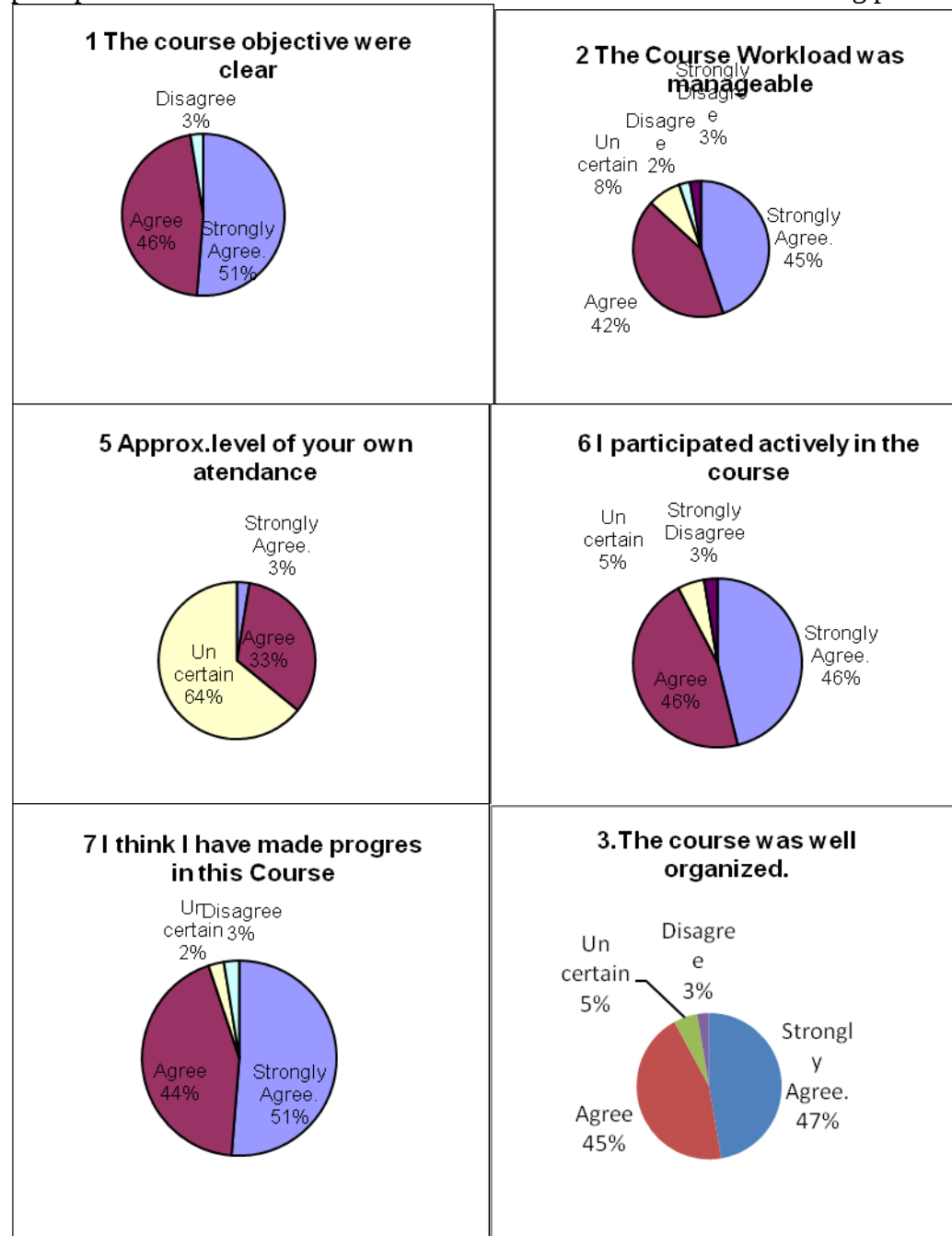
32. I was happy with the amount of work needed for tutorials



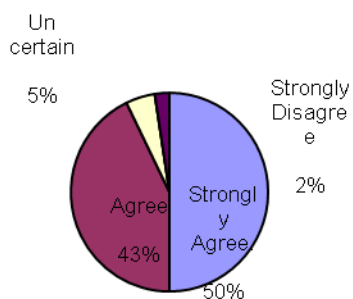
35. The demonstrators dealt effectively with my problems



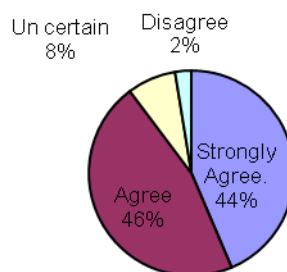
The course entitled "Introduction to Rangeland & wildlife Management" was taught by Mr. Saeed Gulzar and was evaluated by the students through proforma no: 10. The perception of the students for this course is well defined in the following pie charts.



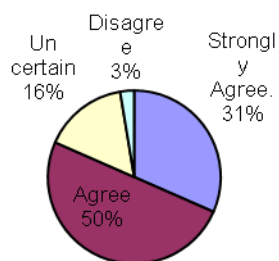
9 I think the Course was well structured to achieve



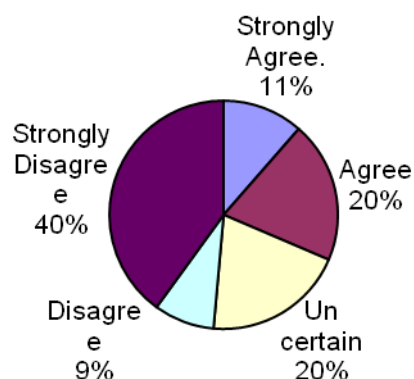
10 The learning and teaching methods encouraged participation.



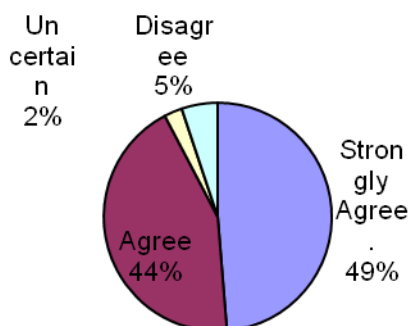
11 The over all environment in the class was conducive to learning



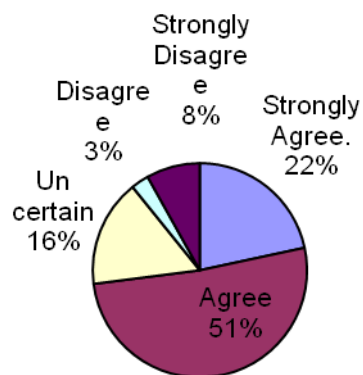
12 Classroom were satisfactory

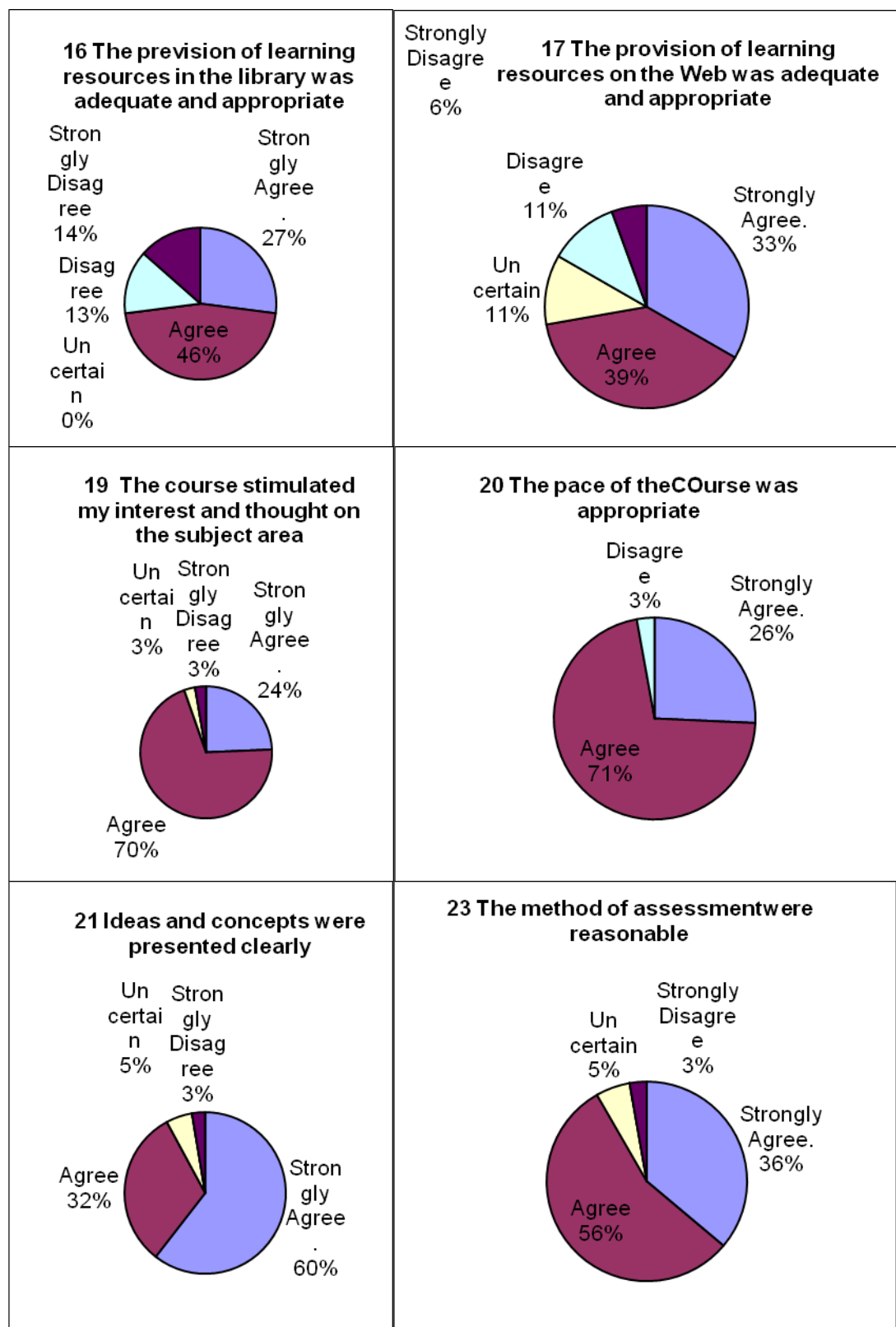


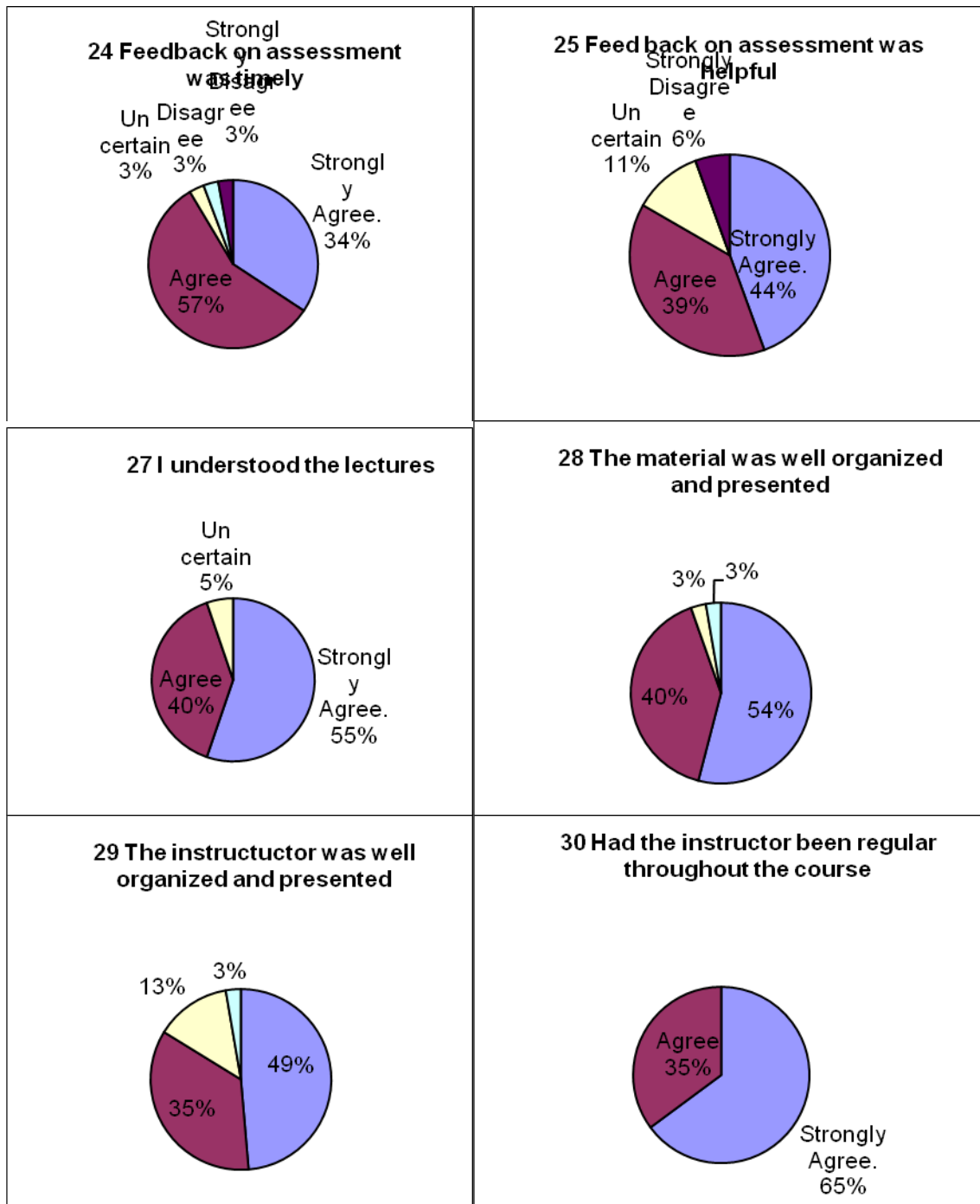
14 Learning material (Lesson Plans, Course Notes etc) were relevant and useful

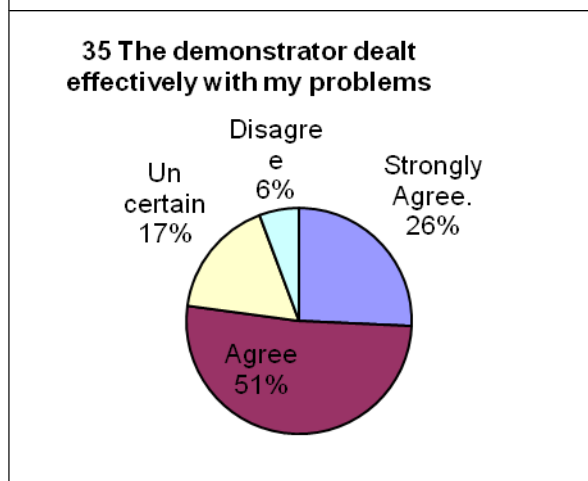
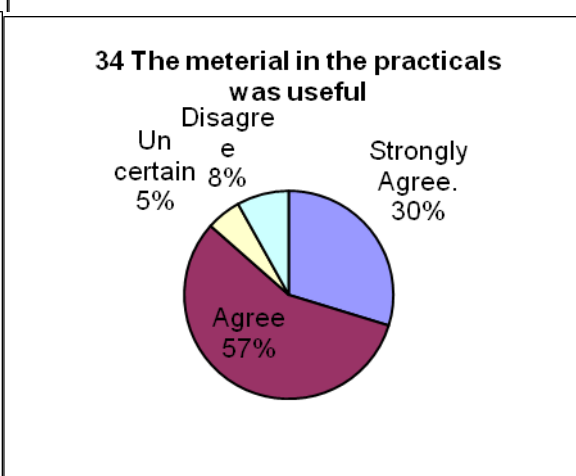
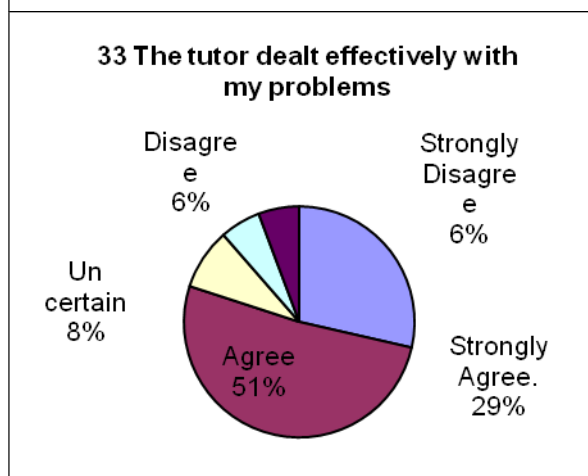
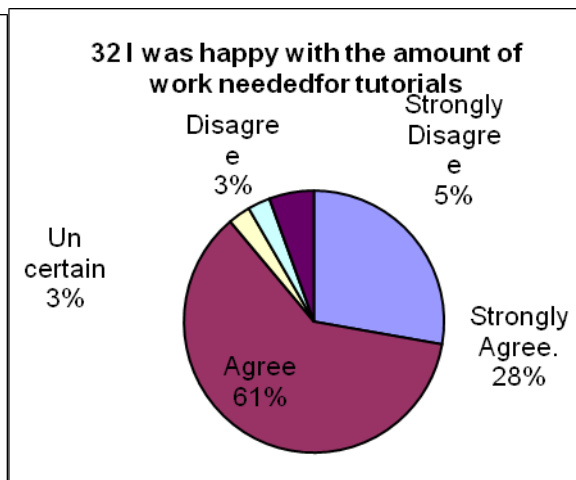
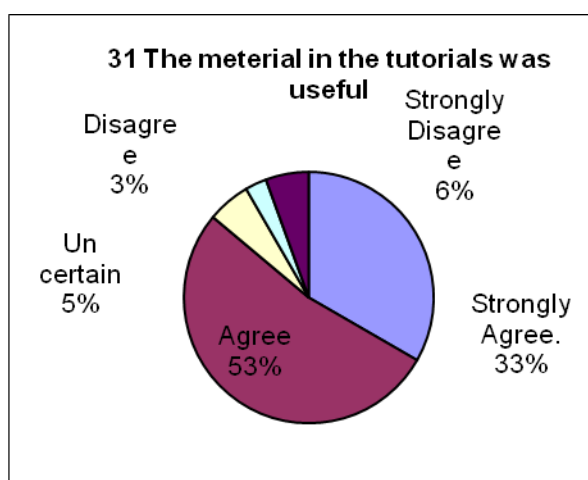


15 Recommended reading Books etc. Were relevant and appropriate



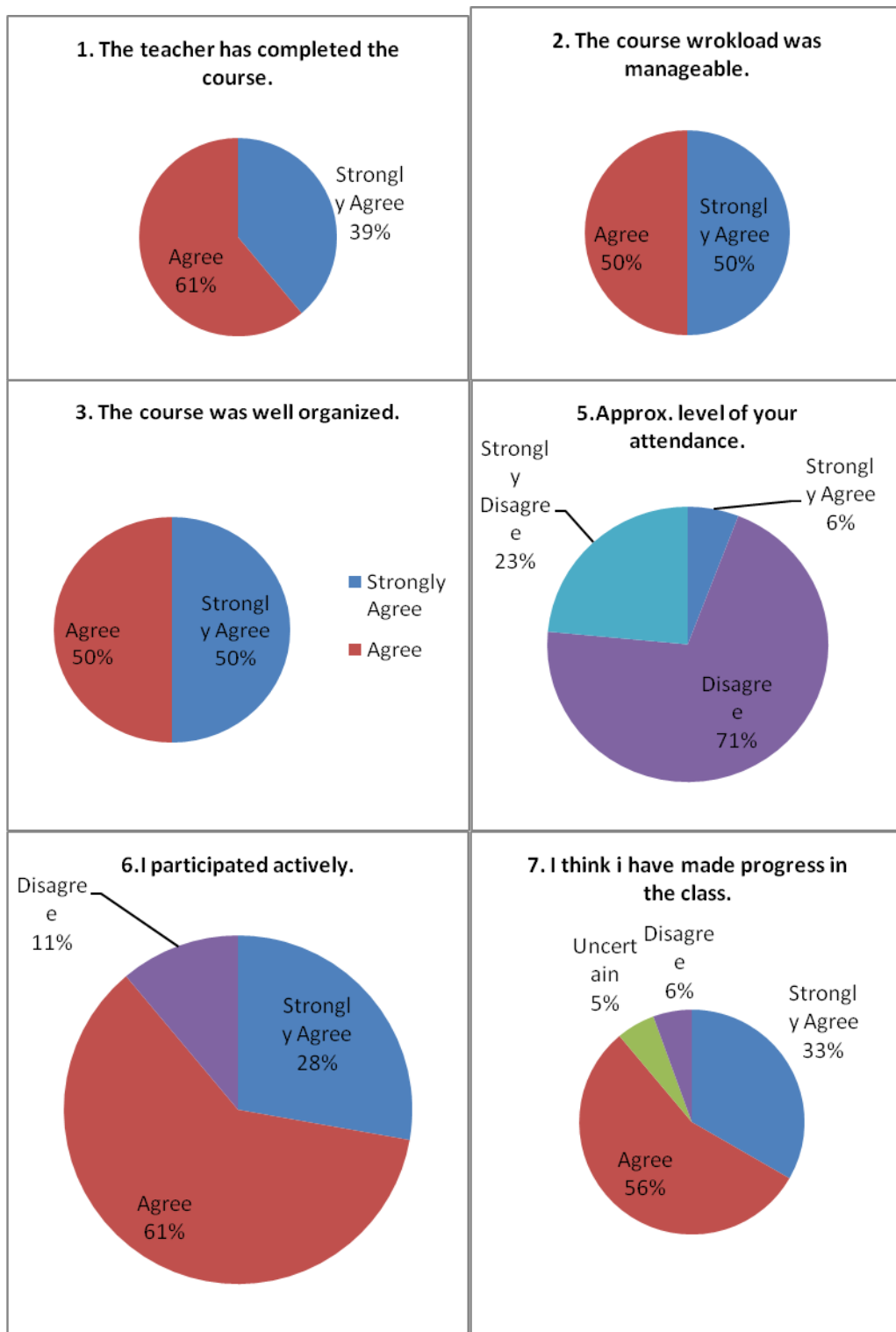




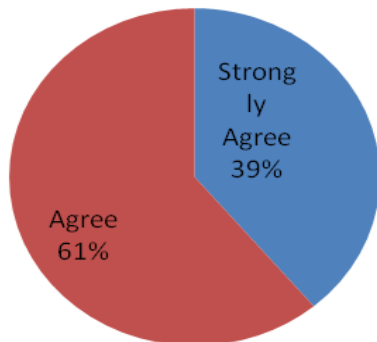


Livestock Interactions RF 508 (Ms. Lubna Ansari)

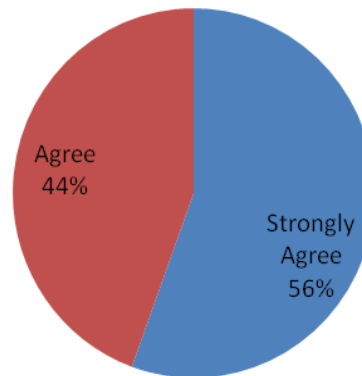
The course entitled “Livestocks Interactions” was taught by Ms. Lubna and was evaluated by the students through proforma no: 9. The perception of the students for this course is well defined in the following pie charts.



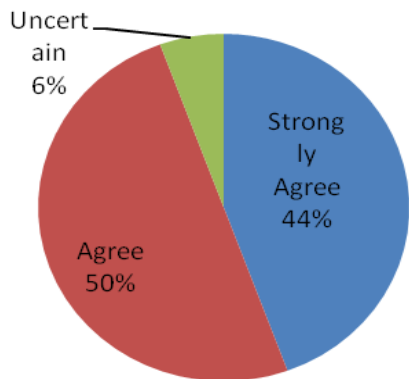
9.I think course was well structured to acvhieve outcomes.



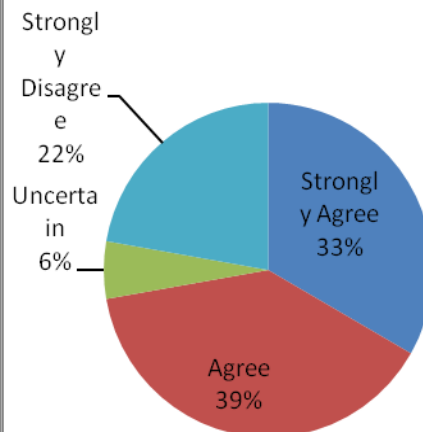
10.The learing & teaching method encouraged participation.



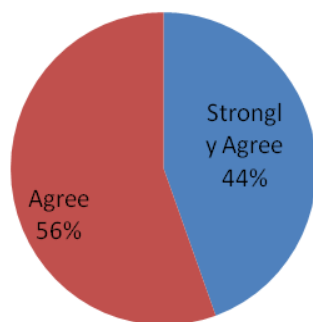
11. the overall environment of class was conducive to learning.



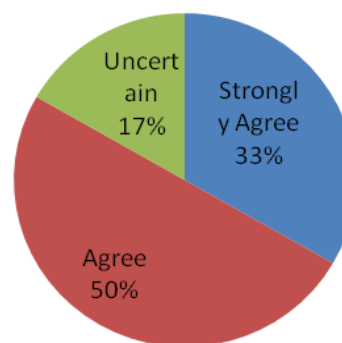
12.Class rooms were staisfactory.

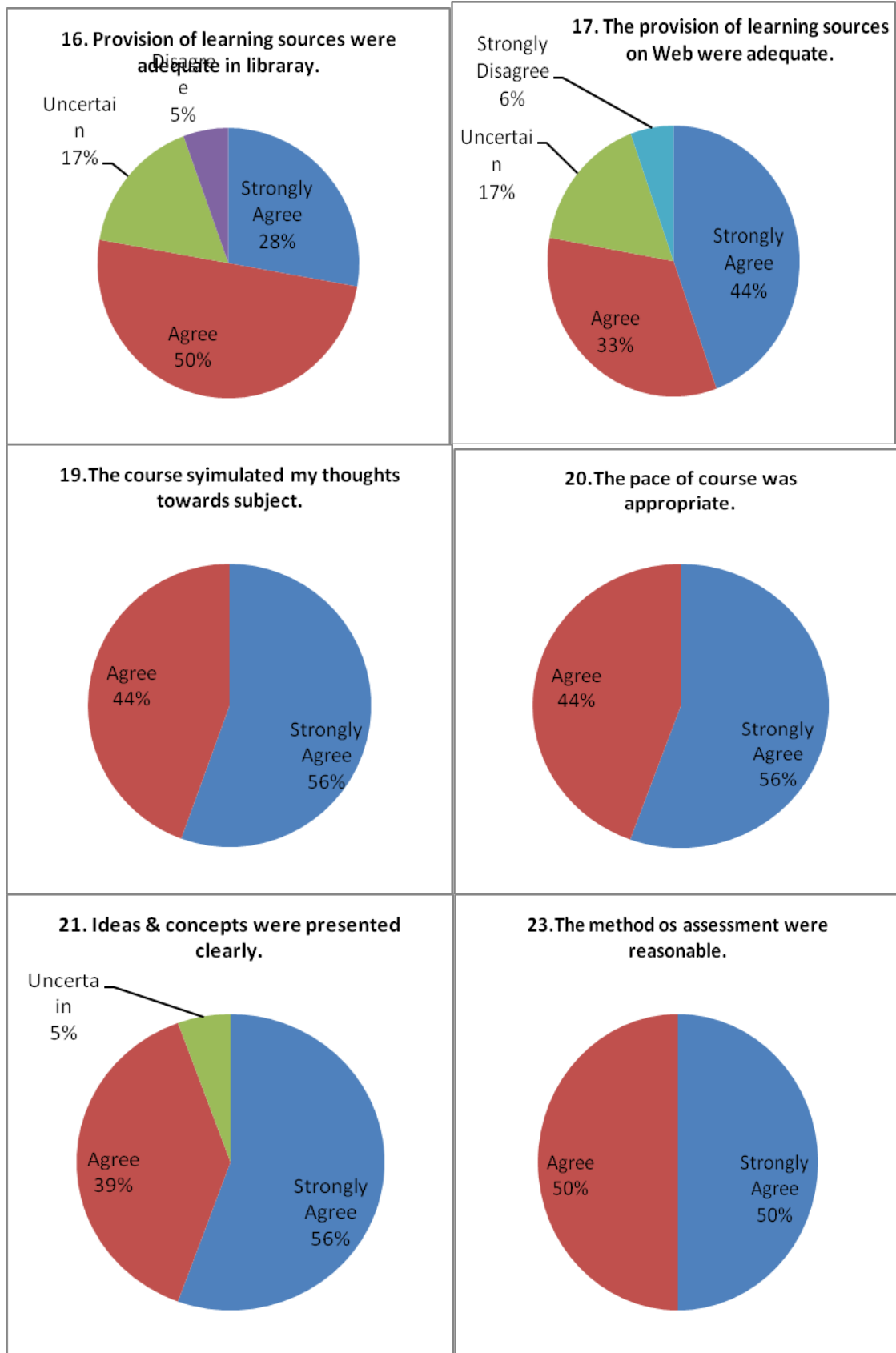


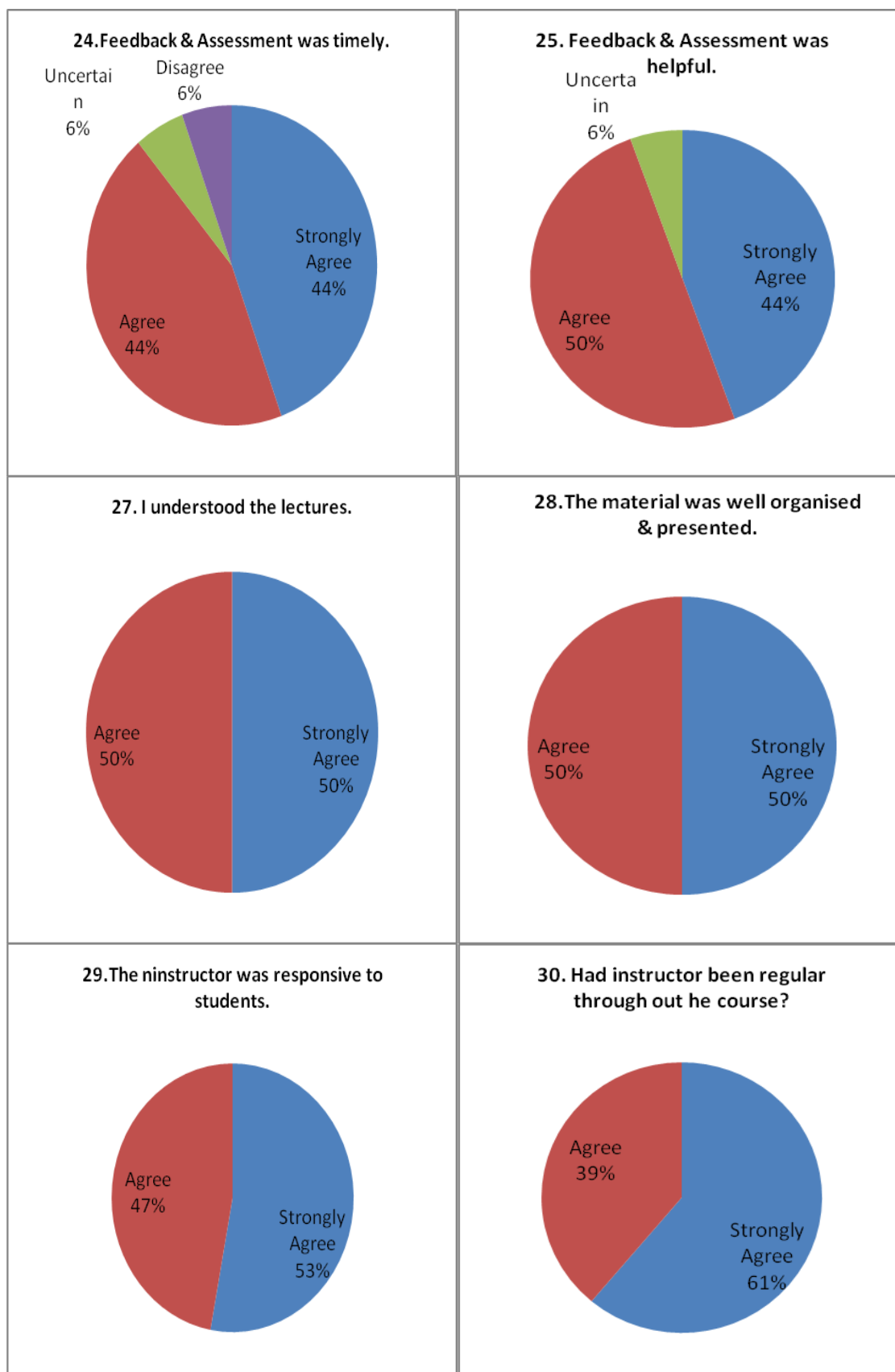
14.Learning material were useful.

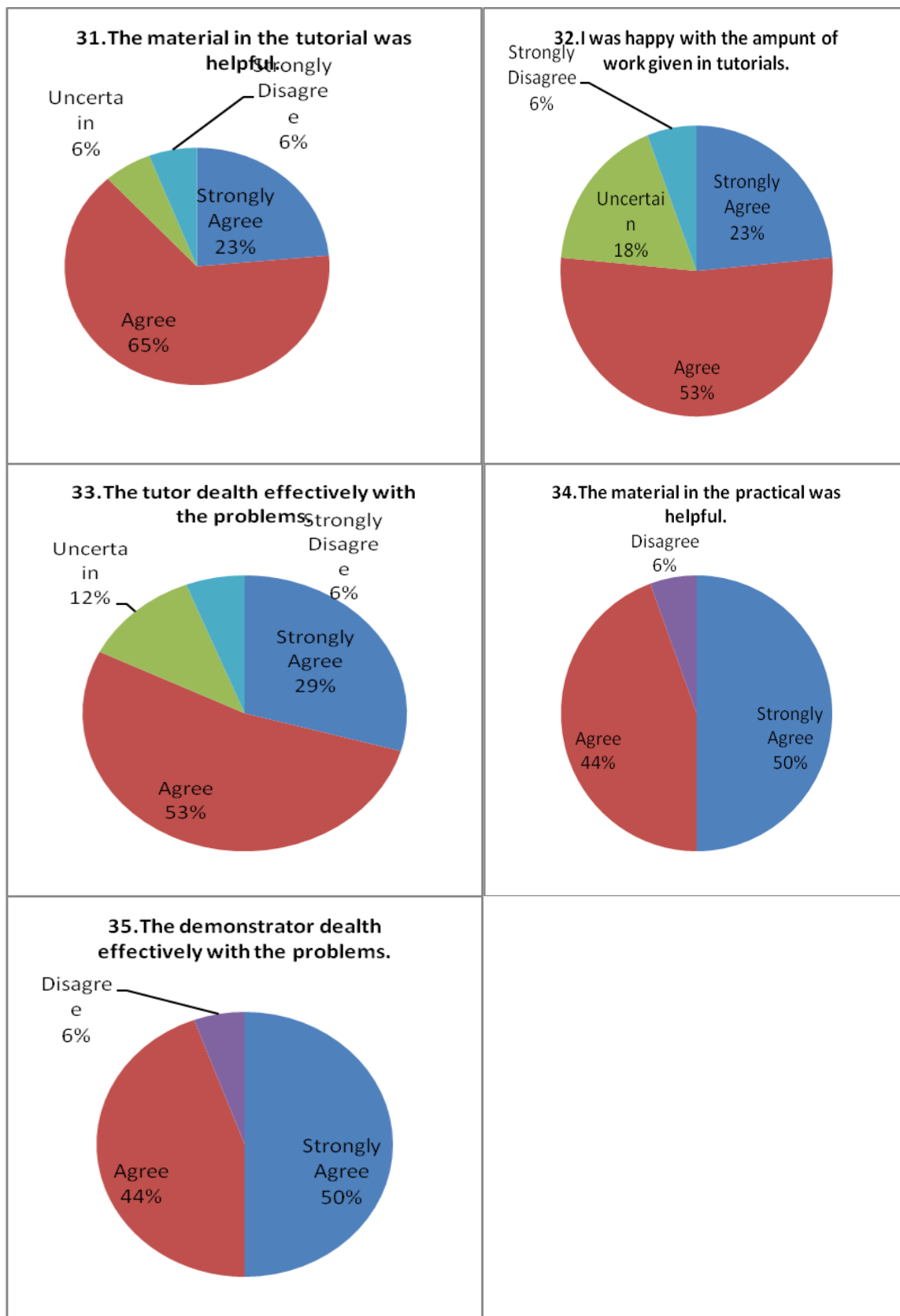


15.Recommended books were relavant.



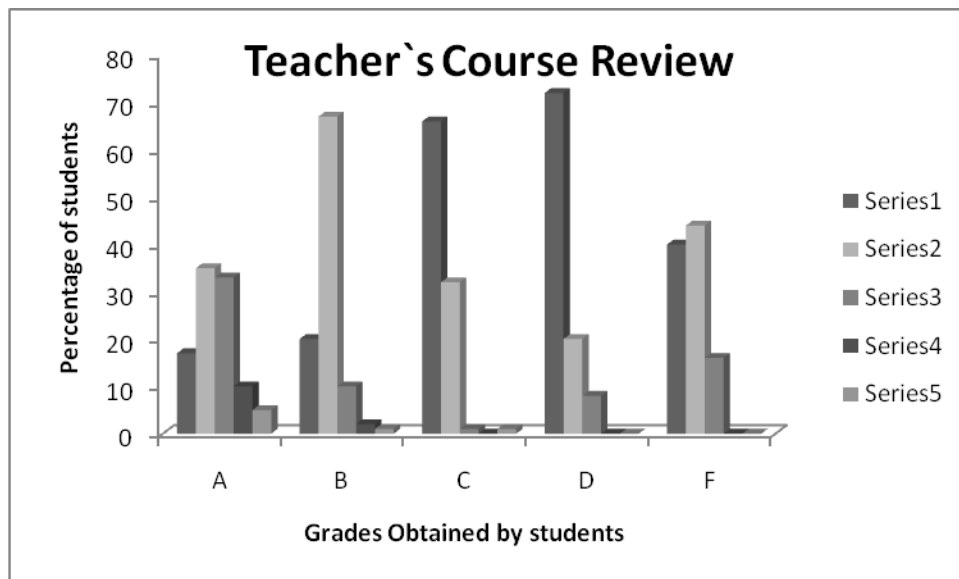






Teacher`s Course Review Reports

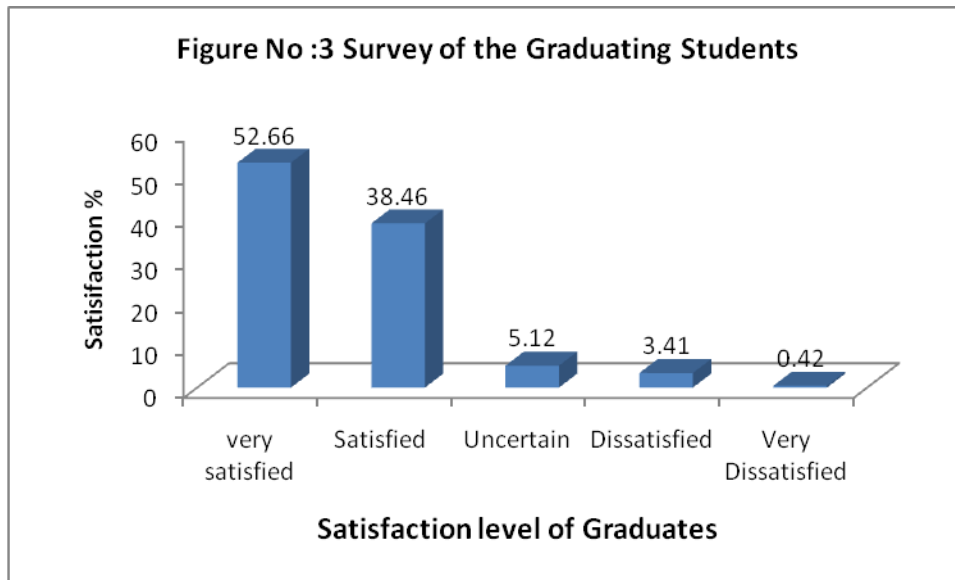
Revision of courses offered during fall 2009-10 and sprong 2010 were reviewd by the teachers and their evaluation is given under (vide proforma 2).



Each teacher was satisfied with the students evaluation of course and teacher vide proforma 1 and 10. All the courses run in conducive manner and 80% teacher are demanding more tours for clarity of concepts of the course

Survey of Graduating Students

Results of survey of graduating students based on Proforma 3 (Annexure III) are given in Figure- 3. The graduating students in the last semester were surveyed before the award of degree. On the average basis 52.66 % students showed their high satisfaction regarding all the parameters, whereas 38.46 % of the students surveyed were satisfied regarding all information asked. The results of graduating students are summarized and given in Figure No: 3.



Affectivity of Internship Experience

The internship experience was found effective in enhancing, ability to work in team, independent thinking, appreciation of ethical values, professional development, time management skills, judgment and discipline. It was first batch in 2010 who prepared working plan of the Chakwal Forest Division on request of Conservator of Forests in Chakwal as their internship. The facilities provided by Forest department affected the perception of the student. Those students (3 %) who were staying in forest guard houses were not happy so categorized the internship experience in dissatisfaction category (Fig- 4; Table 3).

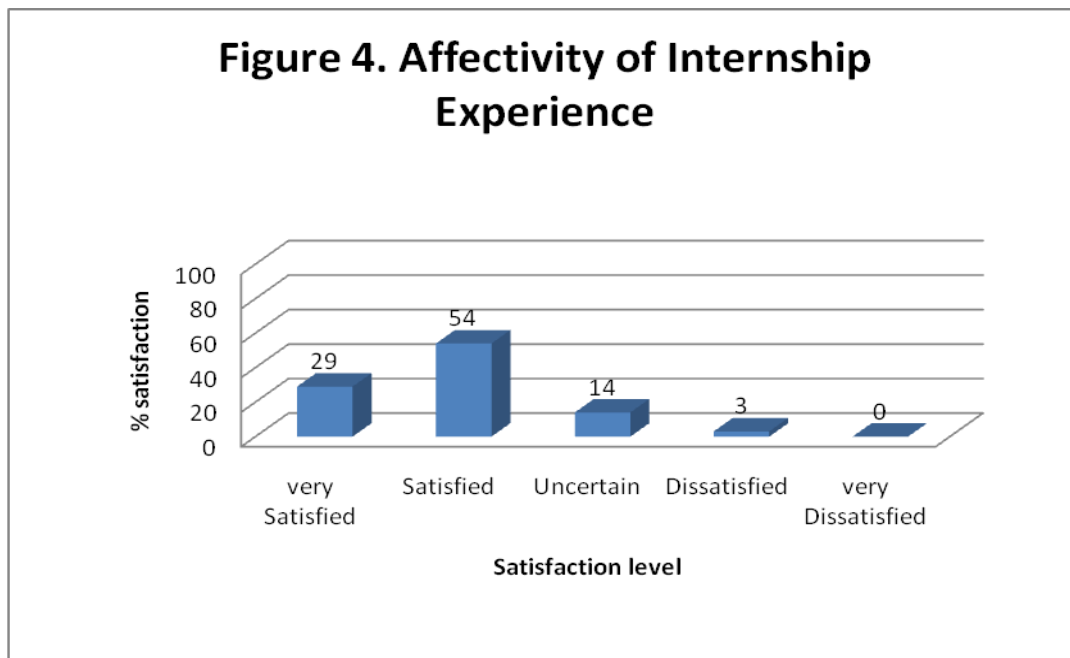


Table 3: The Internship Experience is Effective in Enhancing Professional skills of the graduating students

Serial No	Parameters	Very Satisfied (%)	Satisfied (%)	Uncertain (%)	Dissatisfied (%)	Very Dissatisfied (%)
1	Ability to work in teams	75	19	6	-	-
2	Independent thinking	63	37	-	-	-
3	Appreciation of ethical Values	33	67	-	-	-
4	Professional development	44	66	-	-	-
5	Time management skills	38	62	-	-	-
6	Judgment	44	44	12	-	-
7	Discipline	50	31	19	-	-
8	The link between theory and practice	56	44	-	-	-

Alumni Survey

The alumni survey results was conducted associated with Proforma # 7. Ten students feed back was obtained from the Alumni survey. The programme assessment results are shown below:

Knowledge: 45% students were having view that they have received knowledge about math, humanities and professional students.

Communications Skills: 90% were satisfied the program oral communication, report writing and communication skill. About 62% were highly satisfied with program leadership development. About 805 were not satisfied with the department infrastructure in comparison with other reputed universities.

Skills and Capabilities Reflected In Performance as Foresters.

Our students develop ability to apply knowledge of Forest & Range Management to work as skilled and successful professionals in the respective field. While studying, students learn advance knowledge about the field, gain confidence, experience and skills to handle problems relating to their field of specialization independently as well as working in a team of experts

Employer`s Survey

Feed back about 26 employees was obtained from organizations viz. Punjab Forest Department, Khyber Pakhtoon Khaw Forest Department , range Research Institute-National Agriculture Research Centre Islamabad (NARC), Pir Mehr Ali Shah Arid Agriculture University Rawalpindi and Banks. Their views were keen observed and discussed in the department for future improvements.The major emphasis was to know the employers

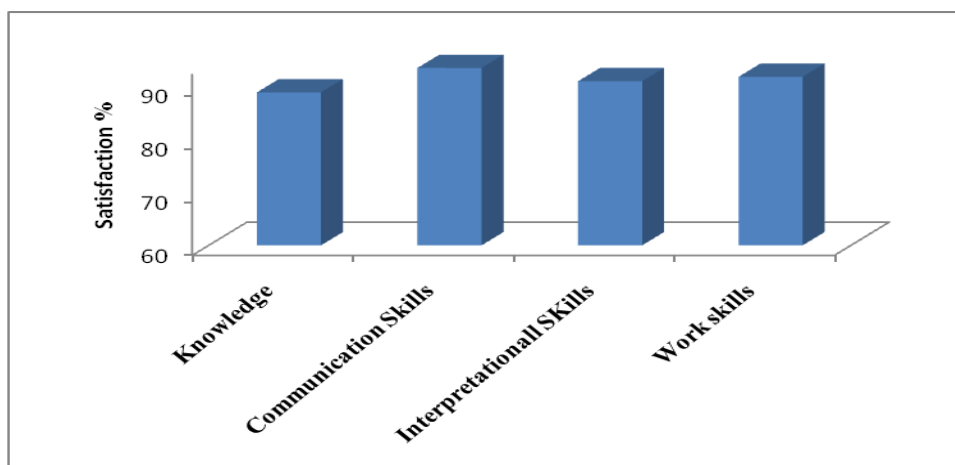


Fig.5. Employer survey for the determination of students skill level

comments on the quality of education regarding: knowledge, communication skill, work skill and interpersonal skill these students have. Survey reflects that our graduates fall above average and in all areas, their abilities were rated above 80%. This indicates that our graduates are well adaptable and show their better potential in any given environment. However, some employers have given general comments about some weaknesses, particularly the practical workability. The point has been well noted and will be tried to overcome for our future and current students.

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

Regular Assessment Process started recently and in future assessments results will be incorporated accordingly. Following are the strength and weaknesses identified.

Strength

The Department of Forestry and Range Management (F&RM) has following items attributed to its strength

- Full time highly qualified and experienced faculty
- Affordable forestry study courses encompassing both theory as well as practical field training
- Field oriented four years degree program at under graduate according to approved HEC criteria
- Geographical position of PMAS Arid Agriculture University is a cause of attraction for most of students
- Enthusiastic faculty and support staff willing to work every where
- Research facilities both in the lab as well as in the field
- Envisaging changes in courses regular with emerging trends and challenges

- First ever university in Pakistan to produce Range / Ranch and Forest managers with special focus in arid and semi-arid areas of the country

Weakness

- ✓ Insufficient funds for laboratory research, library / reference books, medical and transport facilities
- ✓ The department lacks services of / is in dire need of Watershed and Timber technology experts
- ✓ Lack of adequate infrastructure for research and teaching facilities
- ✓ Insufficient scholarship for faculty and students
- ✓ No safety measures are in place in laboratory
- ✓ Insufficient transport facilities for research and study tours
- ✓ Insufficient IT devices Multimedia, computers, etc
- ✓ Underdeveloped campus life and facilities

Opportunities

- ❖ The Faculty / department members and students can have effective contact, conversation and collaboration, and closer partnership with local employees and NGOs owing to peculiar geographical location of the University / department.
- ❖ Having Agriculture degree, the graduates are eligible to apply in multiple (brown and green) sectors e.g., Agriculture, Forestry, Environment, Banking, corporate sectors
- ❖ Out standing students and those with high caliber may opt for Competitive Exams
- ❖ The graduates may change their professional career from one field to other e.g., from agriculture to wildlife, environment, ecology etc.

Threats

- PFI has already taken a lead and possess all infrastructure in the forestry training
- Degree is not getting priority sometimes in the PPSC because of the monopoly of Forestry department
- Loss of potential faculty staff if no incentives in future in the field of Forestry and range Management

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

The evaluation process indicated high efficiency of system and satisfactory impact of outcomes. Almost all the graduate and post graduates got jobs in various organizations (Provincial Department, Universities, Research Organizations, Banks and Private Firms.)

Table 4: Present performance measures for research activities

Faculty	Jour, Publications (National and International)	Conference Publications (Proceedings Abstract)	Projects
Prof. Dr. Sarwat N. Mirza	30	12	1
Dr. Irshad A. Khan	19	0	0
Dr. Abdul Khaliq	19	4	2
Dr. S. Moazzam Nizami	15	2	1
Dr. Aamir Saleem	5	0	0
Mr. Saeed Gulzar	0	0	0
Ms. Lubna Ansari	1	0	0
Mr. Irfan Ashraf	1	0	0

The department is well staffed with availability of expertise in all major fields of Forestry & Range Management.

Significant Future Development Plans

The Department of Forestry & Range Management has planned a number of future research studies addressing the land degradation issues of fragile arid and semi arid environments. Some of the studies include:

- i) Preparation of the forest work plan at under graduate level as part of their internship in eight semester of B. Sc Hons Agriculture with major in Forestry & Range Management.
- ii) Rangeland improvement through introduction of high yielding forage grasses and legumes and plantation of multipurpose trees and shrubs by using various moisture conservation techniques.
- iii) Environmental impact assessment of land degradation caused by development activities like road construction and urbanization.
- iv) Agro-forestry studies of promising multipurpose trees as an economically feasible enterprise for the farming communities.
- v) Feeding studies on small ruminants by integrating grazing with crop based by products.
- vi) Assessment of carbon sequestration through forest plantation in different ecological zones of Pakistan.
- vii) To impart quality education in Forestry through audio visual aids and modern tools along with provision of latest literature, journals, books, reviews and access to internet.
- viii) To extend facilities for field tours, herbarium, museum and field laboratory.
- ix) To prepare hand outs, brochures and pamphlets for the farmers and advisory services

- x) To equip the post-graduate laboratories (Forest Surveying & Engineering, Forest ecology, and taxonomy) with the advanced equipments.
- xi) Human Resource development in Forest & Range Management to meet future challenges for sustainable Forestry to cope with demand & Supply of wood.
- xii) To emphasize problem oriented research on specific and serious issues prevalent in the arid ecology.
- xiii) Over all enhancement of knowledge and skills of faculty members in relation to the latest global advancements in this discipline through exchange programs, short training and collaborative research project within and outside Pakistan.

Community services by the department

- Organization of farmers' day (local Pothowar area)
- Advisory services to the farmers for tree growing as and when desired
- Guidance and supervision of students of various departments numbers about research
- Supervision of students on internship in various organizations in the Punjab.

A number workshops and seminars organized are given in Table 5.

Table 5 : Short courses, Seminars, Workshops and Conferences arranged by the Department Year Short Courses Seminars Workshops/Conferences

Year	Short Courses	Seminars	Workshops/Conferences
2002-2004	1	0	1
2004-2006	0	3	0
2006-2008	0	2	1
2008-2010	1(with ICARDA)	0	1

Faculty satisfaction regarding the administrative services

- The department maintains a ratio of 4:1 for the academic (technical) and administrative non-technical staff which fulfils this standard set by HEC
- Administrative meetings (departmental, university, academic council, and syndicate) are attended as and when required. Normally 1 meeting is held per month.
- Quick office disposal are never delayed, so far no complaint in this regard, received from authorities
- Proper records of each individuals, students thesis etc. are maintained.
- Quantitative assessment of the department since its establishment is given in the table 6.

Table 6: Quantitative assessment of the department (Last 3 years)

Sr. #	Particular	No.	Remarks
I	Undergraduates (B.Sc. Hons) produced	86	Most of the students are now in M. Phil / M. Sc (Hons.) degree (44%), 32% got employment and did not continue education.
ii	Students: Faculty ratio	7:1	Fulfils HEC criteria
iii	Technical: Non-technical Ratio	4:1	Fulfils HEC criteria

Conclusion: The evaluation process indicated high efficiency of system and satisfactory impact of outcomes. Almost 90% of the graduate and post graduates got jobs in various organizations (Provincial Forest departments, universities, research organizations, banks and NGO's and Environmental Research based organization. private firms). About 34 under graduate, 27 Postgraduate and 7 PhD Scholars are still involve in completing their higher education.

Criteria 2: CURRICULUM DESIGN AND ORGANIZATION

Degree Title: B.Sc. (Hons) Agriculture, Majoring Forestry & Range Management.

A. Intent:

All the courses for degree program are being taught under HEC approved scheme of study for forestry. The scheme was approved by NCRC. The committee consisted of experts and learned professors, subject matter specialists from other universities and research organizations from Pakistan. When and if needed, curriculum for the Department of Forestry & Range Management 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.

B. Definition of Credit Hour:

A student must complete a definite number of credit hours. One credit hour is one theory lecture or two hours laboratory practical per week. A credit hour carries 20 marks.

C. Degree Plan

The department of Forestry & Range Management offers 3 degree programs namely; B.Sc. (Hons) Agri. (Major in Range Management & Forestry),

Name of Degree

Pre-requisites

B.Sc. (Hons) Agri.

F.Sc. Pre-medical /

(Major in Range Management & Forestry)

Pre-engineering, after entry test

The list of course and elective courses is attached in Table 2. The selection criterion for each course is:-

- That the course is relevant to the degree program

- It meets the material and international requirements for the degree
- Adequate facilities are available in the department
- The program contents meet the program objectives as highlighted and provided by the Higher Education Commission of Pakistan.

D. **For each course in the program that can be complete for credit** Specifying the following:

- Course title (FR)
- Course objectives and outcome (Given in course breakdown into lectures separately)
- Catalogue description (yes)
- Text book and reference (Given in course contents)
- Syllabus breakdown lectures (yes supplied to QEC separately)
- **Computer usage:** Internet facility is used by the faculty members to update their knowledge regarding each course, research, documentation of references. This facility is also by the students to solve their problems, facilitate their assignments and presentations.
- **Laboratory facilities** are provided to the students for their practical exercise, given in the curricula. Post-graduate students also do the work for their theses in the laboratories, basic equipment, material and chemicals and biochemical are provided.

Degree requirements (B.Sc Hons. Agriculture)

As a whole a student has to study 140 credit hours. In first four semesters, students study minor courses (Agriculture Sciences, Information Technology and Veterinary Sciences etc.) as approved by HEC for agricultural degree. After the completion of four semesters, students choose a specialized field (major) of study. In the next four semesters courses of major specialized (major) subject are taught including some minor courses of other departments (Table 8). The final semester includes internship of 15 credit hours (offered till Spring 2010 semester). In internship students are placed in Punjab Forest Department for preparation of working plan after forest inventories. Degrees are awarded after completing the required number of credit hours (courses) followed by internship report and its presentation. Minimum Grade Point Average (GPA) for obtaining the degree in 2.50. To remain on the roll of the university a student shall be required to maintain the following minimum Cumulative Grade Point Average (CGPA) in each semester to be on the role of the University.

Semester	CGPA
First	0.75
Second	1.00
Third	1.25
Fourth	1.50
Fifth	1.75
Sixth	2.00
Seven	2.25
Eight	2.50

Examination and Weightage

a) Theory

In theory paper, student's 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 here under:

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 undergraduate and 50% for post graduate.

Scheme of studies and Course contents of B. Sc. (Hons.) Agriculture

Scheme of studies for B.Sc. (Hons.) Agri. is given in (Table 7). Detailed course contents of under-graduate and post graduate schemes of studies are given in Annexure 13 and 14, respectively.

Table 7: Curriculum Course Requirements for B.Sc (Hons) Agriculture (Major in Range Management & Forestry) (Approved in 2009)

Course	Title	Credits
Semester II		
FR-302	Introduction to Rangeland & Wildlife Management	3(2-2)
Semester III		
FR-401	Introduction to agro-forestry & water sheds	2(1-2)
Semester V		
General Courses		
AEN-501	Farm Mechanization	2(1-2)
AGRO-501	Arid Zone Agriculture	2(2-0)
SOC-501	Rural postal Sociology	2(2-0)
Major Courses		
FR-501	General Silviculture	3(2-2)
FR-503	Principles of Agro-Forestry	3(3-0)
FR-505	Range Management	3(2-2)
FR507	Forest Biometrics and Inventory	3(2-2)

FR509	Wildlife Management	3(2-2)
Semester VI		
General Courses		
AEN-502	Conservation Engineering and Water Resources Development	2(1-2)
SS-508	Instrumentation & Laboratory Techniques	2(0-4)
Major Courses		
FR-502	Forest Management	3(2-2)
FR-504	Watershed Management	3(2-2)
FR506	Biodiversity and Environment	3(3-0)
FR-508	Range Vegetation –Livestock Interactions	3(3-0)
FR-510	Forest Protection	3(2-2)
Semester VII		
General Courses		
STAT-601	Experimental Designs	2(1-2)
MGT-601	Introduction to Agri .Business Management	2(2-0)
Major Courses		
FR-601	Range Improvement and Rehabilitation	3(3-0)
FR-603	Forest Timber Science	3(2-2)
FR-605	Forest Utilization	2(2-0)
FR-607	Range Medicinal and Poisonous Plants	2(2-0)
FR-609	Project Planning and Scientific Writing	2(1-2)
Semester VIII		
FR-602	INTERNSHIP	15(0-30)

Table8 shows that the curriculum of the Department of Forestry & Range Management is consistent with the program objectives

Table 8: COURSES Vs OUTCOME

Courses	Outcomes				
	Develop communication skills	Developing Research Projects	Analytical & Problem solving skill	Develop of Knowledge & vision	Development of professionalism & Research
FR 30201,FR 401	+++	-	+	+++	++
FR 501, FR 503,FR505, FR 507 , FR 509	+++	++	+++	+++	+++
FR 502, FR 504,FR 506, FR508,FR 510	++	++	+	+++	+
FR 601, FR 603, FR 605, FR 607, FR 609,	+++	++	+++	+++	+++
FR 602	++++	++++	++	+++	+++

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

Assessment of the Department of Forestry & Range Management Curriculum

The assessment of curriculum given in Table 10 and the courses are cross tabulated according to the program outcomes.

1. The curriculum fits very well and satisfies the core requirements for the program, as specified by the respective accreditation body.
2. The curriculum satisfied the general arts and professional and other discipline required for the program according to demands and requirements set by the Higher Education Commission.

Standard 2.2: Theoretical background, problem analysis and solution design must be stressed within the program's core material

Table-9: Detailed Courses representing theoretical background, Problem analysis and solution design:

<u>Elements</u>	<u>Courses</u>	<u>Title of Courses</u>
Theoretical Background	FR-302	Introduction to Rangeland & Wildlife Management
	FR401	Introduction to agro-forestry & water sheds
	FR-501	General Silviculture
	FR506	Biodiversity and Environment
	FR-510	Forest Protection
	FR-607	Range Medicinal and Poisonous Plants
Problem Analysis	FR-503	Principles of Agro-Forestry
	FR-505	Range Management
	FR507	Forest Biometrics and Inventory
	FR509	Wildlife Management
Solution Designs	FR-502	Forest Management
	FR-504	Watershed Management
	FR-508	Range Vegetation –Livestock Interactions
	FR-609	Project Planning and Scientific Writing
	FR-601	Range Improvement and Rehabilitation
	FR-603	Forest Timber Science
	FR-605	Forest Utilization

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

While the curriculum was prepared, all aspects of information technology were considered and after a critical analysis, relevant aspects were integrated into the program. Three computer and I.T. courses (6 credit hours) and two courses of statistics (6 credit hours) based on computer practical usage were included in the curriculum to fulfill the I.T. requirements for the students of B.Sc (Hons) Agri. (major in Range Management & Forestry) degree.

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

- Two seminars each of one credit hours are compulsory at the Post-graduate level
- A course of 3 credit hours entitled “ Project Planning & Scientific writing” has been integrated in the curriculum of B.Sc. (Hons) Agriculture level.
- Assignments are given to B.Sc (Hons) students on specific titles (part of the course) which are presented orally and given as written report (assignments) by the students which increases their oral and written communication skills.

Criteria 3: LABORATORIES AND COMPUTER

- Laboratory Title: Forestry and Range Management Laboratory for the Under-graduate students.
- Location and Area: Faculty of Forestry, Range Management & Wildlife, D- Block Ground Floor
Floor, Main Campus
- Objectives: Laboratory is used for:
Practical exercise and demonstrations to graduate students in their introductory and major courses.
Research work for the graduate and post-graduate students
- Adequacy for instruction: There is no computer for under graduate students in the laboratory.
- Major apparatus: The equipments like Microscopes, autoclave, incubator, deep freezer, refrigerators, laminar flow cabinet, pH meter, elective balance, slide and overhead projectors, shaker, hitter, puppeteers, etc have been purchased under HEC project & installed in the newly established laboratories for proper utilization.

- Major Equipments: The main equipments like saw mill, wood seasoning plant will also soon be installed in the newly established field lab.
- Safety Regulations: Safety measures are available against fire (Extinguishers), minor hazards and accidents, injuries (First Aid Kit). However, the University maintains a Medical Dispensary for such incidents.

Standard 3.1: *Laboratory manuals / documentation / instructions for experiments must be available and readily accessible to faculty and students*

Laboratory manuals of each subject are not available. The department library has not all the relevant books and manuals. However, individual teachers have their own books and manuals. Some manuals will be prepared by the academic staff themselves.

Shortcomings in the laboratory

The laboratory is not spacious and inadequate. The equipments purchased will soon be installed in newly established labs Equipments regarding molecular approaches are lacking e.g. Stereoscope, PCR Spectrophotometer, relevant software.

Standard 3.2: *There must be adequate support personnel for instruction and maintenance of laboratory*

Laboratory is maintained by:

The 2 laboratory assistant (responsible for equipment, glassware, chemicals, materials, etc) and one laboratory attendant who assist the students in practical, cleaning and washing, etc.

Standard 3.3: *The university computing infrastructure and facilities must be adequate to support program's objectives*

The University has limited computer facility for undergraduate and post graduate level students. However, this facility is available at the department level to almost all faculty members independently.

Criteria 4:**STUDENT SUPPORT AND ADVISING**

The University organizes support programs for students and provide information regarding admission, scholarship schemes etc. Department in its own capacity arranges orientation and guided tours of the department. Director Students Affairs is also there and arranges various cultural activities and solves the students' problems. However currently there is no Parent/Teacher association.

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

- a. Courses are taught as per strategy of HEC.
- b. At undergraduate level subjects courses are offered as per scheme of study provided by HEC and approved by Academic Council and at postgraduate level courses are offered according to the availability of the teachers.
- c. Elective courses are offered as per policy of HEC and University

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

- Courses are structured and decided among the departmental faculty members and in board of study meeting
- Decided at the commencement of the semester and the faculty members interact frequently among themselves and with students. Students are welcome to ask question in class and even after the class.
- Emphasis is always given for an effective interaction between undergraduate and post graduate students.

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 choice.

- Students are informed about the program requirements through the office of the head of the department (Chairman) and through the personal communication of the teachers with the students
- The counseling of the students is continuous process and students can also contact with relevant teachers whenever they face any professional problem.
- Student can interact with the teachers / scientist in Universities or research organization whenever they needed and there is open option for the students to get the membership in the professional societies like WWF-Pakistan, Wetland and Houbra foundation, etc.

Criteria 5: PROCESS CONTROL

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

- The process of admission is well established and followed as per rules and criterion set by University both for undergraduate and post graduate programs
- Admission criteria for undergraduate program: F.Sc. pre medical / pre engineering and marks in last attended certificate.
- All these entries are based on the recommendations of supervisory committee
- Admission criteria is revised every year before the announcement of admissions

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.*

- In the 4th semester students are allotted different majors (Like forestry, PP, ENTO, etc) by the Dean faculty of FC & FS
- Students are evaluated through Mid, Final and Practical exams and through assignments
- Registration is done once every year at the time of admission while a student once admitted for each degree is evaluated through his result of each semester. If the students fulfill the criteria of the University they are promoted to the next semester.
- In general, the students are registered on competition bases keeping in view the academic and research standards

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*

- Recruitment policy followed by the University is recommended by HEC. Induction of all posts is done as per rule.
- Posts are advertised in the national newspapers, and the applicants are short listed on the basis of experience, qualification, publications and other qualities / activities as fixed by the University
- The candidates are interviewed by the University Selection Board and Principal and alternate candidates are selected.

- Selection of candidates is approved by the Syndicate for issuing orders to join within a specified period.
- Induction of new candidates depends upon the number of approved vacancies
- Standard set by HEC are considered
- At present, no procedure exists for retaining highly qualified faculty members. However, the revised pay scales of structure is quite attractive
- HEC also supports appointment of highly qualified members as foreign faculty Professor, National Professors and deputed them 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.*

- It is done by periodically revising the curriculum depending upon requirements, innovations and new technology.
- With the emergence of new fields, new courses are set and included in the curriculum
- Students usually buy cheap Asian editions of technology books. These are also available in the University library where documentation, copying and internet facilities are available off and on.
- Students make their own notes using class notes and consulting library books and journals.
- All efforts are made that the courses and knowledge imparted meet the objectives and outcomes.

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.*

- According to the examination system of the University which is clearly documented.
- The evaluation procedure consists of quizzes, mid and final examinations, practical, assignments and reports, oral and technical presentations.
- The controller of examinations announces the date regarding commencement of examination. After each semester, the controller office notifies results of the students.
- The evaluation procedure consists of quizzes, mid and final examinations, practicals, assignments, reports, oral and technical presentations.
- The minimum pass marks for each course is 40% for undergraduate degree.

- 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

Criteria 6: FACULTY

Standard 6-1: *There must be enough full time faculty 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.*

Currently there are eight full time faculty members out of which five are Ph.D. There are currently involve in Phd. The field of specialization of faculty members is Forest Management, Forest Ecology, Range Management, Watershed Management, Agro forestry/ Social Forestry, Forest Biomass estimations, Carbon Sequestration assessments and wood technology (Table 10).

Table 10: Faculty distribution by program area in Forestry & Range Management

Program area of specialization	Courses in the area & average number of sections per year	Number of faculty members in each area	Number of faculty with Ph.D. degree in each area
Forest/Agro-forest Management	10	4	1
Forest/ Range ecology &	9	3	3

Management			
Watershed Management	3	-	-
Wood technology	2	-	-
Forest Carbon Budgeting	1	1	1
Total	25	8	5

Standard 6-2: All faculty members must remain current in the discipline and Sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place. Effective Programs for Faculty Development

- In each semester mixed courses are offered according to work load of faculty members
- Division of students for supervision is made on the basis of faculty expertise/research interests

Existing faculty development programs at department and university level

- From the project “strengthening of Forestry & Range Management department” two faculty members got chance for abroad for their professional development
- Faculty members attended workshops/seminars out side and within university
- Laboratory, Library and internet facilities are available for scholarly work and academics improvement
- Support for attending conferences can lead to enhancement of research initiatives at the university.
- There is university-funded program, which provides financial support for research projects by the young faculty members

Frequency of faculty program evaluation

- As and when required

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

The young faculty is mobilized by timely back up and appreciation by the senior faculty members. Avenues for research funding are provided through university research fund.

There should be the programs and processes in place to attract good faculty members e.g. teaching and research awards annually, reasonable teaching load and class size, social activities and better salary package.

Results of faculty survey employing Proforma 5 (Annexure-V) were summarized and are given Table 12. It was filled by all the 6 faculty members during year 2009-10(Two faculty members are outside the country on study leave)

The results showed satisfaction of the teachers over most of the parameters. However, level of monitoring, cooperation with colleagues and the cooperation of teachers needs to be addressed.

Table 11. Results of the Faculty Survey (Proforma - 5)

S.No	Core Questions	Prof. Dr. Sarwat	Dr. Irshad	Dr. S.M. Nizami	Dr. Aamir Saleem	Lubna Ansari	Saeed Gulzar
1	Your mix of research, teaching and community service.	B	B	B	B	B	B
2	The intellectual stimulation of your work.	B	C	B	B	B	B
3	Type of teaching /research you currently do.	B	C	B	C	B	B
4	Your interaction with students.	A	B	A	A	A	B
5	Cooperation you receive from colleagues.	B	B	A	D	C	C
6	The mentoring available to you.	C	C	A	C	D	D
7	Administrative support from the department.	A	A	A	A	B	B
8	Providing clarity about the faculty promotion process.	A	B	C	D	B	D
9	Your prospects for advancement and progress through ranks.	A	C	C	B	D	-
10	Salary and compensation package.	B	B	B	D	B	B
11	Job security and stability at the department.	A	A	B	A	C	C
12	Amount of time you have for yourself and family.	C	C	B	B	C	C
13	The overall climate at the department.	B	A	B	B	C	C
14	Whether the department is utilizing your	A	A	B	A	C	C

	experience and knowledge						
15	What are the best programs/ factor currently available in your department that enhance your motivation and job satisfaction:	Cooperation of all faculty	Cooperation from Dean	Cooperation from Dean	Cooperation from Dean	Cooperation from Dean	Cooperation from Dean
16	Suggest programs /factors that could improve your motivation and job satisfaction?	Provision of Infra structure, Vigilant monitoring	Provision of more budget.	Easy access to field tours & Research	House hiring & SPS	Duty allocation	Space allocation.

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

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

Supportive Infrastructure and Facilities in learning:

- The labs. are available in the department and students sits in them for reading and research.
- Hot & Cold facilities, Dept. library with easy access make working/ research/ study environment conducive for higher learning. Unfortunately such facilities are not adequately / properly available and there is no continuity in their delivery.

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.*

- First of all library do not have space capacity as per number of students in the University.
- Secondly technical book collection is general not specifics to courses offered and books not properly arranged rather lying haphazardly.
- Thirdly scientific journals in take are negligible that is back bone of any scientific/technical writing.
- Fourthly library is not computerized and internet facility is very meager to the number of students at university level.
- Fifthly library should remain open from 08am to 10pm without any break including Sunday's.

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

The properly designed classrooms are less in number and are without proper maintenance and facilities. They are not updated according to new trends/ technologies. Most of the graduate & post graduate (Major) classes held in labs which badly affects their research use. Similarly faculty offices are very less in number and not fully furnished to make working environment comfortable, rather they are over crowded and unattended on the part of works & finance dept.

Criteria 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*

There is no proper maintenance/ documentation and investment of GPF deducted from salary. Similarly no benefit/ welfare from BF deduction available to faculty. Very meager benefit for faculty children's education at university level is available. Similarly very little attention is being paid for faculty residential facilities development at university campus and major proportion of the facility available mostly allotted to administrative staff and majority of faculty members remain in waiting list for a long time. Transport facility is not frequently and easily available for field works/ touring. Financial support is too low to meet the expenses in dept., only

about Rs. 26000/- is available per annum for office and lab expenses including student's research.

Technical Staff: Works and internet net working depts. are very slow in response. Financial and accounting depts. are also slow in their delivery.

Office equipment: Sufficient office equipment is available to under take teaching and research activities.

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

The intake of B.Sc. (Hons) agriculture with major in Forestry & Range Management students is once in a year.

A detail of the students enrolled in the year 2009-10 is given in Table 12.

Table 12: Enrollment in Different Programs from 2009-10

Year	B.Sc (Hons)
2009	30
2010	34
Total	64

Graduate students and Faculty Ratio for 2009-10

Year	Faculty Nos.	Students Nos.	Ratio
2009	6	54	1 : 9
2010	7	58	1 : 8.2

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

The amount of about Rs. 32000/- per annum for books, laboratories and equipment and computer maintenances and consumable supplies etc in addition to projects funding if available is considered sufficient. Otherwise it is too low to maintain and run the departmental business and dept has to depend on central store for necessary supplies and maintenance.

SUMMARY

Given the importance of fragile arid and semi arid areas of the country, PMAS-Arid Agriculture University, Rawalpindi established the Department of Forestry & Range Management in 2002 to cater the need of producing skilled manpower in this specialized area of education as well as conducting area specific research. The overall objective of the Department of Forestry & Range Management is to impart high level education and undertake research on issues related to conservation and rehabilitation of range and forest resources. Initially, the Department worked under the faculty of Crop & Food Sciences and the degree programmes including B.Sc.(Hons.), M.Sc.(Hons.) and Ph.D were initiated. Realizing the importance of the subject, the University authorities approved a separate Faculty of Forestry, Range Management & Wildlife in 2006 and the Department of Forestry and Range Management started working under the new faculty with more zeal and dedication. The Department activities were strengthened with a modest funding from HEC under R&D project “Establishment of the Department of Range Management & Forestry” which not only provided the much needed equipment for both field and laboratory oriented research work but also provided sufficient number of faculty and support staff positions.

The mission of the Department of Forestry and Range Management is to impart undergraduate and post graduate education, training including internship as well as conduct problem oriented research on topics related to natural resource management in general and forest and rangeland resource conservation and improvement.

The comprehensive “Self Assessment Report” gives detailed analysis of programme objectives and outcomes in the light of feedback obtained through various evaluation proformas designed to achieve the objectives of self assessment report. The analysis showed a clear picture about teachers evaluation, course evaluation, alumni student evaluation, etc. Departmental strengths and weaknesses have also been highlighted in the report for future improvement in the academic and research programmes of the Department. Various bottlenecks hindering the active progress of departmental goals have been identified. Some of these bottlenecks include insufficient field visits and practical training facilities within the

tight schedule of semester system, etc. Efforts will be made to devise a mechanism to improve the practical training of students in collaboration with the institutions like Pakistan Forest Institute, Peshawar especially participation in their working plan exercise of forest resources.

Some of the major achievements of the Department of Forestry and Range Management include a well designed and structured curriculum at the level of undergraduate courses which is developed under the guidelines of the Higher Education Commission and in consultation with the Department of Forestry, Range & Wildlife of University of Agriculture, Faisalabad and Pakistan Forest Institute Peshawar. In addition, the internship of undergraduate programme is designed in collaboration with the leading institutions like PFI, NARC, IUCN, WWF, etc. to give on hand practical experience to the graduates on burning issues of land degradation and rehabilitations. The rules and regulations set forth by the University as well as the Higher Education Commission of Pakistan regarding admission, examination and evaluation of thesis, etc are strictly followed to ensure the implementation of quality standards. Various issues concerning the future improvement in education standards have also been highlighted including effective implementation of tutorial programmes to enable students to interact with teachers in TGMs to discuss academic issues and explore ways and means of better communication among teachers and students for effective learning as well as participation in co-curricular activities. Following actionable Recommendations have been proposed

- A pragmatic and scientific system for newly inducted teachers training should be introduced at the University / department level encompassing important aspects of teaching.
- Two labs are recommended to be established to cater the study requirement of graduate level students.
- Annual budget allocation for operation and maintenance of lab is recommended to be increased to the extent of Rs. 100,000.
- The biannual budget for department library is recommended to be to the allocation tone of Rs. 50000.

- The establishment of “Book Bank” at the department level is strongly recommended. The relevant cell may have provision of keeping 50 photocopies of reference books/ material.
- Research labs are recommended to be established solely for undertaking research activities and not for classes.
- The needs of field tours in Forestry & Range Management cannot be overemphasized. To cater for such need, the Department of Forestry & Range Management should have its own convenience that can be used at liberty or special provision for transport to utilize at the times of hours when so ever required.
- To emphasize country wide importance of natural wealth and its protection and conservation, special funds may be allocated for the publication of textbooks (1500 in No.) and the reference material already written that requires funds for publication.
- Latest multimedia facility with all the accessories and photographing may be provided to the department to cater onsite tour record and subsequent changes / update prophesied in future.
- Orientation as well as refresher courses for the teaching staff may be arranged on regular grounds.
- Short foreign visits for teachers for boosting up research activities may be arranged.
- Credit for writing professional books may be granted as special incentive equivalent to 10 research papers.
- Forestry professional career should not be taken as gender specific and any discrimination in this regard should be discouraged both at field as well as office / research level.

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Program Team Members

Dr Irshad A. Khan (Coordinator)

Dr. Syed Moazzam Nizami (Member)

Dr Abdul Khaliq (Member)

Annexure 9

Resume of Faculty Members

Name	DR. SARWAT N. MIRZA
Personal	H. No. 291, St. 38, G-9/1, Islamabad. 051-9062269
Experience	<i>Period Served</i> Scientific Officer, (19.2.1983-15.9.1987) Range Management NARC/PARC Research Fellow, (1987-1991) Utah State University, USA Senior Scientific Officer, (1993-2002) Range Management Associate Professor (2002 to date) (Range Management & Forestry), University of Arid Agriculture, Rawalpindi
Honor and Awards	-Supervising thesis research of post-graduate students at M.Sc.(Hons.) and Ph.D level as well as member of the supervisory committee of a number of post graduate students. -Member of the Advanced Studies & Research Board of the University of Arid Agriculture. -Member of the Faculty Board and University Academic Council.
Memberships	Member of the society of Conservation Biology
Graduate Students	Ph.D
Postdocs	Year Name
Undergraduate	2002 Ahmad Hussain
Students	2003 Tariq Mehmood
	2005 Syed Moazzam Nizami
Honour Students	Honors/M.Phil
	2006 Hafiz M. Tayyab
	2006 Shakeel Abbas
	2007 Syed Adil Zeeshan
	2007 Sadheer Ahmad
	Five students as Internee
Service Activity	Academics, Research and Administrations

Brief Statement of Research Interest	(research specialization in sub-disciplines of range ecology/management, grazing management, diet selection behaviour of sheep, range resource inventory and assessment, rangeland monitoring and evaluation, shrub ecology and management, desertification control, sand dune stabilization, monitoring and evaluation of range projects).
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Research Grants and Contracts.	HEC project on RM&F (Establishment of the Department of Range Management & Forestry)
Other Research or Creative Accomplishments	Working on Dean FRW

Selected Professional Presentations	Worked as counterpart scientist with ICARDA expatriates from 1992-1994 as Team Leader of Range Section at AZRC Quetta. During 1992, invited to present findings of research programme at ICARDA Regional Meeting of Forage & Pasture Network at Ankara, Turkey. As part of the collaborative research programme of AZRC and ICARDA, participated in the regional workshop on fodder shrub production and management in WANA region under System wide Livestock Initiative (SLI) held at Tunis in 1995 organized by ICARDA. During 1996, participated as country coordinator in project development and planning workshop on fodder shrub production and utilization in WANA region organized by ICARDA at Aleppo, Syria.
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Name	DR. IRSHAD AHMAD KHAN										
Personal	House No.2 Colony No.2 Pir Mehr Ali Shah Arid Agriculture University Rawalpindi										
Experience	Period Served Demonstrator and Teacher (1981) University Agriculture Faisalabad Agriculture Officer (1982) Agricultural Extension Department Lecturer (29-8-1982 to 28-10-1991) Barani Agri. College, Rawalpindi Assistant Professor, (28-10-1991 to 4-12-2004) (Range Management & Forestry) ,University of Arid Agriculture Rawalpindi State Care Officer (1988 to 2000) UUAR Associate Professor (2-12-2004 to date										
Honor and Awards	-Supervising thesis research of post-graduate students at M.Sc. (Hons.) and Ph.D level as well as member of the supervisory committee of a number of post graduate students. -Member of the Faculty Board and University Academic Council.										
Graduate Students Postdocs Undergraduate Students	Ph.D <table> <tr> <th>Year</th><th>Name</th></tr> <tr> <td>2009</td><td>Aamir Saleem</td></tr> </table>	Year	Name	2009	Aamir Saleem						
Year	Name										
2009	Aamir Saleem										
Honour Student	Msc(Honr) Agri /M.Phil Frostry & Range Management <table> <tr> <td>2008</td><td>Irfan Shabir</td></tr> <tr> <td>2008</td><td>Asif Khan</td></tr> <tr> <td>2008</td><td>Nafees Ahmad</td></tr> <tr> <td>2009</td><td>Raja Zaq-ul-Arfeen</td></tr> <tr> <td>2009</td><td>Muhammad Yasin</td></tr> </table>	2008	Irfan Shabir	2008	Asif Khan	2008	Nafees Ahmad	2009	Raja Zaq-ul-Arfeen	2009	Muhammad Yasin
2008	Irfan Shabir										
2008	Asif Khan										
2008	Nafees Ahmad										
2009	Raja Zaq-ul-Arfeen										
2009	Muhammad Yasin										
Service Activity	Academics, Research and Administrations										
Brief Statement of Research interest	Range Management, Watershed Management and enhancement of Mycorrhizal and Nodulation activities of the range plants and trees to increase the growth of range grasses, trees and shrubs in the Rangeland										
Publications	<u>Research Paper Published in HEC approved Journals.</u> 1. Saleem, A., S. N. Mirza, I. A. Khan and J. Franklin. 2009. Effect of diverse ecological conditions on biomass production of										

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	9. Khan, I.A., N. Ayub, S. N. Mirza, S. M. Nizami. 2007. Yield and water use efficiency(WUE) of <i>Medicago Sativa</i> as influenced by Vesicular Arbuscular Mycorrhizae (VAM). Pak. J. Agric., Vol. 40(3): 456-458. 10. Nizami, S.M., S. N. Mirza, M.A. Quraishi and I.A. Khan. 2005. Growing stock evaluation of Sub tropical Chir pinr Forest of Pakistan. International J. Bio.& Biotc., Vol. 1(2):233-235. 11. Khan, I. A., S. Ahmad and N. Ayub. 2003. Response of Oat (<i>Avena sativa</i>) to Inoculation with Vesicular Arbuscular Mycorrhizae (VAM) in the presence of phosphorus. Asian J. Plant Sci. 2(4): 368-370. 11. Khan, I. A., S. Ahmad and S. Miza. 2003. Yield and Nutrient uptake of <i>Avena sativa</i> as influenced by Vesicular Arbuscular Mycorrhizae (VAM). Asian J. Plant Sci. 2(4): 371-373. 12. Khan, I. A., S. Ahmad and N. Ayub. 2003. Yield and Nutrient uptake of <i>Avena sativa</i> as influenced by Vesicular Arbuscular Mycorrhizae (VAM). Asian J. Plant Sci. 2(4): 374-376. 13. Majeed, A., S. Yaqoob and I. A. khan. 1994. Biomass production and its Analysis By <i>Populus euramericana</i>. Sarhad K. of Agric. 10(5): 531-533. 14. Yaqoob, S., A. Majeed, I.A. khan and M.A. A. Quraishi. 1994. Nutrient Dynamic in <i>Populus euramericana</i>. Pakistan Journal of Scientific Research. 46(3,4): 96-98. 15. Khan, I. A., A. Majeed and M.A. A. Quraishi. 1999. The effects of nitrogen and Phosphorus fertilizers and their combination on Range grass quality. Biologia. 143-148.
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Research Paper Published in Journals other than HEC approved Journals

- 1. Khan, I.A.,** S. Ahmad, S.N. Mirza, M. Nizami, M. Athar and S. M. Shabbir.
2007. Growth Response of Buffel Grass (*Cenchrus Ciliaris*) to phosphorus and mycorrhizal Inoculations Agric. Conbspect. Sco. 72: 129-132.
- 2. Khan, I.A.,** S.N Mirza and S.M. Nizami. 2005. Effect of varying intensities of shade on wheat crop. International J. of Biology & Biotechno9logy. 2(3) : 745-749.
- 3. Khan, I.A.,** S. N. Mirza and S. M. Nizami. 2004. Effect of nitrogen and phosphorus fertilizers on grass yield in sub-tropical sub-humid Pothwar rangelands. Pak. J. of Arid Agric. 7(2): 45-48.
4. Majeed, A. M. A.A. Qureshi, S. Yaqoob and **I. A. Khan.** 1991. Nutrient pool in *populus euramericana*. JAPS. 1(3) : 167-170.

Name	Dr. Syed Moazzam Nizami										
Personal	Associate Professor Department of Forestry and Range Management Faculty of Forestry, Range Management and Wildlife University of Arid Agriculture Shamsabad, Murree Road Rawalpindi 46300, Punjab PAKISTAN Ph: +92 51 9062269, 92900019 Cell: +92 321 5029381										
Experience	<table border="0"> <thead> <tr> <th><i>Designation</i></th><th><i>Period Served</i></th></tr> </thead> <tbody> <tr> <td>Associate Professor FRM University of Arid Agriculture, Rawalpindi</td><td>(14.12.2010- to date)</td></tr> <tr> <td>Assistant Professor, Forestry & Range Management</td><td>(3.12.2005- 13.12.2010)</td></tr> <tr> <td>Lecturer Forestry & Range Management University of Arid Agriculture, Rawalpindi</td><td>(12.12.2002- 2.1.2.2005)</td></tr> <tr> <td>Assistant Research Officer / Tutor Punjab Forest Department</td><td>(5.7.1999- 11.12.2002)</td></tr> </tbody> </table>	<i>Designation</i>	<i>Period Served</i>	Associate Professor FRM University of Arid Agriculture, Rawalpindi	(14.12.2010- to date)	Assistant Professor, Forestry & Range Management	(3.12.2005- 13.12.2010)	Lecturer Forestry & Range Management University of Arid Agriculture, Rawalpindi	(12.12.2002- 2.1.2.2005)	Assistant Research Officer / Tutor Punjab Forest Department	(5.7.1999- 11.12.2002)
<i>Designation</i>	<i>Period Served</i>										
Associate Professor FRM University of Arid Agriculture, Rawalpindi	(14.12.2010- to date)										
Assistant Professor, Forestry & Range Management	(3.12.2005- 13.12.2010)										
Lecturer Forestry & Range Management University of Arid Agriculture, Rawalpindi	(12.12.2002- 2.1.2.2005)										
Assistant Research Officer / Tutor Punjab Forest Department	(5.7.1999- 11.12.2002)										
Honor and Awards	• <i>1st Position</i> in University of Peshawar In M.Sc Forestry session 1997-99. • <i>2nd position</i> in University of Peshawar In B.Sc Forestry session 1994-96 • Inspector General of Forests <i>Gold medal</i> for Standing 1st in M.Sc Forestry (1999) • Director General Of Forests <i>Gold Medal</i> for Best Practical Forester(1999) • Pakistan Forest Institute <i>Silver Medal</i> for standing 1st in Forest Management Plan in M.Sc(1999) • Pakistan Forest College <i>Silver Medal</i> for standing 1st in Farm & Energy Forestry Management Specialization(1999.										

	• Pakistan Forest Institute <i>Silver Medal</i> for standing 1ST in Forest Management Scheme (1997). • Member of the Faculty Board and University Academic Council.
Memberships	1. On Line forester Association Pakistan 2. Member of Global Online forester organization.
Graduate Students Postdocs Undergraduate Students Honour Students	Ph.D 1.Saeed Gulzar (Member,2008) Growth, yield and BEF of <i>Dalbergia sissoo</i> in daphar irrigated plantation. 2. Raja Zoq Ul Arfeen (Member, 2009))Estimation of Carbon stocks in temperate forests of Pakistan Honors/M.Phil Raja M. Ahsan(2008-10) Biomass Expansion Factor for <i>Acacia modesta</i> in Sub tropical forests of Pothwar. Mehreen Abbas (2008-10) Biomass production and its distribution in <i>Olea ferruginea</i> (Royle)under rainfed conditions of Pothwar Beenish Khanum (2008-10) Determining wood density of <i>Acacia modesta</i> in Sub tropical forest of Pothwar Mahwish Gul (2008-10) Determining wood density of <i>Olea ferruginea</i> in Sub tropical forest of Pothwar Previous students: Zohaib Hassan (2007-09) Assessment of the economic benefits of natural vegetation as compared to field crop in gullied areas and its role in soil conservation Mohamad Asghar (2004-06) Status of Forest growing stock of Tret Forest Sub Division Murree Hills Arjumand Bano (2004-06) Household fuel wood Consumption and factors affecting fuel consumption in rural areas of Mangla

	Watershed Lubna Ansari (2004-06)Regeneration assessment of Chir Pine (<i>P. roxburghii</i>) in Tret Forest Sub Division Muree Hills.
Service Activity	1. Organizer International Symposium on “Issues in Higher Education in Pakistan” on Nov. 13th 2006. Sponsored by HEC & Promotion of Education in Pakistan Foundation, Inc. USA 2. Ex-member of University Academic Council from 2004-2006 3. Coordinator Debating Society PMAS, Arid Agriculture University for 5years. 4. External examiner in University of Azad Jammu Kashmir Agriculture Faculty Rawalkot for year 2004-2005. 5. Visiting professor of University of Azad Jammu Kashmir Agriculture Faculty Rawalkot for the year 2005-2006 6. Visiting professor of Allama Iqbal Open University for the year 2003-2007. 7. President rotary Club of Islamabad Margallah for year 2005. 8. Academics and Research

Brief Statement of Research Interest	My research interests revolve around management of forests and estimation of biomass and linking ecosystem biomass with the carbon budgeting. 1. One focus has been the detailed estimation of Carbon stocks in forest Ecosystems. 2. Another focus has been Forest tree and stand measurements for yield regulation and scientific management of the watersheds under different environmental scenarios. 3. More recently, I have begun research to establish biomass expansion factors of the dominant species of Pakistani Forest Ecosystems to finally quantifying the carbon stock and sequestration potential. My research has been applied to issues of: 1. Inventory of the forests. 2. Environmental Issues 3. Forest and Watershed Management
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Publications	Abbas, M., S.M. Nizami, A. saleem, S. Gulzar and I.a.Kha. 2010. Biomass Expansion factors of <i>Olea ferruginea</i> grown in natural sub tropical forests of Pakistan. African J. Biotech. Accepted for Publication. Sidra, G., M. Rabi and S.. M. Nizami. 2010. Role of gender in deforestation of natural forests of Lehterar-Murree Hills. J. Hum, soc. Sc., xxi.: 248-252 Nizami, S.M., S.N. Mirza, S. Livesly, S. Arndt, J.C. Fox, I.A. Khan and T. Mahmood. 2009. Estimating carbon stocks in sub tropical pine (<i>Pinus roxburghii</i>) forests of Pakistan. Pak.J.Agric. Sci., 46(4): 266-270. Khan, I.A., N. Ayub, S. N. Mirza, S. M. Nizami and M. Azam. 2008. Synergistic effect of dual inoculation (vesicular arbuscular mycorrhizae) on the growth & nutrients uptake of <i>Medicago sativa</i>. Pak. J. Botany., 40 (2): 939-945 Khan, I.A., N. Ayub, S. N. Mirza, S. M. Nizami and M. Azam. 2008. Yield and Water Use Efficiency (WUE) of <i>Cenchrus ciliaris</i> as influenced by vesicular arbuscular mycorrhizae (VAM). Pak. J. Botany., 40 (2): 931-937
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	Khan, I.A., N. Ayub, S. N. Mirza, S. M. Nizami and R. Hayat. 2008. Yield & nutrient uptake of <i>Cenchrus Ciliaris</i> as affected by VA mycorrhizal inoculation. Sarhad J. Agric.Vol. 24(2): 289-292. Khan, I. A., A.Shahbaz, S. N. Mirza, S. M. Nizami, A. Mohammad and S. Sheikh Mohammad. 2007. Response of Buffel Grass (<i>Cenchrus ciliaris</i>) to phosphorus and mycorrhizal inoculation. Agric. Conspectus Scientificus. Vol. 72(2): 129-132. Khan, I. A., S. N. Mirza and S. M. Nizami. 2005. Effect of Varying Intensities of shade on wheat crop . Int. Journal of Bio & Biotech. Vol. 2 (3): 745-749. Khan, I.A., N. Ayub, S. N. Mirza. and S. M. Nizami. 2007. Response of <i>Medicago sativa</i> to inoculation with vesicular arbuscular mycorrhizae under varying level of phosphorus. Pak. J. of Agric. Sc., 44 (2): 248—250. Khan, I.A., N. Ayub, S. N. Mirza and S. M. Nizami. 2007. Yield and water Use Efficiency (WUE) of <i>Medicago sativa</i> as influenced by arbuscular mycorrhizae (VAM). Pak. J. of Agric. Sc., 44 (3): 456-458. Nizami, S.M., S. N. Mirza, M.A. Quraishi and I. A. Khan. 2005. Growing stock evaluation of Sub tropical Chir pine Forests of Pakistan. Int. J. Biol. & Biotech. 2(1): 233-235. Nizami, S.M. 1998. Perception of Target Population about the role of Punjab Forestry Sector Development Project in Rawalpindi District.. Pak. J. Forestry., 48(4): 235-236. (HEC non referred journals) Khan, I. A., S. N. Mirza and S.M. Nizami. 2004. Effect Of N₂ & P fertilizers on grass yield in Sub tropical Sub Humid Pothwar Land. Pakistan Journal of Arid Agriculture, vol.7 (ii): 45-48 Nizami, S. N. 2004. Agro forestry: Resuscitating a failed Programme. Farming Outlook, Vol. 4 No.1: 20-21 (Book) Syed Moazzam Nizami (2003) A Text book titled “Crop Husbandry” for DAE courses sponsored by National
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	Institute of Science & Technology Islamabad, Punjab Board of Technical Education Lahore & National Book Foundation Islamabad.(Copy rights NISTE):110pp.
Research Grants and Contracts.	<u>International Center for Agricultural Research in the Dry Areas (ICARDA)</u> Integrated Watershed Development for Food Security and Sustainable Improvement of Livelihood in Barani Areas of Pakistan (Focal Person for Forestry) . Sponsored by Austrian Development Agency, CGIAR Targeted Funding (Budget: € 840,421) <u>Ministry of Environment/ Punjab Forest Department/ HEC</u> Estimation of Carbon stocks in managed and unmanaged sub tropical forests of Pakistan (PhD Thesis). Financed by Punjab Forest Department, MoE and Higher Education Commission <u>Allama Iqbal Open University Islamabad</u> Determining Potential of Participatory Forestry in District Jauharabad.
Selected Professional Presentations	International: Estimating carbon Stocks in sub Tropical managed and unmanaged Native forests of Pakistan. International Green House conference 2009. Perth Australia National: Carbon stock estimation under REDD+. SDPI- SDC 13th conference. 23 Dec 2010. Islamabad.

Name	Dr. Abdul khaliq		
Personal	Assistant Professor, Department of Forestry & Range Management, PMAS-Arid Agriculture University Rawalpindi. Ph. Off. 051-9290019, 051-9092269, Ext. 269 E-mail: abdulkhaliq@uaar.edu.pk , chaudhry_ak@hotmail.com		
Experience	Period Served - Sub-Divisional Forest Officer (Social Forestry) Punjab Forest Department (D. G. Khan & Multan). (May 10, 1986 to Oct. 6, 1987) - Research Officer (Forestry) Punjab Forestry Research Institute Faisalabad. (Nov. 16, 1987 to Mar. 28, 2005) - Senior Research Officer (Agroforestry) Punjab Forestry Research Institute Faisalabad. (June 10, 1996 to Dec. 31, 2001) - Assistant Professor, Forestry & Range Management, PMAS-Arid Agriculture University Rawalpindi. (March 29, 2005 to date)		
Honor and Awards	- Letter of Appreciation by Vice Chancellor, University of Agriculture, Faisalabad for completing Ph.D within stipulated period of seven semesters with cash prize of Rs. 5000/- - Supervising thesis research of postgraduate students at MSc (Hons), M.Phil and Ph. D level as well as member of the supervisory committee of a number of postgraduate students. - Member department and faculty board of studies.		
Memberships	- Member of Executive Committee on Nature Farming Research and Development Foundation (NFRDF), Faisalabad - Member Environment Watch, Faisalabad		
Post Graduates, Graduate students, Postdocs, Undergraduate students	Ph.D		
	<u>Year</u>	<u>Name</u>	<u>Dept.</u>
	2006	Fida Hussain	FRM
	2008	Mubashrah Munir	BOT
	2009	Raja Zoq-ul-Arfeen	FRM
	M. Phil		
	2008	Zohaib Hassan	FRM
	2008	Muhammad Sana-ul- Haq	FRM
	2008	Waqas Umar	WLM
	2009	Amna Bibi	BOT
	2009	Humaira shaheen	BOT
	2009	Tahira Batool	BOT
	2009	Muhammad Waqqas Khan tarin	FRM
	2009	Irum Zahra	BOT

	2010	Abdul Raqeeb	FRM
	2010	Muhammad Awais Abdullah	FRM
	2010	Wasim Ahmed	BOT
	2010	Maqsood Ahmed	BOT
	MSc (Hons)		
	2005	Shahid Hussain Khan	PP
	2006	Adnan Fraz Khattak	FRM
	2006	Gulam Abbas	FRM
	2006	Khurram Daud	PP
	2006	Hirra Shah	PP
	2006	Hummera Nazir	PP
	2007	Shakeel abbas	FRM
	2007	Muhammad Sajid	FRM
	2007	Tanzeel javaid Aini Farooqi	FRM
	2007	Muhammad Rehan	SOCIO
	2007	Jamal Tariq Satti	HORT
	2007	Muhammad Anwer	HORT
	2008	Asif Khan	FRM
	2008	Zafar Iqbal Khan	SS
	2009	Samreen Sabir	HORT
	2009	Safia Ramzan	HORT
	2009	Aisha Balouch	HORT
	BSc. (Hons) internee		
	2006	Tanzeel Javaid Aini Farooqi	FRM
	2006	Shakeel Abbas	FRM
	2006	Muhammad Sajid	FRM
	2007	Sana-ul-Haq	FRM
	2007	Faria Kanwal	FRM

Name	Lubna Ansari	
Personal	H.No.2, St. 16, Model Colony, Rawalpindi	
Experience	<i>Period Served</i> Field worker (08.5.2006 -26.12.2006) Sungi Development Foundation, Abbot abad. Lecturer(Project post) (19.12.2006 - 14.01.2008) Forestry & Range Management Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi Lecturer (15.01.2008 – to date) Forestry & Range Management Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi	
Honor and Awards	-Supervising thesis research of post-graduate students at M.Sc.(Hons.) level as well as member of the supervisory committee of a number of post graduate students.	
Graduate Students	<u>Year</u>	<u>Name</u>
Honour students	2008	Benish Khanum
	2008	Mehreen Abbas
	2009	Irum Munir
	2009	Rahat Rauf
	2009	Adeel Ahmad
	2009	Awais abdullah
	2009	
	Honours/M.Phil	
	2010	Saba Rizwam Soharwardy
	2010	Aqdus Hussain
Service Activity	Academics, Research	
Publications	Ashraf, I.M., Yaqoob, S., Ansari, L . , Khan, I.A. 2008. A stydy on Agro- grazing in District Toba Tek Singh.Pak.J.Agri.Sci., 45(1).	
Report	Ansari, L. and. Hussain. 2002. Desertification and ways to combat it. Pakistan agriculture.M.A.Shah and Dr. G.S. Khan (edts). Agriculture Foundation of Pakistan Islamabad	

Name	Saeed Gulzar						
Personal	359, Street 13 Shahzad Town Islamabad						
Experience	<i>Period Served</i> Lecturer (17.08.2006 – to date) Forestry & Range Management Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi Lecturer (Project Post) (13.09.2005 – 16.08.2006) Forestry & Range Management Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi Lecturer (25-10-2003 to 12-9-2005.) Agriculture University Faisalabad D.G Khan Campus						
Graduate Students Honour students	<table> <tr> <td><u>Year</u></td><td><u>Name</u></td></tr> <tr> <td>2007</td><td>Kamran Khan</td></tr> <tr> <td>2010</td><td>Zaheer ud Din</td></tr> </table>	<u>Year</u>	<u>Name</u>	2007	Kamran Khan	2010	Zaheer ud Din
<u>Year</u>	<u>Name</u>						
2007	Kamran Khan						
2010	Zaheer ud Din						
Service Activity	Additional Charge University Estate care Officer						
Conference and Seminar Attended	1- Crop improvement, Conventional and Biotechnological approaches 28-30 August, 2006 arranged by Department of plant Breeding & Genetics, UAAR. 2- Organizer in 2nd International symposium on issues in Higher Education in Pakistan, on 13th November 2006 Arranged by HEC & UAAR. 3- Basic tools for identification and isolation of micro-organism from 27-29 December, 2006 Arranged by Department of Plant Pathology, UAAR.						

Annexure 13

Detailed Course Contents of Under Graduate Scheme of Studies in Forestry & Range Management Department.

FR-302 INTRODUCTION TO RANGELAND AND WILDLIFE MANAGEMENT 3(2-2)

THEORY:

Introduction to Rangelands, scope and importance. Basic terminology, Components of Rangelands Constraints and problems of rangelands. Rangeland Resources of Pakistan; ecological zones and vegetation types. Range ecosystem, Principles of Rangeland Management. Grazing system and grazing pattern in Pakistan. Range improvement techniques.

Concept of Forests, World Vegetation and Forests Resources of Pakistan. Regeneration techniques in different forests types. Introduction to Agroforestry. Social Forestry, Farmland Forestry and Artificial Plantations.

PRACTICALS

Identification and preservations of important Grasses and Plant species of Pothowar. Visits to various Rangeland types and Plantations. Quantitative analysis of range vegetation, Range frequency, relative frequency, density, relative density, cover and relative cover. Measurements of Tree Height, Diameter and Age, etc.

BOOKS RECOMMENDED:

1. Quraishi, M. A. A., G.S. Khan and M. S. Yaqoob. 1993. Range Management in Pakistan. University of Agriculture, Faisalabad.
2. Mohammad, N. (1989). Rangeland Management in Pakistan. NARC Published by ICIMOD.
3. Stoddard, L.A., A.D. Smith and T.W. Box. 1975. Range Management. McGraw Hill Book Co., New York.
4. Syed Saddrudin Hussain, (1990). Fundamentals of Plant Ecology.
5. Sahibzada, M. Hafeez. 1996 Agroforestry Vol I, II , III, IV, V & VI Punjab Forestry Research Institute, Gatwala Faisalabad.
6. Quraishi, M. A. A. and G.S. Khan. 1993. Farm Forestry in Pakistan, University of Agriculture, Faisalabad.
7. Champion, H.G., S.K. Seth and G.M. Khattak. 1963. Manual of Silviculture, Pak. Forest Institute, Peshawar (PFI).

FR – 401 INTRODUCTION TO AGROFORESTRY & WATERSHEDS 2(1-2)

Theory

Concept of Forests, Forests Resources of Pakistan. Introduction to Agroforestry. Social Forestry, Farmland Forestry and Artificial Plantations. Principles of agro-forestry. Agro-forestry classification. Existing agro-forestry systems in Pakistan. Agriculture crops and tree species combination. Introduction to watersheds. Principles of watershed management. Precipitation; types and measurements. Effect of vegetation on precipitation.

Practical

Identification of agro-forestry trees (field visits). Raising nursery of agro-forestry tree species. Measurements of Tree Height, Diameter, Age and Volume. Estimating area of watersheds by parallel line and graphic method. Measuring rainfall intensity and frequency. Introduction to meteorological instruments.

Books Recommended

1. Sahibzada, M. Hafeez. 1996 Agroforestry Vol I, II , III, IV, V & VI Punjab Forestry Research Institute, Gatwala Faisalabad.
2. Quraishi, M. A. A. and G.S. Khan. 1993. Farm Forestry in Pakistan, University of Agriculture, Faisalabad.
3. Champion, H.G., S.K. Seth and G.M. Khattak. 1963. Manual of Silviculture, Pak. Forest Institute, Peshawar (PFI).
4. Nayyar, P.K. Agro-forestry Systems. 1996.
5. Quraishi, M.A.A. 2002. Watershed Management in Pakistan. Dept. of Forestry, Range Management and Wildlife, Univ. of Agri., Faisalabad.
6. Quraishi M.A.A. 2002. Practical Manual of Watershed Management. Department of Forestry, Range Management and Wildlife. Univ. of Agriculture, Faisalabad.
7. J.E Raeder- Roitzsch 1968 Abstract of Lectures held in PFI for watershed Management.

THEORY:

Introduction to tree crop morphology and physiology. The Form and growth of trees. The locality factors of the forests, Forest Composition and distribution, Cultural and Tending operations. Forest protection and site maintenance. Forest Fire and its control.

Silvicultural systems: Introduction: Definition of silvicultural system, classification of silvicultural systems. Silviculture Systems. Execution, advantage, disadvantages, limitations and applicability of the following silvicultural systems in Pakistan. Clear felling system, Shelter wood system, Coppice systems, Pollarding Systems, Accessory systems: Silvicultural systems for Mazri and Ephedra forests according to their characteristics.

PRACTICALS:

Identification of forest trees practices of various operations. Visits to various forests and plantations. Techniques for raising nurseries of different forest tree species.

BOOKS RECOMMENDED:

1. Champion, H.G. et al. 1967. Manual of Silviculture for Pakistan. Pakistan Forest Institute, Peshawar.
2. Quraishi, M. A. A. 1999. Basics of Forestry and Allied Sciences. A-One Publishers, Urdu Bazar, Lahore.
3. Sharpe, G. W., Chare W. Hendee and Wenonah F. Sharpe. 1986. Introduction to Forestry. McGraw Hill Book Co., New York.
4. Sheikh, M.I. 1999. Forests and Forestry in Pakistan. A-One Publishers, Urdu Bazar, Lahore.

FR-503 PRINCIPLES OF AGRO FORESTRY 3(3-0)**THEORY:**

Introduction to Agroforestry and Importance, Social Forestry and Farm Forestry. Social Forestry as a tool for development. Basic Terminology, Importance of wood as energy source. Components of Agroforestry, Ecological, Social and Economical Aspects of Agroforestry System, Agroforestry Systems classification; shifting cultivation, agri-silviculture, silvo-pastoral, agri-silvopastoral, windbreaks, shelterbelts. Agroforestry ecosystem, Existing Agroforestry systems of Pakistan and their Constraints. Introduction to

Joint Forest Management (JFM). Development of wastelands, Interactions in crops, choice of species for agro-forestry. Management of trees in agro-forestry operations.

BOOKS RECOMMENDED:

1. A.P.Dwivedi. 1994. Agro-forestry; Principles and practices. Oxford IBH Publishing Co. Ltd. New Delhi, Bombay.
2. Syed Moazzam Nizami 1996. Forest Recreation Management for beauty and purpose. (Term Paper) Pakistan Forest Institute Peshawar.
3. Indian Forester Journal. Dehra Dun, India.
4. Sahibzada, M. Hafeez. 1996 Agroforestry Vol I, II , III, IV, V & VI Punjab Forestry Research Institute, Gatwala Faisalabad.
5. Quraishi, M. A. A. and G.S. Khan. 1993. Farm Forestry in Pakistan, University of Agriculture, Faisalabad.
6. Champion, H.G., S.K. Seth and G.M. Khattak. 1963. Manual of Silviculture, Pak. Forest Institute, Peshawar (PFI).

FR-505 RANGE MANAGEMENT

3(2-2)

THEORY:

Range Ecological Zones of Pakistan, Basic terminology, Range Soils, Range vegetation, Range Condition and Trend, Range Site, etc. Principles of Range Management. Ecology in relation to Range Management; succession, retrogression. Vegetation Surveys, Range Inventory and Evaluation. Measures of vegetation; cover, density, frequency, forage production, carrying capacity, etc. Proper management of rangeland resources; proper kind of animals, proper season of use, proper distribution of livestock.. Planned Grazing Systems; rotation, deferred rotation, rest rotation, best block grazing etc. Range improvement technology and practices.

PRACTICALS:

Visit of range management project sites, demonstration of range management operations/technologies. Collection of data for range inventory and resource evaluation.

BOOK RECOMMENDED:

1. Holechek, J. et al., 1989. Range Management, Principles and Practices. Prentice Hall, Inc. Newberry. USA.
2. Noor, M. 1989. Rangeland Management in Pakistan. ICIMOD, Katmandu, Nepal.
3. Quraishi, M.A.A., G.S.Khan and S.Y. Mian. 1998. Range Management in Pakistan. University of Agriculture, Faisalabad.
4. Stoddart, Smith and Box. 1975. McGraw Hill Series in Forest Resources.
5. Quraishi, M.A.A., M. Ishaque, 1995. Practical Manual of Range Management, University of Agriculture, Faisalabad.

THEORY: Definition and scope of the subject. Units of timber measurement. Measurement of diameter, height, age, form factor, basal area, volume and increment of felled and standing trees as well as of forest crops. Stem Form Studies, Volume tables, yield tables/management tables. Measurement of firewood and other minor forest products. Sampling methods. Determination of forest resources using Continuous inventory method, Fixed area plot method and Prism Sampling.

PRACTICALS:

Introduction to different instruments used for the determination of diameter, height, age, volume etc. Measurement of log volume. Measurement of forest crop diameter, height, age, basal area and volume. Determining quality class of a forest. Calculation of mean annual and current annual increment. Practice of measuring various parameters of different natural resources.

BOOKS RECOMMENDED:

1. M.S. Philips. 1994. Measuring trees and Forests. 2nd Edition.
2. Bruce, Bonals and Francis. 1982. Forest Mensuration. McGraw Hill Book Co. New York.
3. Negi, S.S. 1986. A handbook of Forestry. International Book Distributors. Dehra Dun, India.
4. Quraishi, M.A.A. 1999. Basic of Forestry and Allied Science. A-One Publishers, Urdu Bazar, Lahore.
5. Ashraf, M. M., I. Ahmad. 1994. Handbook of Forestry. PARC, Islamabad
6. Hassan Abbas. 1996. Elements of Forest Mensuration. PFRI- Faisalabad
7. Husch Bertram, Charles I. Miller and Thomas W. Beera 1982. Forest Mensuration. John Wiley and Sons New York.

THEORY: Concept of wildlife and related terminology. Importance/values of wildlife. Major habitat types/ecosystem and associated wildlife in Pakistan. Status of wildlife in Pakistan (Endangered, threatened spp.). Factors affecting wildlife population in Pakistan. Need for wildlife Management. Principles of wildlife Management. In-site and Ex-site wildlife Conservation in Pakistan. Protected Area (National Parks wildlife sanctuaries, Game Reserves, etc). Zoological gardens/Zoos, Safari Parks, etc. Wildlife Legislation in Pakistan. Institutional setup for wildlife Management in Pakistan. Federal, Provincial, NGOS, etc. Future needs for wildlife Management. Sustainable use of wildlife resources and community participation in wildlife conservation. International Conventions related to wildlife Conservation.

PRACTICALS: Visit to national and wildlife parks/sanctuaries/zoological gardens. Identification of endangered wildlife and study of their conservation. Visit to Margalla Zoo and National Museum of Natural History of Pakistan.

BOOKS RECOMMENDED:

1. Bailey, J.A. 1984. Principles of Wildlife Management. John Wiley & Sons. Inc. USA.
2. Giles, R.H. 1971. Wildlife Management Techniques. Wildlife Society, Washington D.C. USA.
3. Giles, R.H. Jr. 1987. Wildlife Management. W.H. Freeman & Co. San Francisco.
4. Robinson, W. L and Eric, G. Bolen. 1984. Wildlife Ecology & Management. McMillan Publishing Co. New York.
5. Towards Understanding Forestry. 1997. Emporium Publishers, Lahore.
6. Quraishi, M.A.A., R.A. Khan and Sh. M.A.Q. Hussain. 2002. Practical Manual of Wildlife Management. University of Agriculture, Faisalabad.

FR-502 FOREST MANAGEMENT

3(2-2)

THEORY: Introduction. Objectives of Forest Management. The actual growing stock, structure, species composition, age of size class distribution and density. Need for information in management. Nature and components of forest growth, Concept of sustained yield. Current status of the concept in relation to Pakistan. The Normal Forest. Current status of the concept of normality.

The Regulation of the yield; Object of cutting, methods of yield regulation, area method, control by felling rules, by rotation and age-class distribution, periodic yield and regeneration block (Cotta's formulation, equivalent volume). Periodic block, revocable periodic block, single periodic block. Volume and increment methods, Austrian formula, Hinde-Shagen formula, Von Mantel's formula, Masson's ratio and Flury's constant regeneration area method, number and sizes of trees, the Blandford method, the method of control.

PRACTICALS:

Preparation of working plans by doing actual inventory in nearby forest area. Working plans and working schemes. Scope of the plans and their periods. Introduction to Remote Sensing and GIS (Geographical Information System) Technologies, Application of Remote sensing & GIS in Forest Management.

Books Recommended

1. Sheikh, M.I. 1999. Forests and Forestry in Pakistan. A-One Publishers, Urdu Bazar, Lahore.
2. Osmaston, F.E. (1968). The Management of Forests. George Allan and Unwin Ltd., Ruskin House, Manchester, London.
3. Davis, K.P. (1966). Forest Management McGraw Hill Book Co., NY.
4. Khattak, G.M. (1973). Forest Management Ferozsons. Peshawar.
5. Troup, R.S. Silvicultural Systems F.R.I. Dehra Dun (India).

6. Purkash, R. 1985. Forest Management, International Distributors, Dehra Dun.
7. Negi, S.S. 1986. A handbook of Forestry. International Book Distributors. Dehra Dun, India.
8. John. A Howard 1991 Remote Sensing of Forest Resources, 1st Edition, Chapman & Hall, London – New York.

FR-504

WATERSHED MANAGEMENT

3(2-2)

THEORY:

Basic concepts, hydrological cycle, fundamentals of Watershed Management such as objective, Management of snow pack in forest lands, Role of vegetation including protection as well as promotion of existing natural vegetation. Various land use operations and their suitable modifications, Engineering soil conservation practices in watershed management. Structural measures on farmlands and ranges: gully erosion control, diversion structures and surface water drainage, terracing, leveling, sub-soiling, weirs and ponds for storage of surplus water, streambank erosion control. Hydrologic effects of fire The planning process, administration, legislature, basic economic consideration, social implication.

PRACTICALS:

Study of selected watershed projects in Pakistan. Estimating precipitation, evaporation, transpiration, infiltration and run off. Reading contour maps and aerial photographs. Improving existing topographic maps. Determination of area of watershed, drainage density, compactness coefficient, mean annual rainfall and Calculation of Intensity and duration of Single storm.

BOOKS RECOMMENDED:

1. Easter W.K., John A. Dixon and M.M. Hufschmidt. 1986. Watershed Resource Management; an International framework with studies from Asia and the Pacific. F.A.O. Bangkok.
2. Gill, N. 1979. Watershed Development with special reference to soil and water Conservation. F.A.O, Rome.
3. Lee Richard. 1980. Forest Hydrology. Columbia University press. New York.
4. Quraishi, M.A.A. 2002. Watershed Management in Pakistan. Dept. of Forestry, Range Management and Wildlife, Univ. of Agri., Faisalabad.
5. Quraishi M.A.A. 2002. Practical Manual of Watershed Management. Department of Forestry, Range Management and Wildlife. Univ. of Agriculture, Faisalabad.
6. J.E Raeder- Roitzsch 1968 Abstract of Lectures held in PFI for watershed Management.

THEORY: Introduction of biodiversity. Importance of biodiversity and conservation, Loss of biodiversity, causes and consequences. Causes for the loss of bio-diversity. Biodiversity and forestry, Methods for measurement of biodiversity, concept of red book. Increasing diversity by restoring damaged ecosystem. *In situ* conservation. Agricultural productivity and conservation of biodiversity. Environment & bio-diversity. Impact of environmental changes on bio-diversity. Introduction to Environmental impact assessment. Biodiversity Action Plan for Pakistan. Environmental Pollution.

BOOKS RECOMMENDED:

1. IUCN. 2000. Biodiversity Action Plan for Pakistan. IUCN, Pakistan.
2. Johns A.G. 1997. Timber production and biodiversity conservation in tropical rain forests.
3. Kumar. 2000. Biodiversity; Principles conservation. New Delhi, India.
4. Barker, J.S.F. 1997. Harmonizing agricultural productivity and conservation of biodiversity: breeding and ecology. Published by Korean Breeding Society and society for advancement of breeding researches in Asia. Seoul Olympic Parktel, Korea.
5. Wilson, E.O. 1988. Bio-diversity. National Academy Press, Washington, D.C. pp. 521.

THEORY: Types of Interactions. Interactions between plants and animals. Digestive system of range animals, Nutritional requirements of grazing animals. Management of diet quantity. Management of diet quality. Theories of Diet selection; Learning diet selection, individual vs. social learning. Food preference and food aversions. Habitat selection. Intake; factors affecting forage intake by animals. Challenges Herbivores face in Foraging; variation in nutrients, Plant chemical defenses, Plant morphological defenses, Temporal and spatial Variation, Unfamiliar Environments. Plant morphology in relation to grazing. Response of plants to grazing; avoidance of disturbance, tolerance of disturbance. Morphological, physiological and chemical responses of plant to defoliation. Evolution of secondary compounds in range plants and mechanisms of detoxification by grazing animals.

BOOKS RECOMMENDED:

1. Holechek, J. et al., 1989. Range Management, Principles and practices. Prentice Hall, Inc. Newberry. USA.
2. Noor, M. 1989. Rangeland Management in Pakistan. ICIMOD, Katmandu, Nepal.
3. Quraishi, M.A.A., G.S.Khan and S.Y. Mian. 1998. Range Management in Pakistan. University of Agriculture, Faisalabad
4. Robinson, W.C. and E.G. Bolen. 1984. Wildlife Ecology and Management. MacMillan Pub. Co. New York.

THEORY: Mycology; fungi classification, modes of nutrition and reproduction. Bacteria, Viruses, Nematodes and other pathogens. Specific fungi causing different diseases such as wood decay, discoloration, cankers and foliage diseases etc.

Forest Pathology: Plant diseases and their effects. Pathology in relation to forestry practices. Principles of forest diseases control. Symptoms, causal organisms, modes of infection, biology and control of diseases of important forest tree species.

Forest Entomology: Biology and control of important pests of forest trees. Pests of shisham, kail, chir, deodar, poplar, Kikar, Eucalyptus, etc.

Important nursery pests, important seed pests,. General control methods; silvicultural control, biological control, chemical control, use of fire in predatory insect control. Role of insects in human life, integrated pest management.

PRACTICAL

Identification of major fungi and insects causing diseases in forest trees. Field study of important insects of major forest tree species and their identification. Identification of important diseases of forest trees. Field study of forest tree diseases in different ecological zones.

Books Recommended:

1. Mehrotra, R.S. Plant Pathology 2nd edition. 2003. TATA McGraw Hills.
2. Chopra, G.L. 1970. A class book of Fungi. S. Nagin & Company. Jalandhar.
3. Bakhshi, B.K. 1976. Forest Pathology-principles and practices in forestry. Published by the Controller of Publications. Delhi.
4. Graham, S.A. 1952. Principles of Forest Entomology. McGraw Hill book Co. New York.
5. Smith, W.H. 1970. Tree Pathology. Academic Press, London.
6. Blanchard, R.O. and T.A. Tattar. 1981. Field and laboratory Guide to Tree Pathology. Academic Press, London.
7. Boyee, J.S. 1961. Forest Pathology. McGraw Hill Book Company, New York.

FR-601 RANGE IMPROVEMENT AND REHABILITATION

3(3-0)

THEORY: Rangeland Resources of Pakistan. Range Ecology/Range Condition and Trend. Major problems of rangelands/causes of rangeland degradation. Rangeland Regeneration & Rehabilitation. Range Improvement & Rehabilitation Techniques–rangeland protection - range reseeding–water harvesting/spreading techniques–transplanting trees/shrubs (dry afforestation) -indigenous and exotic species for range rehabilitation-prescribed burning & range fertilization–fencing, salting, herding-stock water development. Introduction to Forest regeneration, artificial and natural regeneration. Forest regeneration in arid areas with and

without irrigation. Reclamation of denuded hills, regeneration in land slips, highway planting and aesthetic planting.

BOOKS RECOMMENDED:

1. Khan, Irshad. 1987. Wasteland Afforestation, Oxford and IHB Pub. Co. New Delhi.
2. Quraishi, M.A.A. 1998, Basics of Forestry and Allied Sciences, A-One Publishers, Urdu Bazar, Lahore.
3. Champion, Seth and Khattak. 1965. Silviculture of Pakistan. PFI, Peshawar.
4. Muhammad, N. 1989. Rangeland Management in Pakistan. ICIMOD, Nepal.
5. Sheikh, M.I. 1986. Dry Afforestation Techniques. PFI, Peshawar.

FR-603

FOREST TIMBER SCIENCE

3(2-2)

THEORY:

Important terminology, Introduction to wood Structure. Sap wood and Heart Wood. Soft wood Vs Hard Wood. Defects of wood and their removal. Mechanical and Physical properties of wood. Timber Sawing, seasoning and preservation. Recent developments in seasoning and preservation of wood. Saw milling and wood working. Uses of wood, composite wood products. Pulp and paper. Various forest based industries.

PRACTICALS:

Identification of composite wood sample. Study of different characteristics of soft and hard wood in the laboratory. Wood testing and processing for different uses. Introduction to different sawing methods. Visit to Wood workshop. Visiting a pulp Mill, Match factory or sports industry..

BOOKS RECOMMENDED:

1. Dinwordie, J.M. 1981. Timber, its nature and behaviour. Van Nostrand Reinhold Co., New York.
2. Mehta T. 1981. A hand book of Forest Utilization. International Boode Distributor, Dehra Dun, India.
3. Sjostrom E. 1981. Wood Chemistry-Fundamentals and Applications. Academic Press, London.
4. Quraishi, M.A.A. 1998. Basics of Forestry and Allied Sciences. A-One Publishers. Urdu Bazar, Lahore.

Theory:

Felling and conversion. Different methods of felling and conversion of timber. Types and description of different implements used. Seasons for felling. Hand and mechanical sawing.

Extraction and transport. Different methods of extraction and transport of timber particularly those in use in different forest areas of Pakistan. Various types of equipment used.

Grading and storage Timber. Grading of Chir, Kail, Deodar, Shisham and Mulberry; grading of railway sleepers. Storage of logs and timber, lay out and types of timber depots, maintenance of depot record, different methods of stacking with advantages and disadvantages, measures for protection of stock. Sale and disposal of forest produce. Different systems. Sale and disposal of forest product in different areas.

Minor forest produce. Definition and relation importance of minor forest products. Detailed study of different kinds of minor forest produce and their sources including fibres and flosses, grasses, bamboos and canes, distillation and extraction products, oil seeds, tans and dyes, gums and resins, drugs, spices and other edible products. Details of resin tapping and manufacture of turpentine and colophony. Charcoal manufacture.

Visit to forest depot.

BOOKS RECOMMENDED:

1. Trotter. H. (1940). Manual of Indian Forest Utilization. Oxford University Press.
2. Desh, H.E. (1948). Timber its structure and properties. Macmillan and Co. Ltd., London.
3. Dinwordie, J.M. 1981. Timber, its nature and behaviour. Van Nostrand Reinhold Co., New York.
4. Mehta T. 1981. A hand book of Forest Utilization. International Boode Distributor, Dehra Dun, India.

THEORY: History, scope and classification of medicinal plants of forest/range lands. Collection, drying, storage of plants from wild sources. Introduction, uses, important chemical constituents, collection and adulteration of commonly used medicinal plants. Classification of poisonous plants. Cultivation and uses of dual nature plants. Important medicinal and poisonous plants of rangelands. Classification and identification of important chemical groups of medicinal plants. Role of pollen and anatomical characters for identifying medicinal plants. Methods for the cultivation, harvesting and processing of important medicinal plants.

BOOKS RECOMMENDED:

1. Medicinal Plants of the Northern Areas of Pak by Ghulam Rasool (1998), Saad Printo Pack. Rwp.
2. PFI, Peshawar. 1956. A note on the plants of medicinal value found in Pakistan.
3. Medicinal and poisonous plants of Pakistan by S.R. Baquar 1989, Printas, Karachi.
4. Hamdard Drug Plants of West Pakistan by M.B. Zaman (1970) PFI, Peshawar.

FR-609 PROJECT PLANNING AND SCIENTIFIC WRITING 2(1-2)

Definition and concept of research; Selection of research topics; Scope and importance of project description. Project formulation, Review of literature; Objectives of research projects, methods and approach processing. Project costs and financing. Preparing the PC-1 Project Management team building. Implementation, monitoring, evaluation and appraisal of projects. Scientific Report Writing. Citations and technical references. Presentation of data, interpretation, generalization and inferences; scientific language development, Tabular and textural presentations. Editing and proof reading of manuscripts.

Practicals:

Each student will be required to select problems for project development. The student will develop a PC-1 for the same and write a scientific article on a given topic related to his/her discipline. In addition, the students will be required to conduct assignments on Literature review, Project planning of any Range Management and Agro-forestry projects and its evaluation, scientific writing assignments and presentations, Group discussions of different research topics, etc.

Books Recommended

1. Steppens, A.K., Putman. 1088. Participatory Monitoring and Evaluation. FAO, Rome.
2. Plutchick, R. 1974. Foundations of Experimental Research. Harper & Row, London.
- 3 Matthews, J.R., J.M. Brown and R.W. Matthews. 2000. Successful Scientific Writing:
- 4 A Step-by-Step Guide for Bio-Medical Scientists. 2nd Ed. Cambridge University Press.
5. APS. 1990. Publication Manual of American Psychological Association. 3rd Edition. Washington, D.C. USA.

Part-A: Forest Policy

Definition. Principles of formulation of a policy. To make a policy. The National forest policy-requirements of sound national forest policy. History and formulation of the national forest policies of 1894, 1955 and 1962. policy decisions after 1962.

Part-B: Forest Law

7. Preliminaries. Definition of law. Need for law. The basis of law. Definition of common legal terms: Abatement, advance possession, Bail, cattle pound, cognizable and non-cognizable offence, collusion compounding an offence, Confiscation, Confession, Criminal breach of trust, criminal misappropriation, criminal trespass, easement, Escheat, Evidence, Forfeiture, Intermision, Interruption, Leading question, Mischief, Mistake of fact, Preemption, Recognizance, Reanullius: Right, Royal tree, Salvage, Search Warrant, Seizure, Servitude. Summary trails, summons, summon cases, Treasure, warrant cases, waif wood, wasteland.

2. Acts and Regulations and Rules:

Section by section study of the following Acts and regulations and rules:

1. The Forest Act, (1927) 2. Cattle Trespass Act 3. West Pakistan Wildlife Protection Rules, 1960.

3. Constitution of the permanent Forest Estates i.e. Reserved Forests. Constitution of other types of Forest estates. Protected forests. Village forests. Shared forest. Guzara forests. Property, Definition. Classification. Acquisition of property. Transfer of property. Government property and its Acquisition. Rights and ownership. Protection of forests and the forest produce in transit. Legal organization of Forest Service, Legal definition of a Forest Officer.

BOOKS RECOMMENDED:

1. Explanatory Notes on Forest Law. Compiled for the use of students at Imperial Forest College, Dehra Dun. Manager Publication, Delhi, India, Government of India Press.
2. Forest Act, 1927 Ideal Publisher, Karachi.
3. Khattak G.M (1975) Forest Policy Pakistan Forest Institute –Peshawar.
2. Abeerullah Jan. 1993. Review and analysis of Forest Policies of Pakistan Pictorial Printers (Pvt.) Ltd. Islamabad.
5. Abeerullah Jan. 1993. Forest Policy, Administration and Management in Pakistan. Printers (Pvt.) Ltd. Islamabad
6. Govt. of Pakistan (1975). Forest Policy Directives Ministry of Food and Agri. Government of Pakistan.
7. F.A.O. Forest Policy. Law and Administration F.A.O.Rome.

PRACTICALS:

- ii. Practical training in the related discipline with research & development institutions/NGOs. Project writing, execution and report writing.
- iii. Collection of data/conduct of assignments regarding the Internship under the supervision of local supervisor. Literature search regarding the study topic. Presentation of findings in the internship report and seminar.

BOOKS RECOMMENDED:

1. Javed Ahmad, Nowshad Khan. 1999. Research Methods. Allama Iqbal Open University, Islamabad.
2. Plutchick, R. 1974. Foundations of Experimental Research. Harper & Row, London.
3. Matthews, J.R., J.M. Brown and R.W. Matthews. 2000. Successful Scientific Writing: