

**PIR MEHR ALI SHAH
ARID AGRICULTURE UNIVERSITY
RAWALPINDI**



SELF ASSESSMENT REPORT 2009-10
Department of Entomology
PhD Program

Program Team

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Dr. Ata ul Mohsin	(Member)
Dr. Humayun Javed	(Member)

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Introduction

Department of Entomology started working with the establishment of Agriculture College, Rawalpindi in 1986 preliminary with B.Sc. (Hons) agriculture. With the up gradation of College to the University in 1994, M.Sc (Hons) degree program was started in 1997 and Ph.D. program was introduced in the next coming year, 1998.

Being agriculture-based country, the subject of Entomology serves as an important management source of information to all the farming community from field crops insect pest management to household and forest pest management. It also serves as a source of skilled personnel development to meet the need of the growing economic needs. Keeping in view its mission and objectives, the department of Entomology periodically reviews its curriculum to meet the challenges and to keep up with the pace of development. The department is always committed to enhance students' professional training and career opportunities. It arranges field visits and holds national and international seminars on current issues relating to the protection and quality of post-harvest etc. The faculty is actively engaged in a number of research projects some of which are funded by Higher Education Commission. Some projects were funded by other funding agencies like Pakistan Science Foundation.

Provision of quality education and research has been the clear landmarks of this department. It is committed to promote merit and improve quality of education, teaching and research. The department is always willing to cooperate with the Quality Enhancement Cell of the University as well as to incorporate their recommendations for improving standard of teaching, quality of learning and achievement of its objectives. This report reflects efforts of the department to evaluate its performance for future improvement in collaboration with the QEC.

This Self Assessment Report (SAR) comprises of eight sections. The first section outlines the programme mission and objectives. Section 2 provides information about the curriculum development. Section 3 enlists the laboratories and other relevant information followed by student support and guidance. The last four sections provide information about student support, process control, faculty characteristics and institutional facilities and support provided by the university.

Criterion-1: Programme Mission, Objectives and Outcomes

Study of insects is simply called as Entomology. We come in contact with different insects in our every day life. These very small living creatures are very good competitors of human race on this planet. It covers all the fields like harmful insect pests, beneficial insects including biocontrol agents, pollinators, scavengers, honey bee, silkworm and other useful insects. Management of major insect pests of field crop, stored grains, fruit trees, vegetables and ornamentals etc using IPM techniques and safe and judicious use of pesticides is also a key component of entomology. In case of medical discipline, entomology is playing a key role in healing of wounds by application of sterile maggots which are otherwise difficult to heal specially in diabetic patients. Likewise environmental pollution, biodiversity and insect resistance against the pesticides are the burning issues of today which warrant continuous processes of education and research. Advanced education to the students at PhD level, in this specialized field, involves the use of modern/advanced teaching methods and innovative analytical techniques for insect pest problem solving attitudes and techniques establishment. Application of applied knowledge regarding pest management not only reduces enormous losses due to insect pests, lessen pollution hazards and develop a sustainable and substantially profitable production system for the farmers.

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

To produce professionals of strong background and recent technical knowledge to resolve the challenges relating to the insect pests infesting field crop, fruits and vegetables and stored commodities and the beneficial insects to produce valuable products like honey and silk, natural biopesticides based on plant, bacteria, viruses like *Bacillus thuringiensis*, nuclear polyhedroviruses etc thereby helping in development of agricultural and industrial economy. These useful products can directly help to improve quality of the human life as well economy of the country indirectly.

Documented measurable objectives

The department is offering Ph.D. degrees in Entomology discipline to cater highly skilled local manpower for future needs at national and international level. Research areas especially related to entomological issues of the agricultural sector at national level of arid agriculture and others are mostly selected for research.

Objectives of Entomology program are given as under.

1. To equip them with necessary theoretical and practical knowledge relating to the field of Entomology and to enable them to apply this knowledge professionally and productively.
2. To train and prepare the students about application of the latest techniques of IPM (Integrated Pest Management) program. This helps to contribute in reduction of environmental pollution and uplifting of human health.
3. To ensure application of entomological knowledge in a systematic way to reduce cost incurred on plant protection techniques especially on pesticides.
4. To prepare them to work in an R &D environment effectively.
5. To enable them to be a good human and an efficient, job-oriented and dedicated researcher and worker with a reasonable earning to lead a prosper life.

Main elements of strategic plan to achieve the mission and objectives

- Strengthening and implementation of a solid teaching system based on the knowledge, expertise and vision gathered from world reviews, literature, innovations, proceedings, symposia etc for the award of degree.
- Scheming and improving the curricula involving core subjects related to present day Entomology problems and their solutions
- Establishing and strengthening well-equipped specialized research laboratories to conduct to research
- Publication of review papers, popular articles and scientific papers in well reputed journals, editing of books and manuals etc.
- Execution of research projects funded by the universities and other agencies.
- Provocation of linkages with national and international research organizations to solve indigenous problems relating to research.

PROGRAM OBJECTIVES ASSESSMENT

The department monitoring system is focused on the lines:

- Student-Teacher interaction
- Students views for program/faculty
- Critical analysis and policy formulation for development of infrastructure
- Periodic review of the target achievements at department level

Table: 1 Program Objectives Assessment

S. #	Objective	How Measured	When Measured	Improvement Identified	Improvement made
1	Improvement and intensification of Entomology at AAUR	Getting views of PhD scholars based on identification of insect pests infesting crop plants in the field Suggest management practices for specific pest problems	It is a regular process as per requisite	Establishing an insect pest advisory service at the department Development of Techniques of guidelines are required to be improved	For insect pest identification identified specimen are preserved for technical support Techniques regarding research and field practices developed and dissemination to the students and the growers also
2	To communicate fundamental and practical knowledge to the graduate and Post-graduate students	Assessing the previous understanding of students through exams/tests and student response	During the already established regular and periodic exam system by the university	Incorporation of new techniques in entomology course work and accordingly some new subjects are required to be incorporated in the syllabus	Improvement of existing courses as per requisite Communication system is made better by developing the class lectures and using audio visual aids
3	Supervision of students in research/ internship	Evaluating the students research/internship project topics, and thesis/reports by the concerned committees/evaluators, synopsis and thesis defence seminars etc	Existing evaluation procedure, prior to initiate the projects and at the completion of the research thesis	Strong scrutiny system for topics and synopsis evaluation Students to deliver seminars and prepare reports	Seminars, presentation sessions and class discussions, were organized for communication proficiency improvement
4	Incorporation of associated fields	Reviewed by concerned departmental or faculty level committees, and councils (academic council)	In the periodic meetings of the concerned bodies	Allied topics/courses are suggested in the light of university/ HEC guidelines/recommendations.	New development in related fields are incorporated for awareness and exposure regarding the field
5	Foresee the new lines of education and areas of research	Through surveillance of crop pests, judging manpower, communication to evaluate farmers opinions and review of national, regional and international literature	Regular feature	Latest subjects should be incorporated in syllabus, to study the new challenges	Endorsement of new syllabus to incorporate modern techniques

Expected Outcomes of the Programme:

1. The scholars must have ability to understand the entomological issues related to pests, their identification, management and environmental problems and potential to resolve these issues.
2. The scholars should have a substantial skill to identify the pests and biocontrol agents and its application in devising IPM techniques for sustainable pest solutions.
3. The scholars should have ample capacity to analyze the pest problem and to recommend an adequate and effective pest management package suitable for the situation keeping in view cost effectiveness and environmental safety.
4. The scholars must have capability to take up research on advanced level research on the problems relating to applied and economic entomology.
5. The scholars shall gain advanced theoretical and practical knowledge of the subject helping them to advance in their professional life and higher studies.
6. The scholars shall be capable to establish their own enterprises and business using their skills such as silkworm production, honey production, sterile maggot production, mass scale production of predators and parasites.
7. The scholars shall have potential to contribute in national economy and development through their research projects and development initiatives.

Relationship between programme outcomes and objectives are given in table 2.

Table 2: Programme outcomes and their relationship with the Programme objectives

		Outcomes						
Objectives		1	2	3	4	5	6	7
	1	+++	+++	++	+++	++	++	+
	2	+++	+++	+++	+++	++	++	++
	3	+++	++	+++	+++	++	++	+
	4	+++	++	+++	++	+++	+	+
	5	++	++	++	+++	++	++	++
	6	++	++	++	++	++	+	++

+ = Moderately satisfactory

++ = Satisfactory

+++ = Highly satisfactory

Programme Outcome Measurement

So as to evaluate the performance of the most concerned with regard to achievement of the stipulated objectives; information was gathered from the target groups through prescribed proforma provided by the Quality Enhancement Cell of Pir Mehr Ali Shah, Arid Agriculture University, Rawalpindi. The prescribed proformas were filled in by the respective class students, respective faculty members, department alumni, and the graduates (previously passed out from the university) working in different organizations, research institutes, and agriculture departments in different capacities/positions at national level.

PROGRAM ASSESSMENT RESULTS

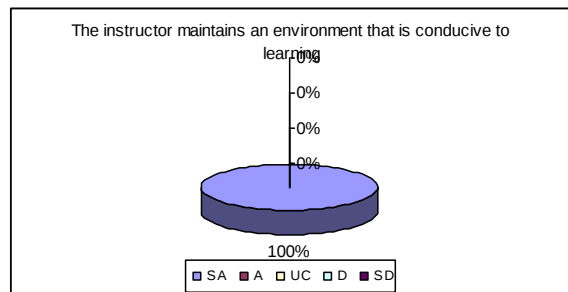
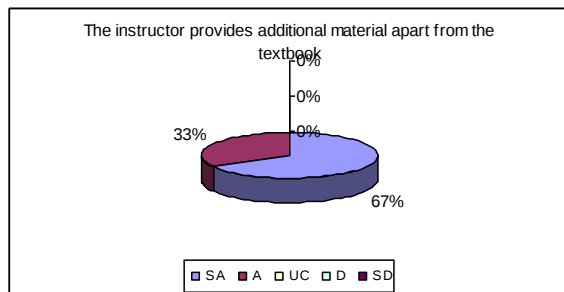
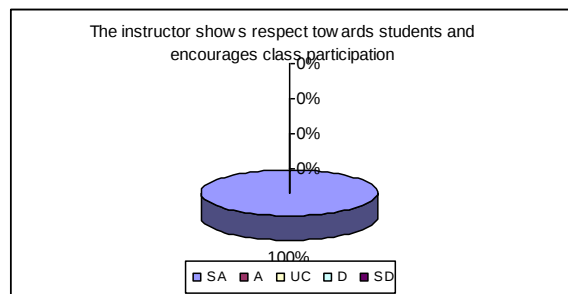
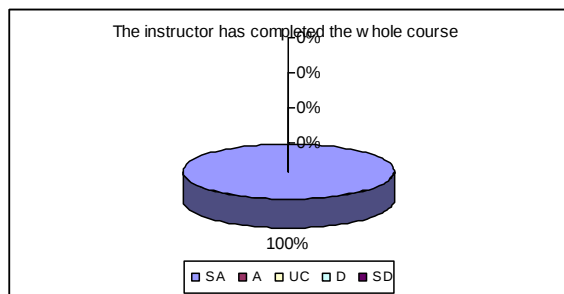
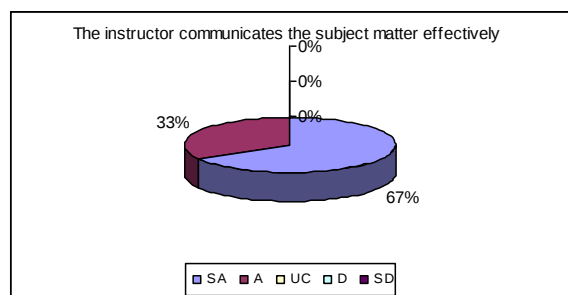
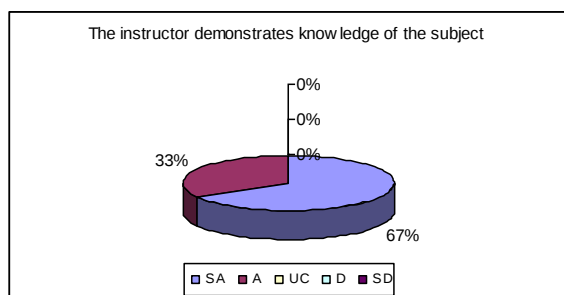
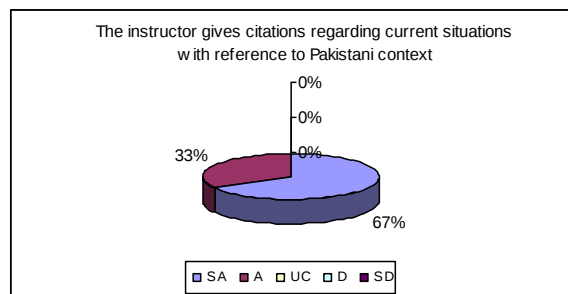
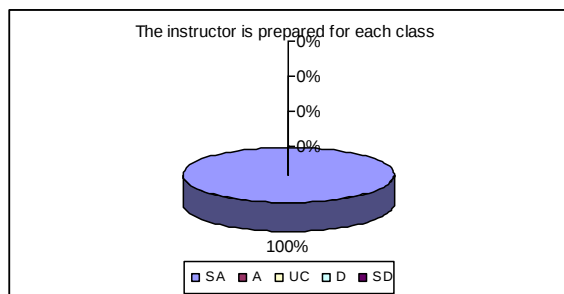
Teachers' Evaluation

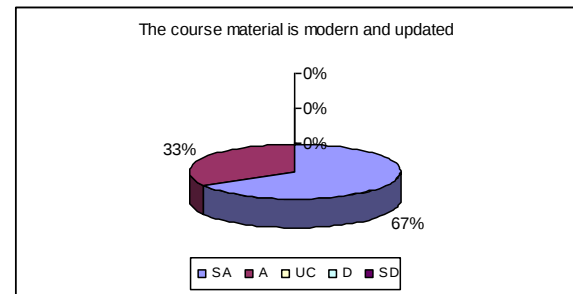
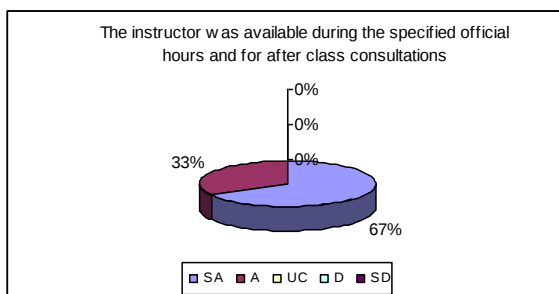
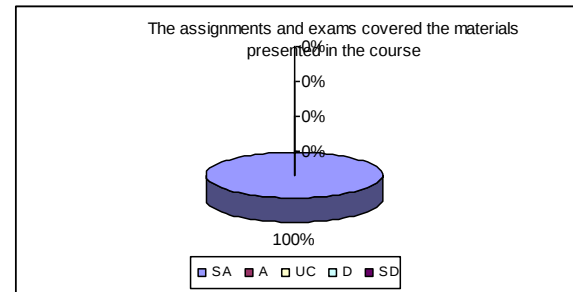
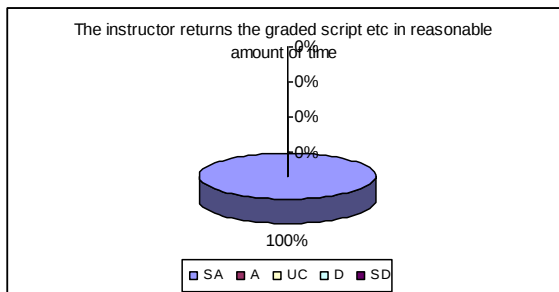
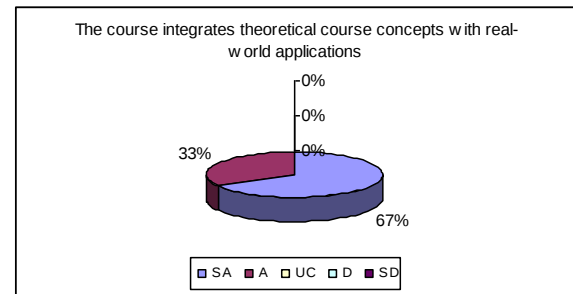
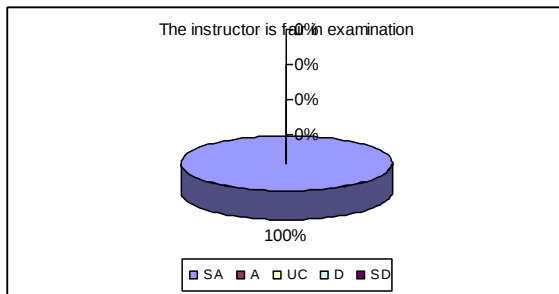
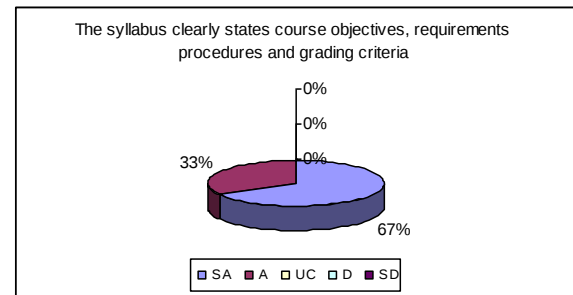
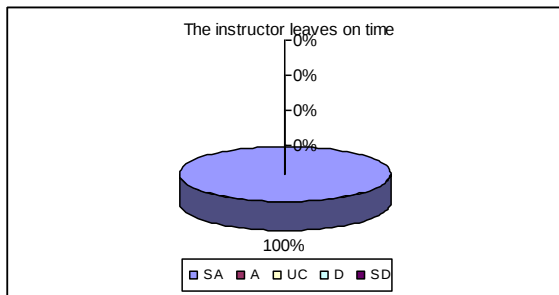
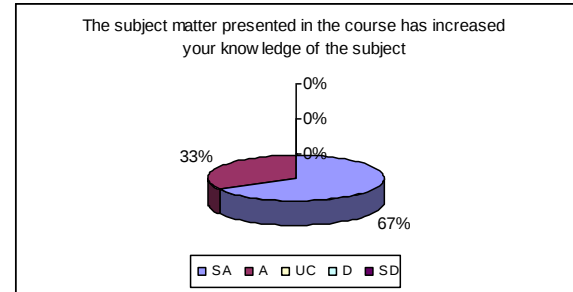
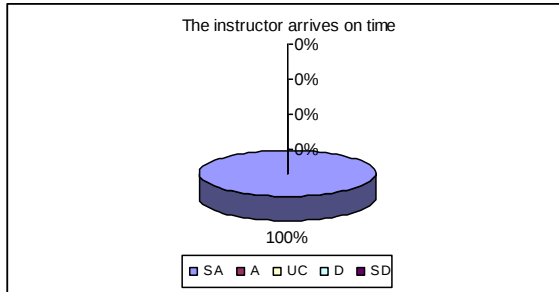
Regarding the teachers' performance and their assessment, evaluation was done by the respective students and their comments were gathered on prescribed proforma. This evaluation was done for different courses assigned to individual teachers through filling in Proforma 10 (Annexure-IV). Dr. Muhammad Naeem taught PhD course related to immature insects, their taxonomic classification and other aspects related to this very important course. The reason is that most economic agricultural insect pests threaten our crops at their immature stages rather than adults.

Pie Charts Showing Teacher Evaluation

The individual graphs reflected excellent performance of the teacher in all respects. However, 33 % students agreed but not strongly about proper citation, communication, demonstration of the subject etc. Overall, assessment showed the effective teacher-student in ENT-707.

Interaction and learning environment about the course and proved to be a good one for PhD students to face the agri. based problems related to immature insect pests.





SA: Strongly Agree A: Agree UC: Un-certain D: Disagree SD: Strongly Disagree

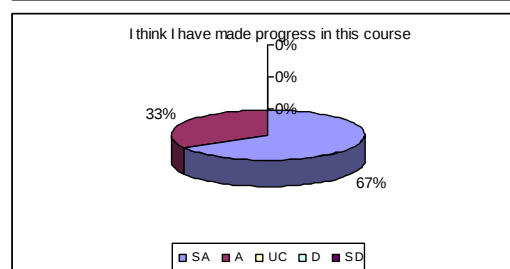
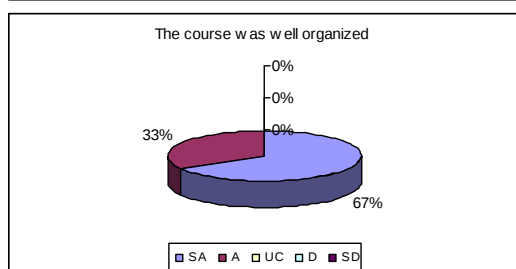
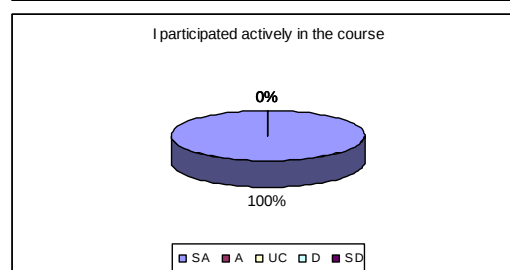
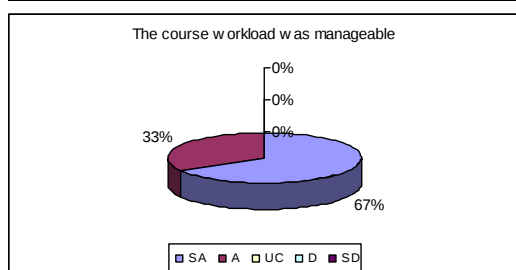
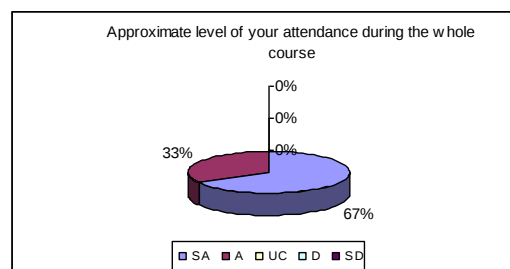
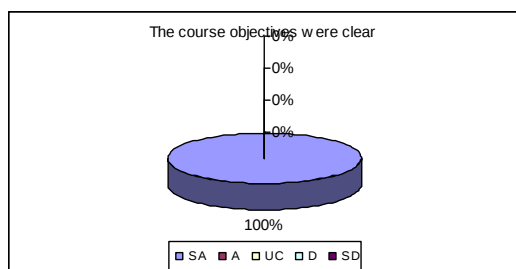
Students Course Evaluation

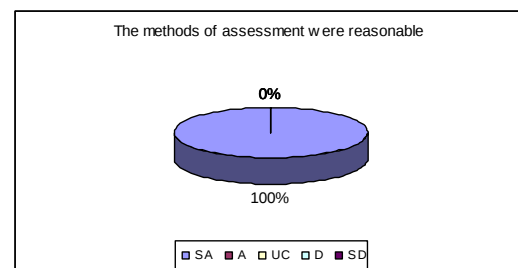
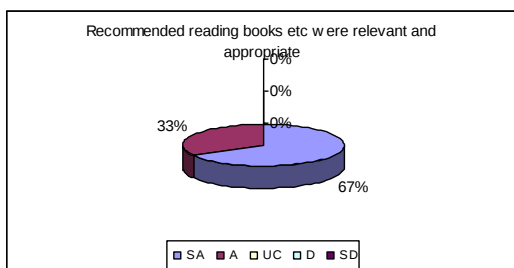
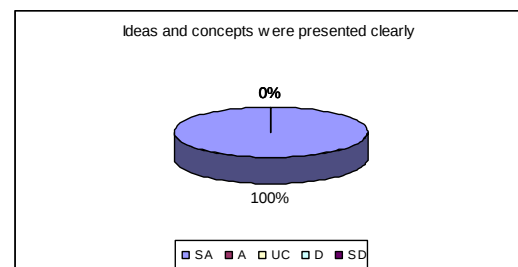
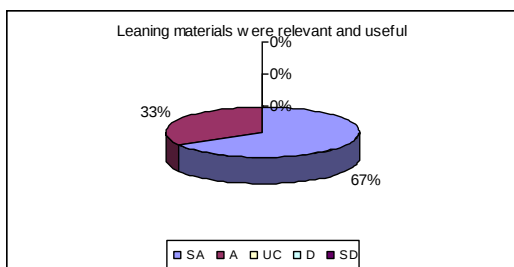
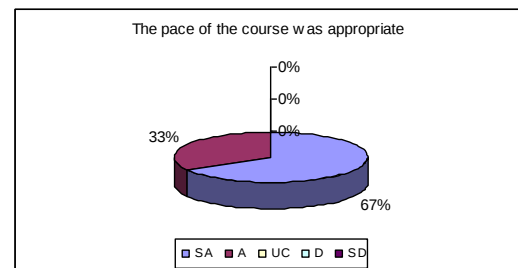
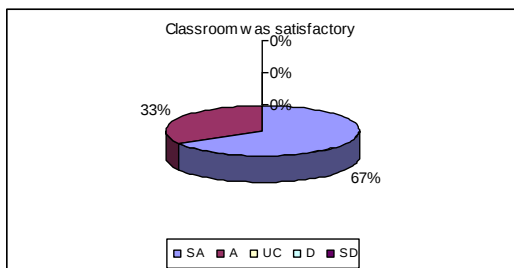
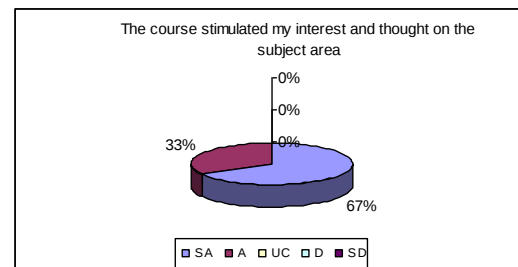
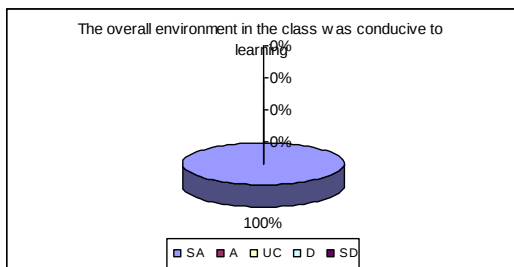
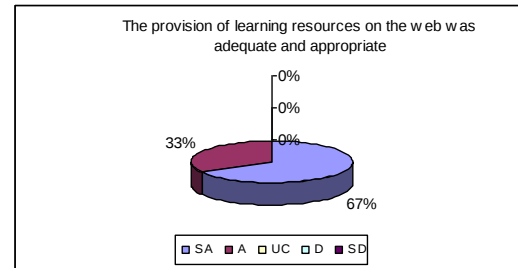
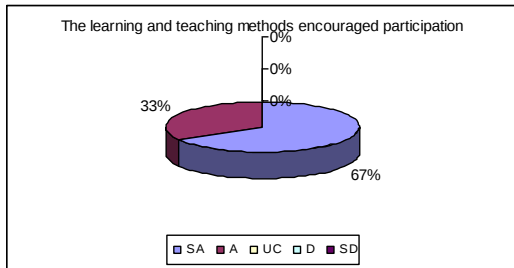
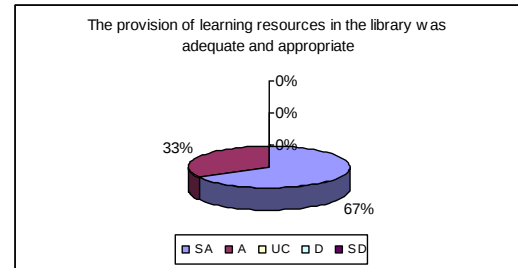
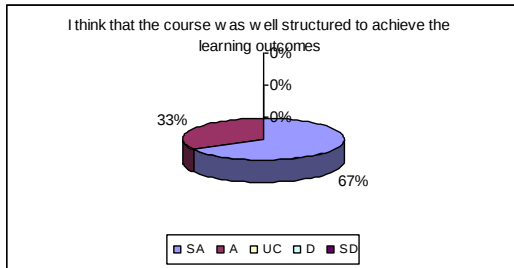
Courses taught the teachers at department level were also evaluated by the concerned students. The course of the teacher was evaluated on the basis of information gathered from Proforma 1 (Annexure-III) for Dr. Muhammad Naeem. The performance level for each course is depicted in figure as shown below. Evaluation of courses alongwith their scores as done by the students are given as under.

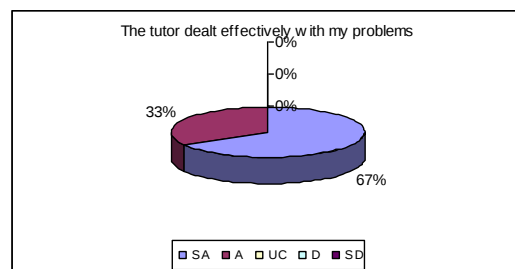
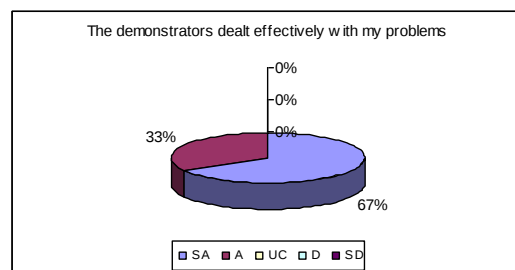
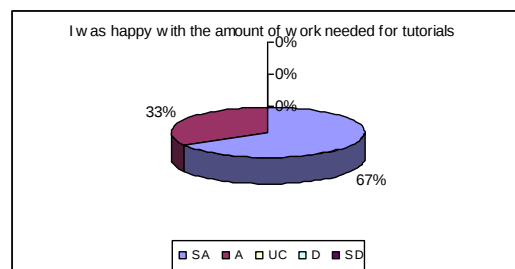
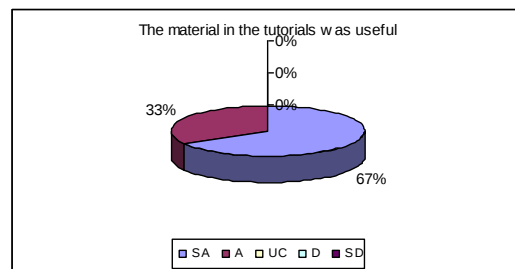
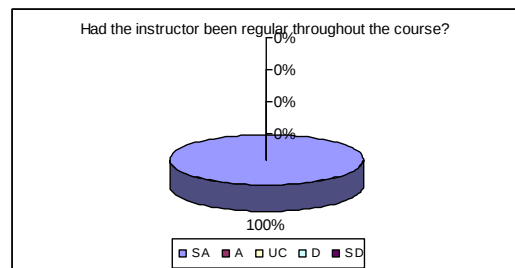
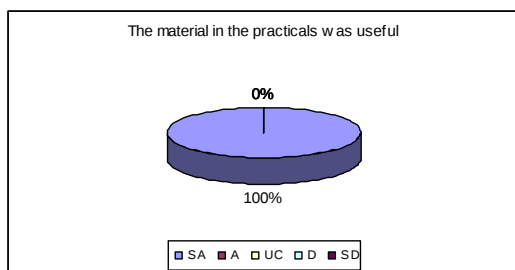
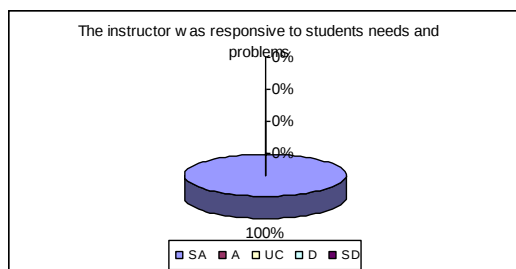
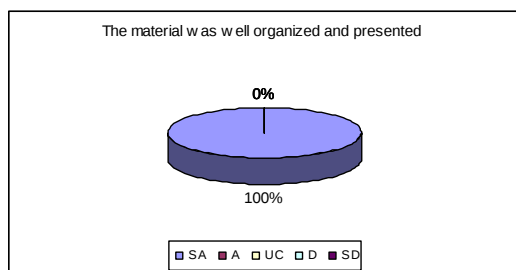
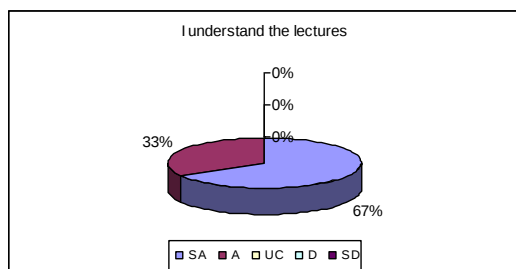
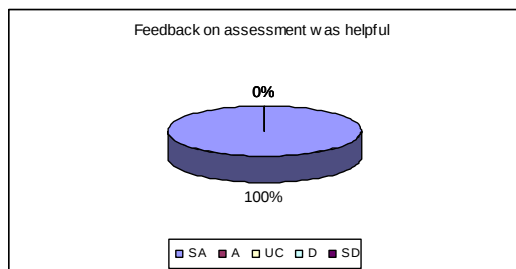
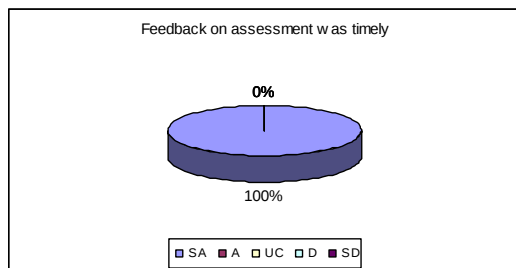
Pie Charts Showing Student Course Evaluation

Course ENT 707 Classification of Immature Insects

All of the students were found strongly agreed or agreed with the statement that course objectives were clear, course work was manageable and the course was well organized. All the three PhD students actively participated in the whole throughout the course period. Students were agreed and strongly agreed to the ideas and concepts presented and they understand what is presented there in class.







SA: Strongly Agree A: Agree UC: Un-certain D: Disagree SD: Strongly Disagree

Strength of the Department

Entomology department has a regular activity regarding inhouse accountability or review of the previous semester to discuss achievements, performance, attitude and regularity of the students. The main strength of the department is the urge and desire to promote the entomological knowledge and research to solve the field problems relating to crop pests, systematics, pesticide resistance, food security and economic entomology. At present three of the senior faculty members are foreign qualified Ph.Ds, one local PhD whereas three junior faculty members are doing Ph.D. abroad. It is hoped that on their return the department will be capable to achieve the targets of success in research and teaching methodologies. So far as equipment and laboratories are concerned; through HEC funded project entitled” Strengthening of Entomology Department” procurement of required equipment and upgradation of laboratories is being done which would be a big support in upgradation of both educational and research activities at the department.

Weakness Identified In the Program

The department is facing acute shortage of:

- Lack of Electron microscope, Microtome, Growth chambers and equipment related to molecular techniques etc.
- With the increase in students’ registration a severe dearth of space (class rooms) is being felt.

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

Present Performance Measures for Research Activities

Table 3 Research Performance of the Faculty

Faculty	Journal Publications (National & International)	Conference Publications (Proceedings Abstract)	Projects
Dr. Muhammad Aslam	1	-	1
Dr. Muhammad Naeem	-	-	1
Mr. Humayun Javed	-	-	-
Dr. Ata-ul-Mohsin	-	-	-
Mr. Mobushir Riaz Khan	Abroad for PhD studies		-
Dr. Javaid Iqbal	2	2	-
Dr. Munir Ahmed	4	-	-
Dr. Asif Aziz	1	-	-
Mr. Imran Bodlah	-	-	-
Dr. Muhammad Farooq Nasir	-	-	-
Mr. Muhammad Tariq	Abroad for PhD studies		

The department is under staffed and need more Ph.Ds to be inducted.

Faculty with Excellent Research Award

- PEF 8th National Education Award, 2002.
- 13th Star award, 2002.
- Quid-i-Azam Gold Medal, 2004

(Prof. Dr. Muhammad Aslam, Chairman Entomology Department was honored with these awards)

Community Services by the Department

- Participated in “Kisan Mela” organized by PMAS-Arid Agriculture University Rawalpindi at Koont Farm near Chakwal.
- Pest identification service for the visiting farmers and recommendation of pest management methodology

Faculty Satisfaction Regarding the Administrative Services

- Department regularly participate/attend all periodical/scheduled meetings including departmental, university, academic council, and syndicate).
- Corresponding to the HEC standards Entomology Department maintains a ratio of 8:3 for the academic (technical) and administrative (non-technical) staff.

- All sorts of records/inventories pertaining to personnel, students, results or thesis etc have been maintained in a regular and proper way.
- A good level of regularity has been maintained in quick office disposal; so far no complaint has been lodged from any quarter in this regard.
- Regular Review meeting at the end of semester has become a usual feature of the department.

Major Future Improvement Plans

Keeping under consideration the previous evaluation / monitoring activity, the department is focusing specifically on:

- Establish and maintain better teaching/learning environment and standards for better output.
- Conducting field visits incorporating entomological problems particularly of arid areas.
- To impart quality education in Entomology using all the possible techniques and materials.
- To develop and disseminate extension material regarding pest management.
- Organizing workshops on Integrated Pest Management both for the TOTs and the agricultural/research officers of arid areas.
- Preparation and dissemination of extension literature like, brochures and pamphlets for the farmers and advisory services.
- To establish the post-graduate laboratories in the disciplines of host plant resistance, plant disease vectors, and Sericulture laboratories. Human Resource development in Entomology to meet future challenges for sustainable agriculture leading to self sufficiency in food.
- To plan and execute problem oriented research on local and serious crop pests prevalent in the arid ecology.
- Capacity building of faculty members in relation to the latest global advancements in this discipline through exchange programs, short term trainings and collaborative research projects with federal and provincial government bodies.

Table: 4 Quantitative Assessment of the Department

Sr.#	Particular	No.	Remarks
------	------------	-----	---------

iii	Ph.D. produced	1	In employment
iv	Post-Doc fellowship	-	
v	Ph.D. Scholarship for faculty	-	
vi	Students: Faculty	35:1	Fulfils HEC criteria
vii	Technical: Non Technical ratio	8:3	Fulfils HEC criteria
viii	Average grade point	Around 3	Fulfils HEC criteria

The periodic assessment of the departmental activities exhibited high efficiency of system and adequate impact of outcomes. Two students have got admission in PhD (one inland and the other abroad).

CRITERION 2: CURRICULUM DESIGN AND ORGANISATION

Degree

Ph.D. Entomology

Pre-requisites

M.Sc. (Hons) Agric. in Entomology, Entry test, Interview

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)/week. One credit hour carries 20 marks. Duration of a semester is 18 Weeks.

DEGREE PLAN

Ph.D. Entomology

The Ph.D. programme was initiated in 1998. At present department have two Ph.D. faculty members. Whereas four teachers are continuing their Ph.Ds. The department has produced 5 Ph.Ds. Whereas 15 students are currently enrolled in the Ph.D. programme. The department is strictly following HEC instructions and guidelines in relation to admission, examination and performance evaluation of Ph.D. students.

➤ **Curriculum course requirements for Ph.D. Entomology degree is summarized below.**

Ph.D Course work includes two taught courses as well as two seminar in major subjects as well as three from other departments as minor courses i.e. Biochemistry, Statistics and Agronomy to broaden the knowledge base of the students. The Ph.D. students are required to defend synopsis at the faculty level. Evaluation of Ph.D. dissertation is accomplished externally by two foreign examiners from the technically advanced countries.

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

The assessment of curriculum is done in the following table and the courses are cross tabulated according to the program outcomes.

Table 5 Courses Taught during the semester Versus Outcome

Course/ Groups of courses	Out comes
---------------------------	-----------

	1	2	3	4	5	6	7
Ent-705, Ent-706, Ent-707, Ent-708, Ent-709, Ent-715, Ent-716, Ent-719,	+++	++++	++	++++	++++	+++	+++
Ent-710, Ent-711, Ent-712, Ent-713, Ent-714	++++	++++	++++	+	+++	+	++++

+ = Relevant

++ = Relevant & satisfactory

+++ = Very relevant & Very satisfactory

++++ = Highly relevant & Highly satisfactory

- The curriculum fits very well and satisfies the core requirements for the program, as specified the respective accreditation body.
- 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 backgrounds, problem analysis and solution design must be stressed within the program's core material.

Table 6: Programme Courses corresponding to theoretical background, problem analysis and solution design.

Elements	Courses
Theoretical backgrounds	Ent-710, Ent-711, Ent-712
Problem analysis	Ent-713, Ent-714, Ent-701, Ent-702
Solution design	Ent-703, Ent-704, Ent-705, Ent-706, Ent-707, Ent-708, Ent-709, Ent-715, Ent-716, Ent-719, Ent-720

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 as:

- Computer and I.T. courses (3 credit hours) have been integrated in the curriculum of Ph.D students which fulfill the requirements of I.T.

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

- Students of Ph.D are assigned presentations and group works during different courses which are presented in the class to develop and enhance their written and oral communication and motivation skills.

SURVEY OF DEPARTMENT OFFERING Ph.D. PROGRAMS

1	General Information:	
1.1	Name of Department	Entomology
1.2	Name of Faculty	FC&FS
1.3	Date of imitation of Ph.D. program	1998
1.4	Total number of academic journals subscribed in area relevant to Ph.D. program	-
1.5	Number of Computer available for Ph.D. student	3
1.6	Total internet bandwidth available to all the students in the department	Univ. net service
2	Faculty Resources:	
2.1	Number of faculty members holding Ph.D. degree in the department	4
2.2	Number of HEC approved Ph.D. Advisors in the department	2
3	Research output:	
3.1	Total number of articles published last year in International Academic Journals that are authored by faculty members and students in the department	2
3.2	Total number of articles published last year in Asian Academic Journals that are authored by faculty members and students in the department	6
3.3	Total number of ongoing research projects in the department funded by different organizations	2
3.4	Number of post-graduate students in the department holding scholarships/fellowships	3
3.5	Total Research Funds available to the Department from all sources	More than 20 millions
3.6	Number of active international linkages involving exchange of researchers/students/faculty etc. (Attach Details)	-
4	Student information:	
4.1	Number of Ph.D degrees conferred to date to students from the department during the past three academic years	6
4.2	Number of Ph.D students currently enrolled in the department	9
4.3	Ratio of number of students accepted to total number of applicants for Ph.D. program	-
5	Program information	

5.1	Entrance requirements into Ph.D. program (M.Sc/M.Phil.) indicate subjects or M.Sc/M.Phil	M.Sc. (Hons) Entomology (CGPA 3)
5.2	Is your Ph.D program based on research only/ (Y/N)	No
5.3	Maximum number of years in which a Ph.D. degree has to be completed after initial date of enrollment in Ph.D. program	5
5.4	Total number of post M.Sc. (16 year equivalent) courses required for Ph.D	18 credit hrs
5.5	Total number of M.Phil level courses taught on average in a term/semester	-
5.6	Total number of Ph.D. level courses taught on average in a term/semester	-
5.7	Do your students have to take/write	
	a. Ph.D. Qualifying examination (Y/N)	Yes
	b. Comprehensive examination (Y/N)	Yes
	c. Research paper in HEC approved journal	Yes
	d. Any other examination (Y/N)	-
5.8	Total number of international examiners to which the Ph.D. dissertation is sent	Two
5.9	How is the selection of an examiner from technologically advanced countries carried out?	-
5.10	Is there a minimum residency requirement (on campus) for award of Ph.D. degree?	-
6	Additional information	
6.1	Any other information that you would like to provide	-

CRITERION 3: LABORATORIES AND COMPUTER FACILITIES

There are four laboratories in the department. The facilities and shortcomings of these laboratories are listed as under.

- Laboratory Title:
 - Biosystematics laboratory
 - Biocontrol laboratory
 - Insect Toxicology Laboratory
 - Stored grain insect laboratory
 - Apiculture laboratory
- Location and Area: Faculty of Crop and Food Sciences, A-Block, 2nd Floor, Main Campus
- Objectives: Laboratories are used for:
 - Research work for the PhD scholars
 - Used for execution of the research/development projects funded by HEC, PSF, PARC, and other national and international agencies/institutions.

Future Need

- Well equipped laboratories to fulfill the future needs of research/education are necessitated for better results

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

Laboratory manuals are not available. Presently the department library has all the relevant books. Though laboratories are not spacious but serving the purpose at limited level. The equipments are being procured and replaced as per availability of funds. Equipments regarding molecular approaches are lacking e.g. centrifuge (slow and ultr), PAGE-Electrophoresis apparatus, PCR, Spectrophotometer, relevant software and chemicals.

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

Laboratories are maintained by only one laboratory assistant (equipment, glassware, chemicals, material etc). Three laboratories attendant assist the students in practicals, cleaning and washing.

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

- To upgrade the prevailing education facilities, separate class rooms are needed as presently classes (lectures) are taken in laboratories.
- Space limitation is a major constraint as department could not initiated some of the major subjects like sericulture, host plant resistance and insect vectors' research activities.
- **Computing facilities support:** Available to a limited number of faculty members and PhD scholars
- **Shortcoming in computing infrastructure:** Computers with internet facilities should be available to all faculty members and postgraduate students.
- **Safety Arrangements:** There is no proper safety arrangement and no security plan is in place in case of emergency. The department is located on the 2nd floor; there is no emergency exit for the labs.

CRITERION 4: STUDENT SUPPORT AND ADVISING

To resolve students' issues regarding provision of guidance and information in various social and educational matters, Directorate of Students Affairs provides an effective support. University organizes various cultural activities and study tours/visits to broaden the students knowledge and experience to be utilized in their practical life.

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

- Corresponding to the HEC guidelines and Academic Council's recommendations regarding schemes of study, all the courses are offered accordingly to PhD level as per mentioned of the authorities but depend upon the availability of teachers and facilities.
- All the courses (number and type) are taught as per the HEC criterion/standard.
- To meet the human resource needs in public and private sector at national level, the PhD level courses are tailored accordingly.

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

All of the courses are designed / tailored to address the teaching needs in an effective way. In this regard teaching staff and students are consulted periodically to get the feedback for further improvement. Along with theoretical aspects of the courses, practical work is also done in field/laboratories while students are also oriented to tackle their professional needs through different assignments and submission of reports. They are coupled with various institutions/organization to get updated knowledge and insight addressing their future needs.

In this regard

- Keeping in view the feedback from students and teachers, courses are structured and updated in the board of study meeting.
- It is common and general practice to maintain an effective interaction between students and faculty and inter and intra classes of the 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 choices.

Students are guided properly in relation to their on-going educational programs at university and also focusing their future needs.

- Entomology department has developed full harmony among the faculty members and students especially the PhD scholars. Management has made all sorts of efforts to update their knowledge and information source.
- Students are informed about the program requirement through the office of the head of the department.
- Their information records related to their studies are regularly updated through teacher – student interaction.
- Directorate of Placement Bureau also helps in communicating and exploring jobs for the university students.

CRITERION 5: PROCESS CONTROL

It includes student admission, students' registration, faculty recruitment activities which are dealt by various statutory bodies and the university administration.

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

- A well established admission system works at university/department level. This is followed as per the rules and regulations set by the university. Admission for PhD degree is properly advertised in the newspapers having national level circulation.
- Admission criteria for PhD degree course are described in definite term by the university and admission system is based upon the recommendations of supervisory committee.
- Prior to the admission process, criterion for admission is revised every year as a regular process.

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

- Registration of students is done once in a degree course but evaluation is done a number of times through different examination stages. Successful completion of one semester ensures the promotion to the next semester.
- Recommendations regarding admission process for different departments are forwarded to the Registrar office for their formal registration as university student.
- Admission merit based upon marks percentages of previous and entry test exams etc.

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

University follows recruitment policy given by the HEC. Induction of all positions at Faculty level is done as per rule:

- Different faculty positions are advertised in different newspapers of national circulation; Applications are received by the Registrar office, call letters are issued to the short-listed candidates 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.
- 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 deutes 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 meting its objectives

- To impart the most recent advances and techniques in entomology, course curriculum are regularly revised / updated time to time.
- With the emergence of new fields, new courses are set and included in the curriculum.
- Students usually buy relatively cheaper books of Asian Editions. These editions are also available in university library where computers, electronic journals and internet facility are made available to all faculty members and scholars.
- All sorts of audio visual aids are utilized in educational process.

- All efforts are made that the courses and knowledge imparted meet the objectives and outcome. The progress is regularly reviewed in the staff meetings.

Standard 5-5: The process that ensures that scholars have completed the requirements of the program must be based on standards, effective and clearly documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives.

- The Controller of Examinations announces the date of commencement of examination. After 10-20 days of the examinations, the controller office notifies the results of the students. The evaluation procedure involves quizzes, mid and final examinations, practicals, assignments and reports, oral and technical presentations. Candidates who secure 80% or above marks are awarded grade A; grade Gold medals are awarded to the scholars who secure highest marks in various fields. Degrees are awarded to the scholars on the annual convocation that is held annually.

CRITERION 6: FACULTY

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

At present there are one professor, one associate professor, two assistant professors and two lecturers working in the programme. One assistant professor and two lecturers are abroad perusing Ph.D. studies.

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

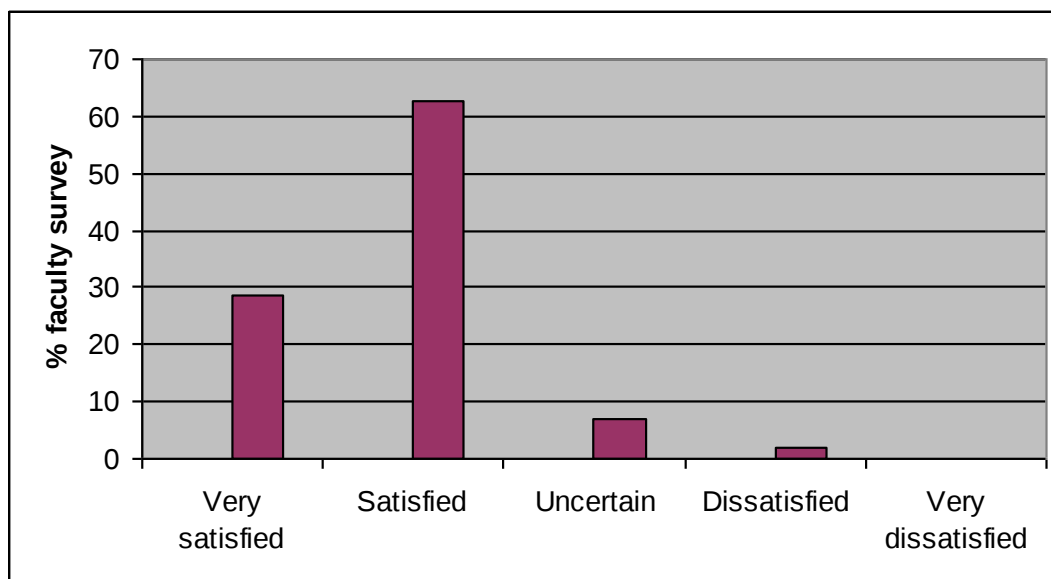
- Faculty members are provided with different academic, research and training facilities as per availability in the university system.
- Currently three faculty members are abroad for completion of their PhD degrees sponsored by HEC.
- Research supervisors are offered incentives for implementing different laboratory and filed experiments to promote high standard research activities.

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

Motivation and encouragement are among the main tools for the better performance of the faculty team members. Faculty members are contented by the initiatives undertaken by the management in this regard. Formal and informal coaching by the senior faculty members, different entertainment events, field visits and excursions etc play a vital role in motivating the young faculty members.

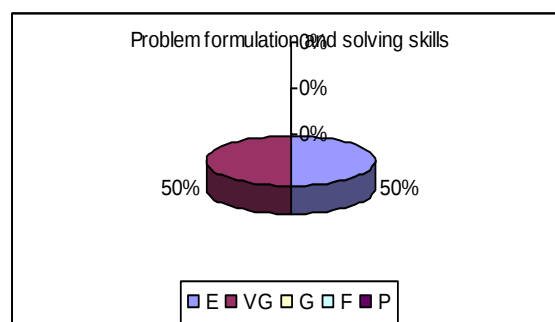
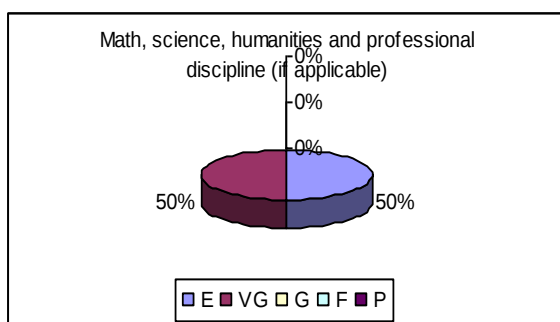
Faculty Survey:

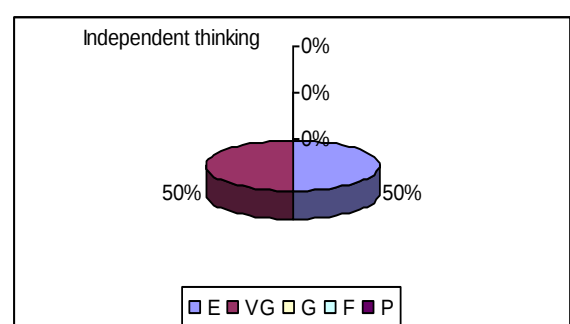
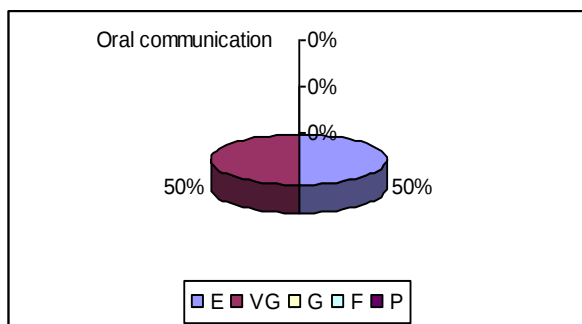
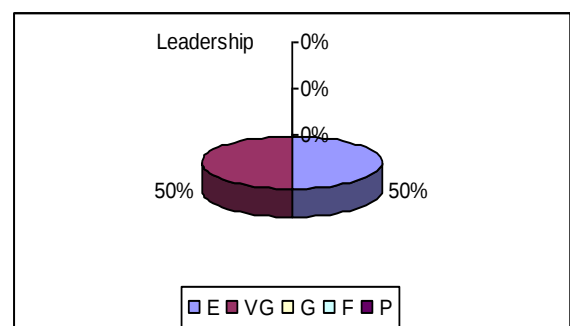
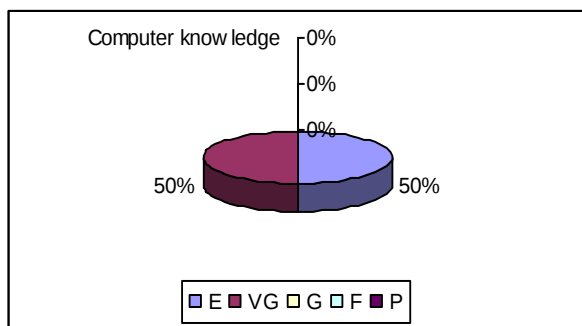
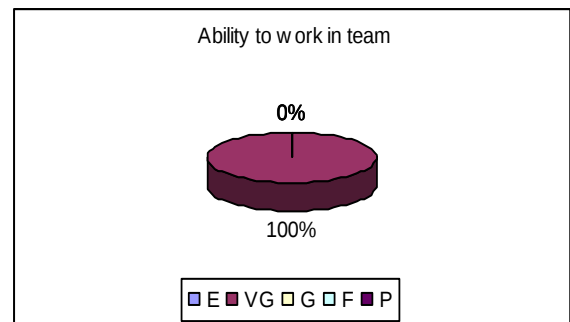
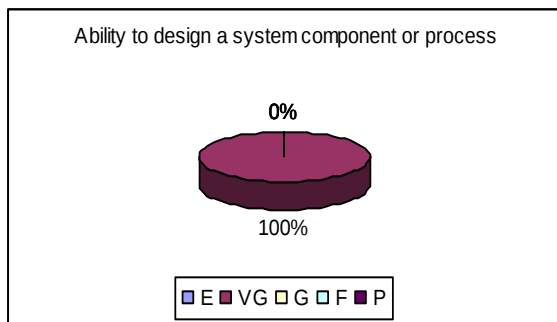
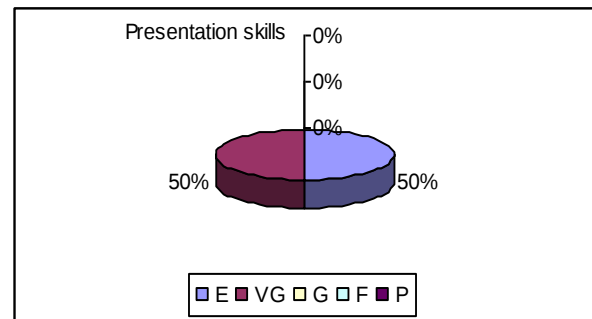
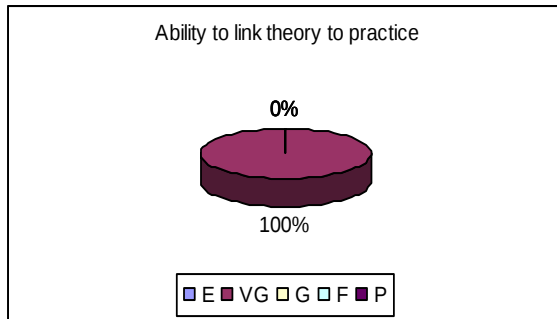
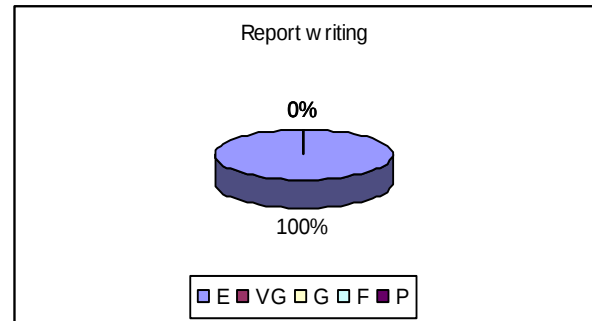
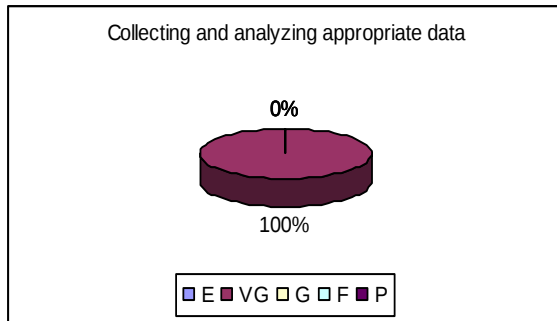
Below given figure represents the Faculty survey (Proforma 5, Annexure V). The results indicated that significantly 60% are satisfied as compared to others. However around 30% are very satisfied. Our HEC strengthened project will help to improve the practical workability.

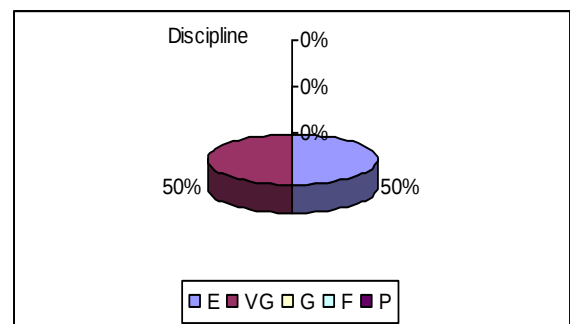
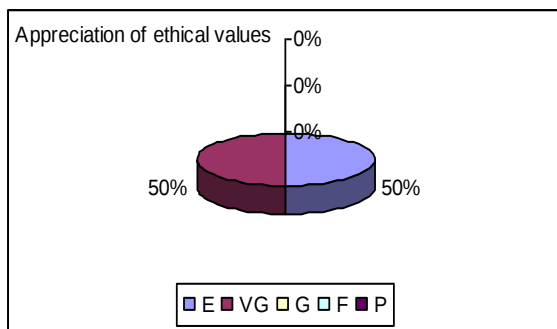
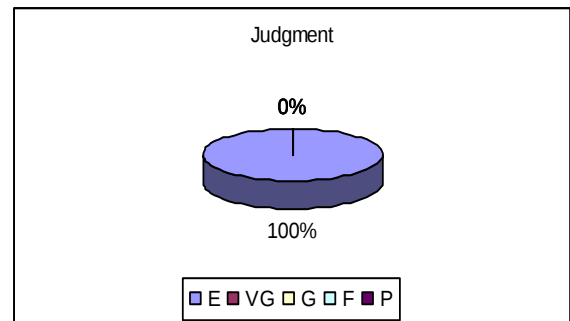
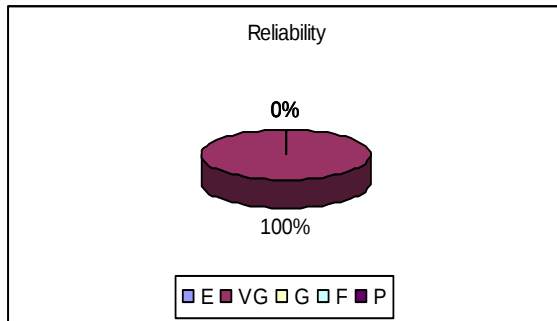
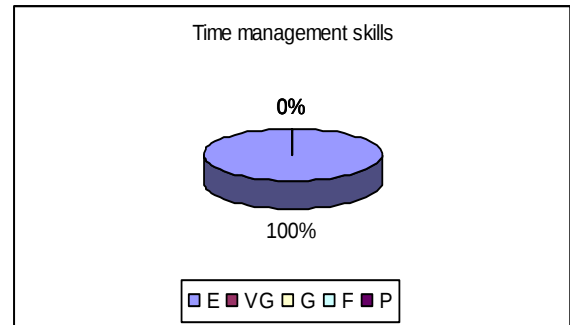
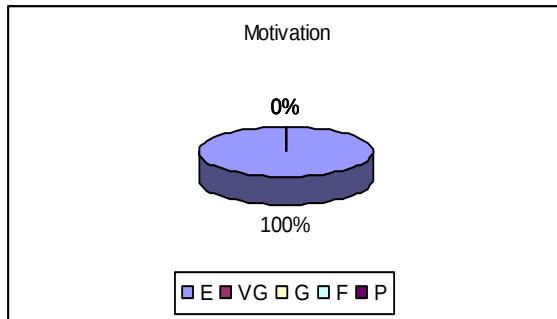


At present one Professor, one associate professor, three assistant professors and four lecturers are working in the department. Most faculty members are experienced and professionally sound in their respective fields.

Survey of performance of faculty members (performa 8) revealed that faculty was very good to excellent in performance for different activities like collection of required materials in teaching, computer utility for teaching and transfer of knowledge to students, interpersonal interactions and student management.







Excellent = E, Very good = VG, Good = G, Fine = F, Poor = P

Based on information collected from the employee, it became clear that interpersonal communication and relationships are important factors to contribute better knowledge and expertise transfer in faculty members as well as to the students. Motivation of ethical values can also play a pivotal role in better relationship and healthy environment.

Faculty Resume

1. DR. MUHAMMAD NAEEM

Associate Professor



Name	Dr. Muhammad Naeem								
Personal	Associate Professor Department of Entomology, Pir Mehr Ali Shah, Arid Agriculture University, Rawalpindi E-mail: naeem18ap@yahoo.co.uk muhammad.naeem@uaar.edu.pk Phones: Office: +92-519062206 Cell: 03335751475								
Experience	<u>PROFESSIONAL EXPERIENCE:</u> 1.Associate Professor (2006-2010): Served in Department of Entomology, PMAS-Arid Agriculture University, Rawalpindi, Pakistan. 2.Assistant Professor (2001-2005): Served as Assistant Professor, Department of Entomology, University of Arid Agriculture, Rawalpindi. 3.Lecturer (1998-2001): Served as Lecturer, Department of Entomology, University of Arid Agriculture, Rawalpindi..								
Honor and Awards	1. Higher Education Commission One year Postdoctorate Fellowship from Feb. 2004 to Feb. 2005 in United Kingdom 2. Pakistan Ministry of Education Three years postgraduate foreign scholarship for Ph.D. in United Kingdom 3. Pakistan Ministry of Education Two years scholarship for M.Sc.(Hons). UAF. Pakistan								
Membership	Hold memberships of the following Organisation and Societies <table border="0"> <tr> <td>1992-97</td><td>Agroforestry Research Group, UK</td></tr> <tr> <td>1993-97</td><td>Pakistan Overseas Society, England</td></tr> <tr> <td>1994-95</td><td>International Student Organisation, Leeds</td></tr> <tr> <td>2002 to date</td><td>The Agrics, Alumni Association, UAF.</td></tr> </table>	1992-97	Agroforestry Research Group, UK	1993-97	Pakistan Overseas Society, England	1994-95	International Student Organisation, Leeds	2002 to date	The Agrics, Alumni Association, UAF.
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1993-97	Pakistan Overseas Society, England								
1994-95	International Student Organisation, Leeds								
2002 to date	The Agrics, Alumni Association, UAF.								

	MEMBERSHIP OF VARIOUS COMMITTEES OF THE UNIVERSITY:				
	S/#	Name of the Committee			Served as
	1	Tour Coordinator			Convener
	2	Time table and Date sheet Committee			Convener
	3	Comprehensive (Written & Oral) Examination Committee, Dept. Zoology, Dept. Wild life			Member
	4	Applications Scrutiny Committee for admission to B.Sc.(Hons.) Agri.			Member
	5	Scrutiny of Synopsis and Thesis, Department of Sociology and Anthropology			Member
	6	Quality control			Member
Graduate Students Postdocs Undergraduate Students Honour Students	<u>STATUS FOR M.Sc.(Hons.) STUDENTS UNDER MY SUPERVISION</u>				
	(a) Department of Entomology				
	S.No.	Name	Year	Title	Status
	1	Sharafat Ali. (94-arid-172)	2000	The Responses of Aphid Spp. On Different Varieties of Brassica Crops.	Completed
	2	Nazar Iqbal. (95-arid-14)	2001	The Responses of the Population Density of Insect Pests of Maize (<i>Zea mays</i> L.) in Relation to Different Fertility Regimes Using NPK, FYM and EM-Compost.	Completed
	3	Shakeel Ahmed (96-arid-49)	2002	Population Dynamics And Distribution of Wheat Aphids And Their Natural Enemies	Completed
	4	Irfan Ahmed (00-arid-354)	2004	Development of the Cereal Bait Formulations for the Lesser Bandicoot Rat, <i>Bandicota bengalensis</i> (Gray).	Completed
	5	Waqas Abdullah (00-arid-819)	2006	Interrelationship of Cereal Aphids and their Natural Enemies on Wheat.	Completed
	6	Abrar A.Mohsin (04-arid-234)	2006	Bionomics of Rose Aphids and their Natural Enemies	Completed

	7	Imran Abbas (00-arid-768)	2008	Comparative study of parasitoids attacking aphids on wheat and Brassica	Completed
	<u>STATUS FOR Ph.D. STUDENTS UNDER MY SUPERVISION</u>				
	S.No.	Name	Year	Title	Status
	1	Ahmad Zia (98-arid-889)		Biosystematics of Damselflies (Zygoptera:Odonata) of Pakistan	In progress
	2	Imran Bodla (98-arid-778)		Biosystematics of aphid parasitoids from Punjab Province of Pakistan	In progress
	3	Mubashar Hassan (05-arid-26)		Investigations on adaptability of some silkworm lines to adverse temp. and humidity for seed cocoon production	In progress
	4	Abdul Sattar (08-arid-772)		Ecology and management of Termites in Urban environment (Islamabad)	In progress
	5	Anwaar Hyder Khan Alvi (08-arid-02)		Role of Nucleopolyhedrovirus in the Management of Chickpea pod borer (Helicoverpa armigera Hubner)	In progress
	6	Asia Riaz (93-ag/arid-347)		Relative efficacy of potent biocontrol agents of Earias vitella (FAB.)	In progress
	Member of M.Sc.(Hons.) Students (15 Students) Member for Ph.D. Students (07 Students)				
Service Activity	<u>Termite treatment, Household insect management in University</u>				
Brief Statement of Research Interest	<u>Insect biosystematics and ecology</u>				

Publications	1. Naeem, M. and M. Yousuf. (1999). Taxonomy of Amorphoscelidae, Empusidae, Hymenopodidae and Eremiaphilidae (Mantodea: Dictyoptera) from Punjab Province (Pakistan). <i>Pakistan Entomologist's</i>. 21(1-2). 33-38. 2. Naeem, M. and S.G. Compton, (2000). Population Dynamics of Filbert aphid, <i>Myzocallis coryli</i> (Goetze) on Hazel bushes to an Agroforestry System. <i>Pakistan Journal of Biological Sciences</i>. V. 3(2). 306-308. 3. Naeem, M. Samina, A. Sartaj and T. Mehmood. (2000). Diversity of Soil Fauna in Hedges, Cultivated and Uncultivated Field Areas. <i>Pakistan Journal of Arid Agriculture</i> : 3(1-2): 27-32. 4. Ali, S. M. Naeem and Ehsan ul Haq. (2000). Evaluation of Cabbage Aphid, <i>Brevicoryne brassicae</i> (L.) on Different Varieties of Rapeseed Mustard Crop under Field Conditions. <i>Pakistan Journal of Biological Sciences</i>. 3(6):991-992. 5. Naeem, M. and M. Yousuf. (2000). Bisystematics of Mantidae (Mantodea: Dictyoptera) from Punjab, Pakistan. <i>Pakistan Entomologists</i>. 22(1-2):111-115. 6. Latif, M. S. T. Alam and M. Naeem. (2001). Comparative Efficacy of Different Insecticides Against Whitefly <i>Bemisia tabaci</i> (Genn) on Two Cotton Varieties. <i>Online Journal of Biological Sciences</i> 1(6):480-482. 7. Sartaj, A. Naeem, M. Samina and Mahmood T. (2001). Preference of Wheat and Maize by <i>Tribolium castaneum</i> (Herbst) Under Laboratory Conditions. <i>Pakistan Journal of Arid Agriculture</i> 4(1-2): 85-89. 8. Bostan N. and M. Naeem. (2002). Evaluation of Resistance in Some Wheat Cultivars to <i>Tribolium castaneum</i> (Herbst) under Laboratory Conditions. <i>Asian Journal of Plant Sciences</i>. 1(2): 95-98. 9. Naeem M., S. Ahmed and M. Latif. (2002). Effect of Orchard on the Spread of Cotton Leaf Curl Viral Disease. <i>Asian Journal of Plant Sciences</i>. 1(2): 99-100. 10. Naeem M., S. Compton and L.D. Incoll. (2002). Population Trends of Barley-feeding Aphids and Their Parasitoids to an Agroforestry Environment. <i>Pakistan Journal of Arid Agriculture</i>. 5(2): 43-52.
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11. Compton SGA and M. Naeem (2005) Dispersal and Landing of Insects in silvoarable agroforestry: Implications for Better Pest Management. Proceeding of International Workshop of Sanitary and Phytosanitary Measures. 81-88pp. UAAR.
12. Mahmood K and M. Naeem (2006) Observation on animal behavior before and after earthquake in District Bagh, Azad Jammu and Kashmir. Abstracts: 26th Pakistan Congress of Zoology (International). University of the Punjab, Lahore. 83-84.

International

13. Incoll, L.D., D.T. Corry, C. Wright, D. Hardy, S.G. Compton, M. Naeem, D. Phillip and J. Griffiths. (1994). Silvoarable experiment with quality timber production hedges. *Agroforestry Forum*, 5(1):22-23, University of Wales, Bangor. UK.
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21. Naeem, M., W. Wakil and N. Iqbal. (2005). Effects of inorganic fertilizers farm yard manure and effective microorganism compost on corn leaf aphid. *Rhopalosiphum maidis* fitch. and their predators. *Bangladesh Journal of Agriculture Research*. 30(1): 1-7.

	<u>CONFERENCES /PROCEEDING</u>					
	1	2007	M. Naeem and I. Bodla	Biosystematics of <i>Tribolium castaneum</i> (Herbst).	Proceedings of training workshop on “Controlled and modified atmospheres to preserve post harvest quality of stored grains”	
	2	2006	Mahmood K and M. Naeem	Observation on animal behavior before and after earthquake in District Bagh, Azad Jammu and Kashmir. (Abstracts)	26 th Pakistan Congress of Zoology (International). University of the Punjab, Lahore	
	3	2005	Compton SGA and M. Naeem	Dispersal and Landing of Insects in silvoarable agroforestry: Implications for Better Pest Management	Proceeding of International Workshop of Sanitary and Phytosanitary Measures	
Research Grants and Contracts	<u>HEC FUNDED PROJECT</u> 1. Project No. 20-305/R&D Project Title “ Biosystematics of Odonata of Pakistan” Worked as Principle Investigator (Completed with National & International publications in 2008)					
Other Research or Creative Accomplishments	Three species of aphid parasitoids new to science					
Selected Professional Presentations						

CRITERION 7: INSTITUTIONAL FACILITIES

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

The faculty has access to e-library which is very helpful for the high quality education and producing research of international standard. They also have access to the internet. However the department lacks facilities as mentioned below:

- Majority of the faculty members do not have access to the PCs as department have only three Computers provided by the university.
- No registered softwares of computer programmes are available to be installed at departmental level.
- Registered antivirus software is immediately required.
- Registered versions of Microsoft Windows, Office XP, Adobe reader, writer are required.
- A printer with in built scanner and fax facility is urgently needed by the department.

Standard- 7.2: The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel

The University Central Library has very limited number of books, journals and periodicals. It's a small library in term of space and facilities with no catalogue systems. It does not meet the standards of a University Library. Department itself is developing its own library. It needs funds allocation to establish a well equipped library at departmental level.

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

Currently the class rooms are not enough and the space is not only limited but some basic facilities are lacking. Multimedia are not available for the lecture halls. Practical lab space is also not meeting the needs which affect the quality of teaching. Although at present offices for the faculty are sufficient, yet on the return of the remaining faculty, we will face severe problem regarding shortages of offices for the staff.

CRITERION 8: INSTITUTIONAL SUPPORT

The university administration has been striving to strengthen all the departments and up-gradation of departments and establishing new Faculties and Institutes. The university is also trying to attract highly qualified faculty members. Currently, the university has launched tenure track system which would be helpful in pooling up better human recourses as faculty members.

Standard 8-1: There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars

At present department is having inadequate financial resource to meet the present needs for a better education system. Individual research grants for students and faculty are mainly supporting the departmental research activities. Keeping in view the awful need for increasing the financial resources to establish a library, laboratories and computer facilities, tThe HEC has approved a project for strengthening the department. This project will prove beneficial in improving the quality of education and research.

Standard 8-2: There must be an adequate number of high quality Ph.D. students.

Ph.D. admission is usually offered in each semester.

RESEARCH STUDENTS REVIEW

Proforma 4 was used to conduct survey to review the progress of Ph.D scholars. General inferences are drawn hereunder.

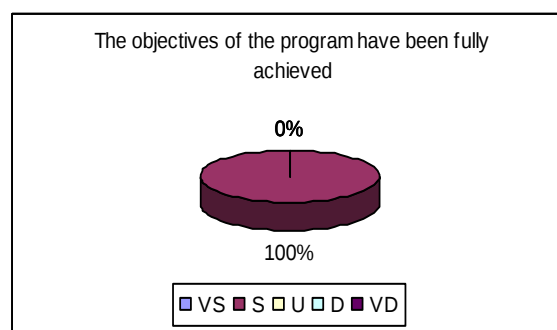
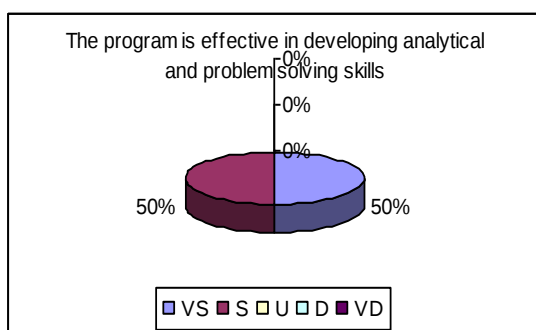
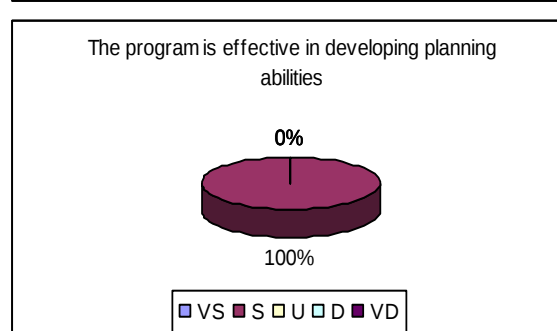
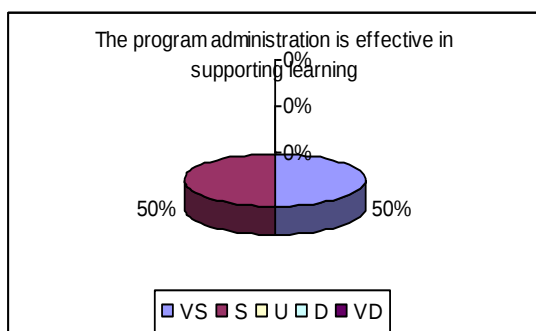
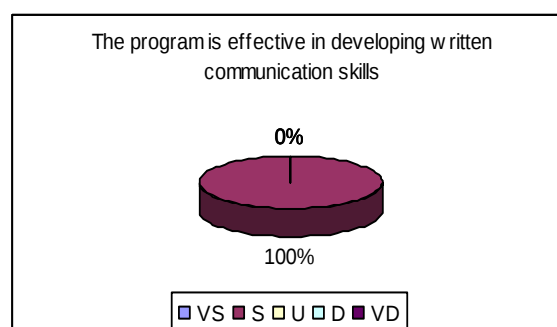
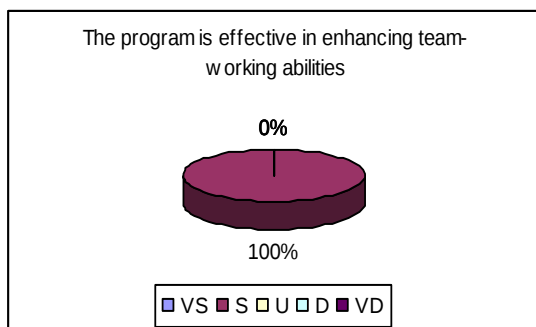
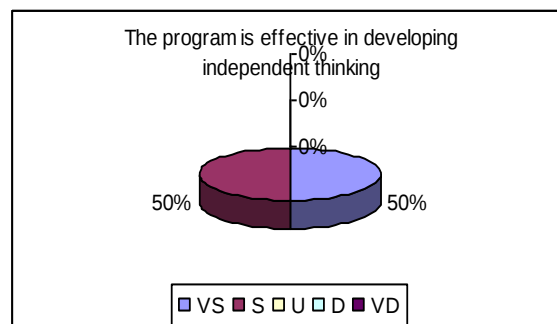
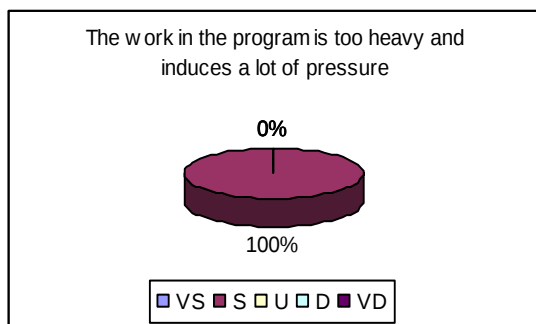
- Majority of the scholars were found satisfied with the level of supervision maintained at department.
- The scholars had access to the available sophisticated equipments through a well managgemed system.
- The scholars have access to scientific literature through central laboratory.

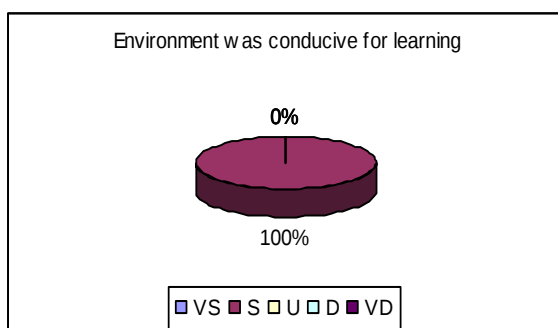
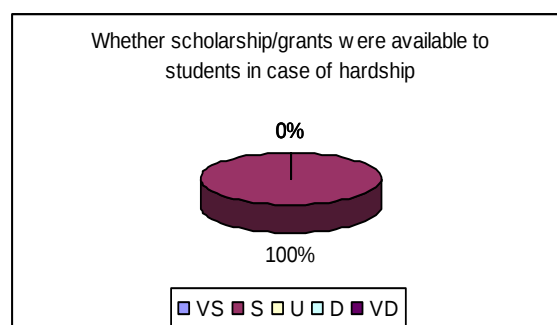
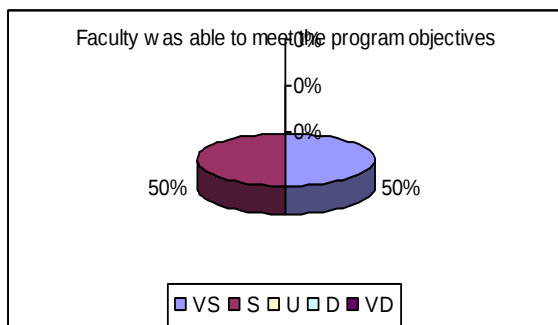
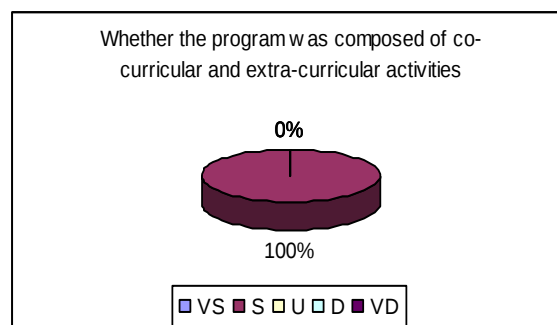
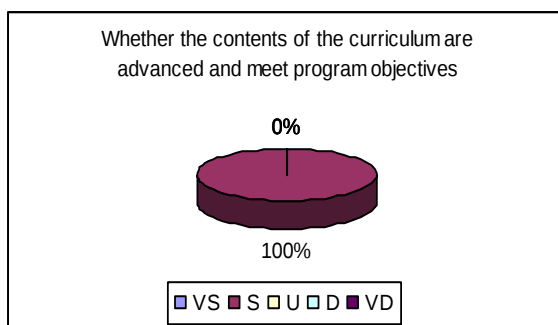
- Some scholars have requested for the provision of computers or their research work.
- Some scholars argued that equipments relating molecular and biochemical techniques should be made available in the department to carry out biochemical analysis of cereals, toxicological study of insecticides and biosystematics study of insects.

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

Although administration provides adequate financial resources, yet there is need to increase budget to carry out advance level research.

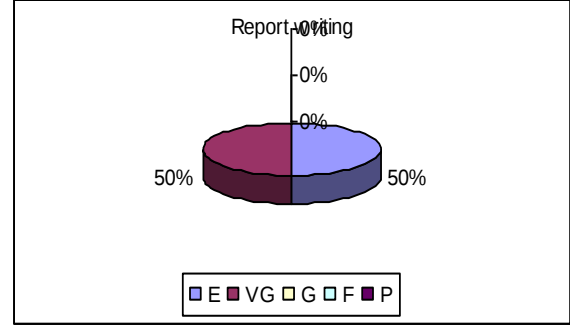
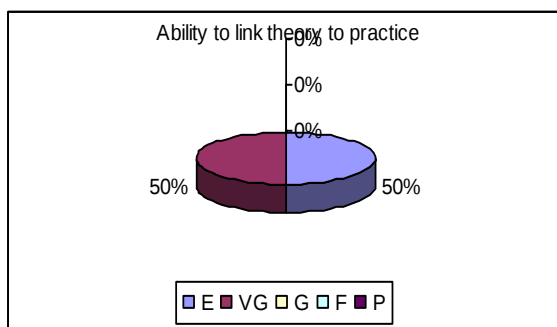
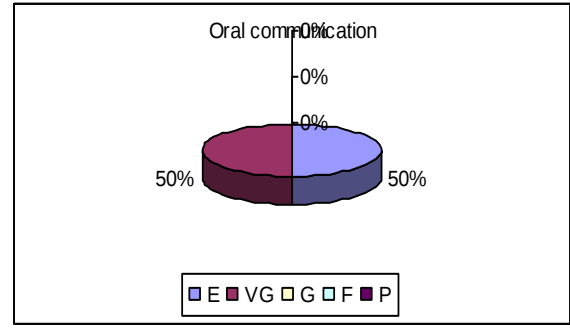
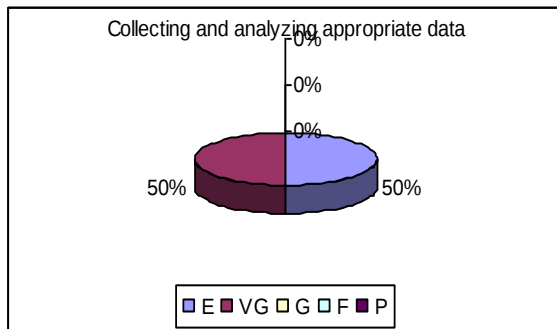
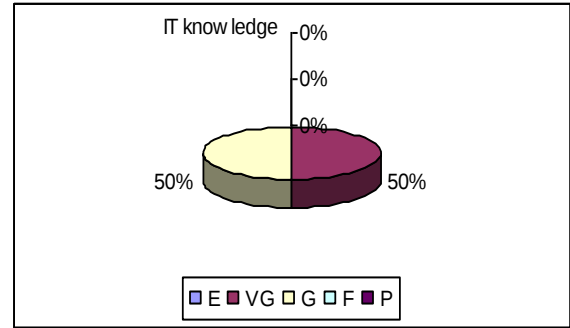
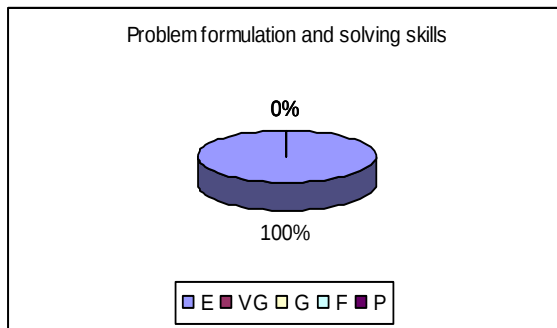
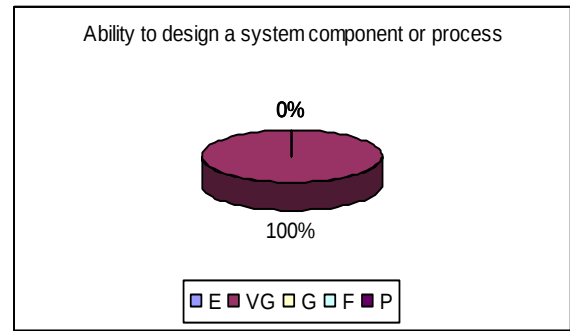
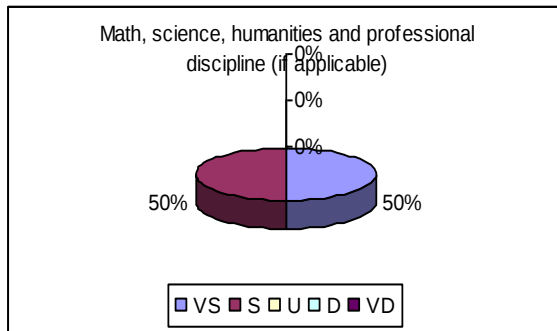
Survey of Graduating Students

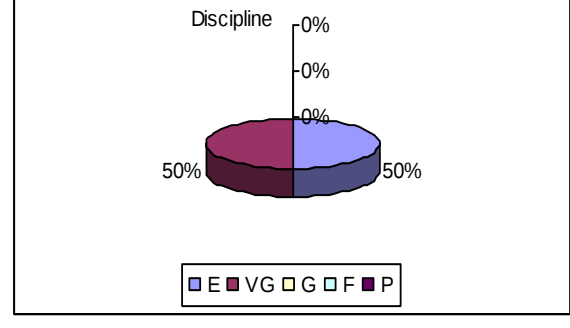
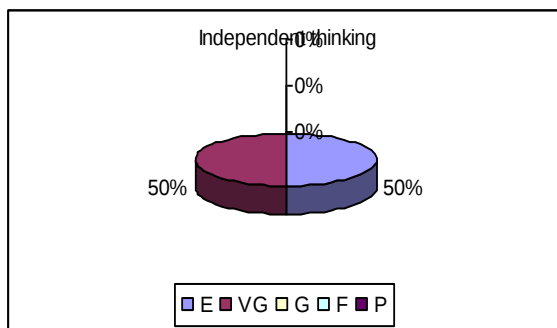
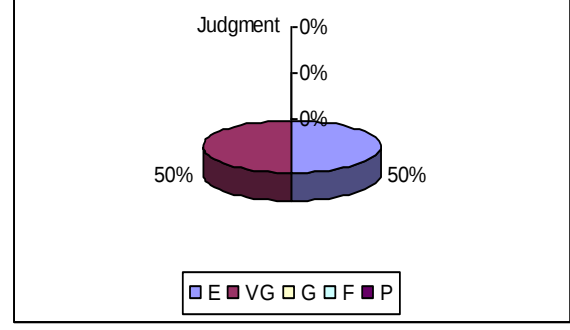
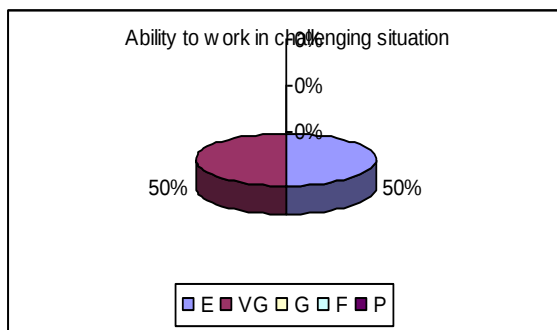
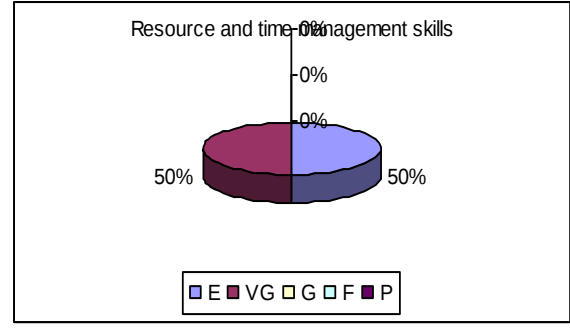
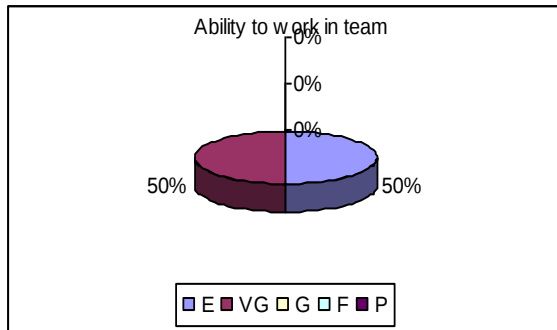
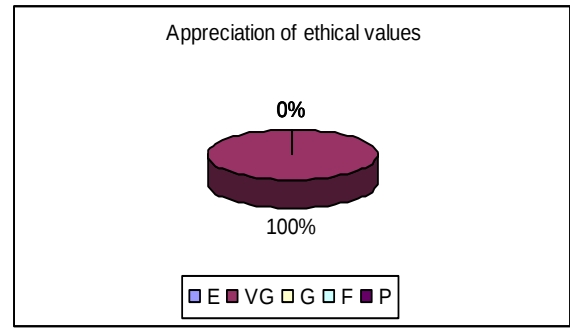
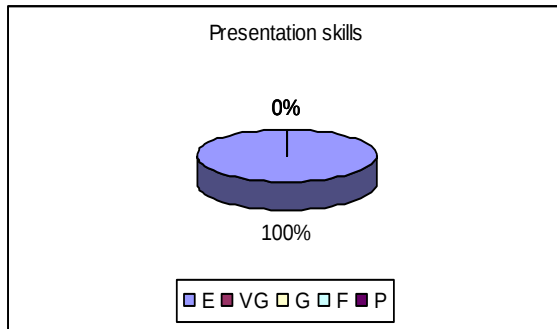




Survey of graduating students stresses more emphasis on incorporation of latest technologies for better transfer of information, training and knowledge. They also required planning abilities through research and curriculum for achievement of results. Environment of teaching and research was found satisfactory, however, more infrastructure of the department and grants or scholarships of students were required in case of hardships faced during their study.

Alumni Survey





Survey of alumni highlighted the need of up-to-date knowledge incorporating IT skills, better oral and report writing skills, ability to work under stress and face deadlines for better job opportunities and survival for the graduating students. They also stresses for better time management, judgement and disciplined life of the studens.

Summary and Conclusion

Department of Entomology presently has four PhD faculty members and two are HEC approved supervisors for PhD studies. PhD students are working on different theoretical, logical and applied aspects of entomology. Works include taxonomic, cottage industry of entomology, host plant resistance and molecular aspects of entomological problems linked to betterment of society. Strengthening of department is also helping to improve the infrastructure, laboratories and other facilities required for education transmission facilities. These facilities have improved the status and research vision of the registered PhD scholars.

Four laboratories for Biosystematics, Stored Product Entomology, Biological Control and Insect Toxicology has been established with advanced equipments and controlled environmental conditions for effective and long lasting experiments. Facilities of advanced microscopy, growth chamber, testing devices for effects of stored product insect pests, high performance liquid chromatography with adequate supply of respective chemicals and their glassware served as sources for better research and experimentation.

Data regarding the course and teacher evaluation of the selected PhD course for this report revealed effective transmission of educational material, communication skills and suitable environment with resources revealed improvement of interaction between student-teacher. PhD students have performed well in their studies and teacher has improved by performing in teaching, research and transmission of applied knowledge to common public like help in control of termite under urban and rural environments. Computers have been provided to PhD students in laboratories for their effective search of scientific materials and synopsis, thesis, research articles etc. This has helped to improve their efficiency and saved time. Availability of funds for purchase of miscellaneous items for research work are also provided by the University as well as through project and scholarships for their better research work and improved outputs for the society. The teacher improved the course according to the need of the time. Information collected from the alumni and graduating students required better time management, judgement and disciplined training of the graduating students. They also demanded to stress more on IT based communication and interpersonal skills to meet the challenges the coming problems in the market place for better job opportunities.

Development of honey bee research station at Koont Farm will also be in application to do practical and field-oriented research for farmers to provide learning opportunities in bee farming. Many research aspects can be carried out from establishment of year-round rearing of fertile and healthy queens to low cost management of their pests like mites, ants, hornets etc. These and many other aspects are under great concern to the present growers for year-round breeding of commercial bee farming.

Annexure -1

Proforma - 1

Student Course Evaluation Questionnaire

(To be filled by each Student at the time of Course Completion)



Department _____ Course No _____
 Course Title _____ Teacher Name _____
 Year of Study _____ Semester / Term _____

Please give us your views so that Course quality can be improved. You are encouraged to be frank and constructive in your comments

CORE QUESTIONS

Course Content and Organization	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. The course objectives were clear	☐	☐	☐	☐	☐
2. The Course workload was manageable	☐	☐	☐	☐	☐
3. The Course was well organized (e.g. timely access to materials, notification of changes, etc.)	☐	☐	☐	☐	☐
4. Comments					

Student Contribution	☐ <20%	☐ 21-40%	☐ 41-60%	☐ 61-80%	☐ >81%
	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
5. Approximate level of your own attendance during the whole Course					
6. I participated actively in the Course	☐	☐	☐	☐	☐
7. I think I have made progress in this Course	☐	☐	☐	☐	☐
8. Comments					

Learning Environment and Teaching Methods	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
9. I think the Course was well structured to achieve the learning outcomes (there was a good balance of lectures, tutorials, practical etc.)	☐	☐	☐	☐	☐
10. The learning and teaching methods encouraged participation.	☐	☐	☐	☐	☐
11. The overall environment in the class was conducive to learning.	☐	☐	☐	☐	☐
12. Classrooms were satisfactory	☐	☐	☐	☐	☐
13. Comments					

Learning Resources	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
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	☐	☐	☐	☐	☐
17. The provision of learning resources on the Web was adequate and appropriate (if relevant)	☐	☐	☐	☐	☐
18 Comments					

Quality of Delivery	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
19. The Course stimulated my interest and thought on the subject area	☐	☐	☐	☐	☐
20. The pace of the Course was appropriate	☐	☐	☐	☐	☐
21. Ideas and concepts were presented clearly	☐	☐	☐	☐	☐
22. Comments					

Assessment	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
23. The method of assessment were reasonable	☐	☐	☐	☐	☐
24. Feedback on assessment was timely	☐	☐	☐	☐	☐
25. Feedback on assessment was helpful	☐	☐	☐	☐	☐
26. Comments					

Additional Core Questions

Instructor / Teaching Assistant Evaluation	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
27. I understood the lectures	☐	☐	☐	☐	☐
28. The material was well organized and presented	☐	☐	☐	☐	☐
29. The instructor was responsive to student needs and problems	☐	☐	☐	☐	☐
30. Had the instructor been regular throughout the course?	☐	☐	☐	☐	☐

Tutorial	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
30. The material in the tutorials was useful	☐	☐	☐	☐	☐
31. I was happy with the amount of work needed for tutorials	☐	☐	☐	☐	☐
32. The tutor dealt effectively with my problems	☐	☐	☐	☐	☐

Practical	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
33. The material in the practicals was useful	☐	☐	☐	☐	☐
34. The demonstrators dealt effectively with my problems.	☐	☐	☐	☐	☐

Overall Evaluation

35. The best features of the Course were:

36. The Course could have been improved by:

Equal Opportunities Monitoring (Optional)

37. The University does not tolerate discrimination on any irrelevant distinction (e.g. race, age, gender) and is committed to work with diversity in a wholly positive way. Please indicate below anything in relation to this Course which may run counter to this objective:

Demographic Information: (Optional)

38. Full/part time study: Full Time ☐ Part Time ☐
39. Do you consider yourself to be disabled: Yes ☐ No ☐
40. Domicile:
41. Gender: Male ☐ Female ☐
42. Age Group: less than 22 ☐ 22-29 ☐ over 29 ☐
43. Campus: Distance Learning/ Collaborative ☐

THANK YOU

Annexure -2

Proforma 2

Faculty Course Review Report

(To be filled by each teacher at the time of Course Completion)



For completion by the course instructor and transmission to Head of Department of his/her nominee (Dept. Quality Officer) together with copies of the Course Syllabus outline

Department:		Faculty:	
Course Code:		Title:	
Session:		Semester:	Autumn ☐ Spring ☐ Summer ☐
Credit Value:		Level:	Prerequisites:
Name of Course Instructor:		No. of Students Contact Hours	Lectures
			Seminars
Assessment Methods: give precise details (no & length of assignments, exams, weightings etc)			

Distribution of Grade/Marks and other Outcomes: (adopt the grading system as required)

Undergraduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	F	No Grade	Withdrawal	Total
No. of Students										
Post-Graduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	No Grade	Withdrawal	Total	
No. of Students										

Overview/Evaluation (Course Co-coordinator's Comments)

Feedback: first summarize, then comment on feedback received from:
(These boxes will expand as you type in your answer.)

1) Student (Course Evaluation) Questionnaires

2) External Examiners or Moderators (if any)

3) Student /staff Consultative Committee (SSCC) or equivalent, (if any)

4) Curriculum: comment on the continuing appropriateness of the Course curriculum in relation to the intended learning outcomes (course objectives) and its compliance with the HEC Approved / Revised National Curriculum Guidelines

5) Assessment: comment on the continuing effectiveness of method(s) of assessment in relation to the intended learning outcomes (Course objectives)

6) Enhancement: comment on the implementation of changes proposed in earlier Faculty Course Review Reports

7) Outline any changes in the future delivery or structure of the Course that this semester/term's experience may prompt

Name: _____ Date: _____
(Course Instructor)

Name: _____ Date: _____
(Head of Department)



Survey of Graduating Students

(To be filled out by graduating students in last semester/year before the award of degree)

The survey seeks graduating students' input on the quality of education they received in their program and the level of preparation they had at university. The purpose of this survey is to assess the quality of the academic programs. We seek your help in completing this survey.

A: Very satisfied B: Satisfied C: Uncertain D: Dissatisfied E: Very dissatisfied

1. The work in the program is too heavy and induces a lot of pressure.
A B C D E
2. The program is effective in enhancing team-working abilities.
A B C D E
3. The program administration is effective in supporting learning.
A B C D E
4. The program is effective in developing analytical and problem solving skills.
A B C D E
5. The program is effective in developing independent thinking.
A B C D E
6. The program is effective in developing written communication skills.
A B C D E
7. The program is effective in developing planning abilities.
A B C D E
8. The objectives of the program have been fully achieved.
A B C D E
9. Whether the contents of curriculum are advanced and meet program objectives.
A B C D E
10. Faculty was able to meet the program objectives.
A B C D E

11. Environment was conducive for learning
- | | | | | |
|---|---|---|---|---|
| A | B | C | D | E |
|---|---|---|---|---|
12. Whether the Infrastructure of the department was good.
- | | | | | |
|---|---|---|---|---|
| A | B | C | D | E |
|---|---|---|---|---|
13. Whether the program was comprised of Co-curricular and extra-curricular activities
- | | | | | |
|---|---|---|---|---|
| A | B | C | D | E |
|---|---|---|---|---|
14. Whether scholarships/ grants were available to students in case of hardship
- | | | | | |
|---|---|---|---|---|
| A | B | C | D | E |
|---|---|---|---|---|

Answer question 9 if applicable.

9. The internship experience is effective in enhancing
- | | | | | | | |
|----|--------------------------------------|-----|-----|-----|-----|-----|
| a. | Ability to work in teams | (A) | (B) | (C) | (D) | (E) |
| b. | Independent thinking | (A) | (B) | (C) | (D) | (E) |
| c. | Appreciation of ethical Values | (A) | (B) | (C) | (D) | (E) |
| d. | Professional development | (A) | (B) | (C) | (D) | (E) |
| e. | Time management skills | (A) | (B) | (C) | (D) | (E) |
| f. | Judgment | (A) | (B) | (C) | (D) | (E) |
| g. | Discipline | (A) | (B) | (C) | (D) | (E) |
| h. | The link between theory and practice | (A) | (B) | (C) | (D) | (E) |

10. What are the best aspects of your program?

11. What aspects of your program could be improved?

You may use additional sheets for questions 10 & 11 if needed.

Annexure -4

Proforma 4

RESEARCH STUDENT PROGRESS REVIEW FORM



(To be filled out by Master/ M.Phil / Ph.D Research Students on six monthly basis)

To be submitted by the HoD / Dept. Quality Officer to the QEC

For Research Student to Complete:

1. Date of admission to the department
2. Date of initiation of research
3. Date of completion of Course work
4. Number of credit hours completed
5. Date of Synopsis Defense
6. Cumulative Grade Point Average (CGPA) secured
7. Please outline details of progress in your research since your last review (including any research publications):
8. Do you have any comments on the level of supervision received?
9. What do you plan to achieve over the next 6 months?
10. Do you have any comments on generic or subject-specialist training you may have received or would like to receive internally and / or externally?
11. Do you have easy access to sophisticated scientific equipment?
12. Do you have sufficient research material / commodities available?

Student _____

Date: _____

Supervisory Committee Comments

(Please comment on and benchmark the student's progress against your University's internal and external HEC Quality Criteria for Master/PhD/MPhil Studies)

Principal Supervisor: _____

Date: _____

Co-Supervisor: _____

Date: _____

Co-Supervisor: _____

Date: _____

Head of Department Comments:

Signature: _____

Date: _____

Director, Board of Research Studies (or equivalent) Comments:

Signature: _____

Date: _____

Dean/Director, QEC Action: (including monitoring of Follow-up action) Date: _____



Annexure -5
Proforma 5

Faculty Survey

(To be submitted on annual basis by each faculty member)

The Purpose of this survey is to assess faculty members' satisfaction level and the effectiveness of programs in place to help them progress and excel in their profession. We seek your help in completing this survey and the information provided will be kept in confidence. Indicate how satisfied are you with each of the following aspects of you situation at your department?

A: Very satisfied B: Satisfied C: Uncertain D: Dissatisfied E: Very dissatisfied.

- | | | | | | |
|-----|--|---|---|---|---|
| 1. | Your mix of research, teaching and community service. | | | | |
| | A | B | C | D | E |
| 2. | The intellectual stimulation of your work. | | | | |
| | A | B | C | D | E |
| 3. | Type of teaching / research you currently do. | | | | |
| | A | B | C | D | E |
| 4. | Your interaction with students. | | | | |
| | A | B | C | D | E |
| 5. | Cooperation you receive from colleagues. | | | | |
| | A | B | C | D | E |
| 6. | The mentoring available to you. | | | | |
| | A | B | C | D | E |
| 7. | Administrative support from the department. | | | | |
| | A | B | C | D | E |
| 8. | Providing clarity about the faculty promotion process. | | | | |
| | A | B | C | D | E |
| 9. | Your prospects for advancement and progress through ranks. | | | | |
| | A | B | C | D | E |
| 10. | Salary and compensation package. | | | | |
| | A | B | C | D | E |

11. Job security and stability at the department.

A B C D E

12. Amount of time you have for yourself and family.

A B C D E

13. The overall climate at the department.

A B C D E

14. Whether the department is utilizing your experience and knowledge

A B C D E

15. What are the best programs / factors currently available in your department that enhance your motivation and job satisfaction:

16. Suggest programs / factors that could improve your motivation and job satisfaction?

Information about faculty member

i. Academic rank:

A: Professor B: Associate Professor C: Assistant Professor D: Lecturer
E: Other

ii. Years of service:

A: 1-5 B: 6-10 C: 11-15 D: 16-20 E: ≥20

Name: _____ Signature: _____ Date: _____



Annexure -6

Proforma 6

SURVEY OF DEPARTMENT OFFERING Ph.D. PROGRAMS

The following information is required for EACH Department in which a Ph.D. program is offered.

1	General Information:	
1.1	Name of Department	
1.2	Name of Faculty	
1.3	Date of initiation of Ph.D. program	
1.4	Total number of academic journals subscribed in area relevant to Ph.D. program.	
1.5	Number of Computers available per Ph.D. student	
1.6	Total Internet Bandwidth available to all the students in the Department.	
2	Faculty Resources:	
2.1	Number of faculty members holding Ph.D. degree in the department.	
2.2	Number of HEC approved Ph.D. Advisors in the department.	
3	Research Output:	
3.1	Total number of articles published last year in International Academic Journals that are authored by faculty members and students in the department.	
3.2	Total number of articles published last year in Asian Academic Journals that are authored by faculty members and students in the department.	
3.3	Total number of ongoing research projects in the department funded by different organizations	
3.4	Number of post-graduate students in the department holding scholarships/fellowships.	
3.5	Total Research Funds available to the Department from all sources.	
3.6	Number of active international linkages involving exchange of researchers/students/faculty etc. (Attach Details).	

4	Student Information:	
4.1	Number of Ph.D. degrees conferred to date to students from the Department during the past three academic years.	
4.2	Number of Ph.D. students currently enrolled in the department.	
4.3	Ratio of number of students accepted to total number of applicants for Ph.D. Program.	
5	Program Information	
5.1	Entrance requirements into Ph.D. Program (M.Sc. / M.Phil.) Indicate subjects or M.Sc. / M.Phil.	
5.2	Is your Ph.D. program based on research only? (Y/N)	
5.3	Maximum number of years in which a Ph.D. degree has to be completed after initial date of enrollment in Ph.D. program.	
5.4	Total number of post M.Sc. (16 year equivalent) courses required for Ph.D.	
5.5	Total number of M.Phil. level courses taught on average in a Term / Semester.	
5.6	Total number of Ph.D. level courses taught on average in a Term / Semester.	
5.7	Do your students have to take/write:	
	a. Ph.D. Qualifying examination (Y/N)	
	b. Comprehensive examination (Y/N)	
	c. Research paper in HEC approved Journal	
	d. Any other examination (Y/N)	
5.8	Total number of International examiners to which the Ph.D. dissertation is sent.	
5.9	How is the selection of an examiner from technologically advanced countries carried out?	
5.10	Is there a minimum residency requirement (on campus) for award of Ph.D. degree?	
6	Additional Information	
6.1	Any other information that you would like to provide.	



Employer Survey

(To be filled in by Employer - after the completion of each academic year)

The purpose of this survey is to obtain employers' input on the quality of education University of Arid Agriculture, Rawalpindi is providing and to assess the quality of the academic program. The survey is with regard to University of _____ graduates employed at your organization. We seek your help in completing this survey.

A: Excellent

B: Very good

C: Good

D: Fair

E: Poor

I. Knowledge.

1. Math, Science, Humanities and professional discipline, (if applicable)

(A) (B) (C) (D) (E)

2. Problem formulation and solving skills

(A) (B) (C) (D) (E)

3. Collecting and analyzing appropriate data

(A) (B) (C) (D) (E)

4. Ability to link theory to Practice

(A) (B) (C) (D) (E)

5. Ability to design a system component or process

(A) (B) (C) (D) (E)

6. Computer knowledge.

(A) (B) (C) (D) (E)

II. Communication Skills

1. Oral communication

(A) (B) (C) (D) (E)

2. Report writing

(A) (B) (C) (D) (E)

3. Presentation skills

(A) (B) (C) (D) (E)

III. Interpersonal Skills

1. Ability to work in teams

(A) (B) (C) (D) (E)

2. Leadership

(A) (B) (C) (D) (E)

3. Independent thinking

(A) (B) (C) (D) (E)

4. Motivation

(A) (B) (C) (D) (E)

5. Reliability

(A) (B) (C) (D) (E)

6. Appreciation of ethical values

(A) (B) (C) (D) (E)

IV. Work skills

1. Time management skills

(A) (B) (C) (D) (E)

2. Judgment

(A) (B) (C) (D) (E)

3. Discipline

(A) (B) (C) (D) (E)

V. General Comments

Please make any additional comments or suggestions, which you think would help strengthen our programs for the preparation of graduates who will enter your field. Did you know as to what to expect from graduates?

This image shows a blank sheet of white paper with horizontal black ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slightly textured appearance.

VI Information About Organization

1. **Organization Name**_____
2. **Type of Business**_____
3. **Number of Graduates (specify the program) in your Organization:**

Annexure -8



Proforma 9

Faculty Resume

Name							
Personal	<i>May include address(s) and phone number(s) and other personal information that the candidate feels is pertinent.</i>						
Experience	List current appointment first, each entry as follows: <i>Date, Title, Institution.</i>						
Honor and Awards	List honors or awards for scholarship or professional activity.						
Memberships	<i>List memberships in professional and learned Societies, indicating offices held, committees, or other specific assignments.</i>						
Graduate Students Postdocs Undergraduate Students Honour Students	<i>List supervision of graduate students, postdocs and undergraduate honors theses showing:</i> <table border="0"> <thead> <tr> <th>Years</th><th>Degree</th><th>Name</th></tr> </thead> <tbody> <tr> <td colspan="3">Show other information as appropriate and list membership on graduate degree committees.</td> </tr> </tbody> </table>	Years	Degree	Name	Show other information as appropriate and list membership on graduate degree committees.		
Years	Degree	Name					
Show other information as appropriate and list membership on graduate degree committees.							
Service Activity	<i>List University and public service activities.</i>						

<i>Brief Statement of Research Interest</i>	<i>May be as brief as a sentence or contain additional details up to one page in length.</i>				
<i>Publications</i>	<i>List publications in standard bibliographic format with earliest date first.</i> ○ Manuscripts accepted for publication should be included under appropriate category as “in press;” ○ Segment the list under the following standard headings: ▪ Articles published by refereed journals. ▪ Books. ▪ Scholarly and / or creative activity published through a refereed electronic venue. ▪ Contribution to edited volumes. ▪ Papers published in refereed conference proceedings. ▪ Paper or extended abstracts published in conference proceedings. (refereed on the basis of abstract) ▪ Articles published in popular press. ▪ Articles appearing in in-house organs. ▪ Research reports submitted to sponsors. ▪ Articles published in non-refereed journals. ▪ Manuscripts submitted for publication. (include where and when submitted).				
<i>Research Grants and Contracts.</i>	<i>Entries should include:</i> <table><tr><td>Date</td><td>Title</td><td>Agency / Organization</td><td>Total Award Amount</td></tr></table> <i>Segment the list under following headings:</i> ▪ Completed ▪ Funded and in progress ▪ In review	Date	Title	Agency / Organization	Total Award Amount
Date	Title	Agency / Organization	Total Award Amount		
<i>Other Research or Creative Accomplishments</i>	<i>List patents, software, new products developed, etc.</i>				
<i>Selected Professional Presentations</i>					

Annexure -9



Proforma 10

Teacher Evaluation Form

(To be filled by the student)

Course Title and Number: _____

Name of Instructor: _____ Semester _____

Department: _____ Degree _____

Use the scale to answer the following questions below and make comments

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

Instructor:					
1. The Instructor is prepared for each class	A	B	C	D	E
2. The Instructor demonstrates knowledge of the subject	A	B	C	D	E
3. The Instructor has completed the whole course	A	B	C	D	E
4. The Instructor provides additional material apart from the textbook	A	B	C	D	E
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	A	B	C	D	E
6. The Instructor communicates the subject matter effectively	A	B	C	D	E
7. The Instructor shows respect towards students and encourages class participation	A	B	C	D	E
8. The Instructor maintains an environment that is conducive to learning	A	B	C	D	E
9. The Instructor arrives on time	A	B	C	D	E
10. The Instructor leaves on time	A	B	C	D	E
11. The Instructor is fair in examination	A	B	C	D	E
12. The Instructor returns the graded scripts etc. in a reasonable amount of time	A	B	C	D	E
13. The Instructor was available during the specified office hours and for after class consultations	A	B	C	D	E
14. Course:					
15. The Subject matter presented in the course has increased your knowledge of the subject	A	B	C	D	E
16. The syllabus clearly states course objectives requirements, procedures and grading criteria	A	B	C	D	E
17. The course integrates theoretical course concepts with real-world applications	A	B	C	D	E
18. The assignments and exams covered the materials presented in the course	A	B	C	D	E
19. The course material is modern and updated	A	B	C	D	E

Comments:

Instructor: _____

Course: _____

Annexure-X: Detailed Course Contents of Ph.D in Entomology

ENT-701 RESEARCH METHODS IN ENTOMOLOGY 4(1-6)

THEORY:

Introduction; techniques and apparatus employed in entomological research: temporary and permanent mounts, microtomy, use of camera lucida. micrometry and scientific photography; bio-assay for insecticide residues; use of Potter's tower, atomic absorption spectrophotometer, gas chromatography, high performance liquid chromatography, ultraviolet visual spectrophotometer, amino acid analyser, electrophoresis, ultra centrifugation, scanning and transmission, electron microscopy and computer software in entomology; methods of sampling, analysis of data and report writing.

PRACTICAL:

Insect collection apparatus and preservation techniques; rearing and culturing; exercises in microtomy, permanent slides, micrometry and scientific photography; maintenance and measurement of microclimate; use of different equipments in entomological experiments, sampling, tabulation, analysis and interpretation of data.

BOOKS RECOMMENDED:

1. Bancroft, J. D. and A. Stevens, 1990. Theory and practice of histological techniques. Chaschill Livingstone, London.
2. Blaker, A.A. 1977. Handbook for Scientific Photography. W.H. Freeman and Co., San Francisco-3, Erlich, H., 1992. PCR Technology: Principles and Applications for Amplification. W.H.
3. Freeman & Company, New York. Peterson, A. 1976. Kntomological Techniques. Edward Bros. Inc. Ann. Arbor. Michigan. U.S.A
4. Singh, P. & R.F. Moore, 1985. Handbook of Insect Rearing VoU & II, Hlsevier, U.S.A.
5. Smith, 1. 1960. Chromatographic and Electrophoretic Techniques William Heinemann Medical Books Ltd., London. Vol.1 (4"1 edition) XII.
6. Tonapai, G. T. 1994. Experimental Entomology - An aid to Laboratory and Field Studies. CBS Publishers and Distributors-Delhi, India.

ENT-702 ENVIRONMENTAL ENTOMOLOGY 2(2-0)

THEORY:

Introduction; diversity and stability of insects in different environments; interactions of various groups olinsects with biological, chemical and physical constituents of their environment; physical and chemical characterization of environmental contaminants, impact of pollutants on insects and

non-target organisms at different levels; biological responses to pollutants and biogeochemical cycles; insects as indicators of levels of pollution. Insects as environment cleaners and soil builders.

BOOKS RECOMMENDED:

1. Annual Review of Entomology, 1965 to date Palo Alto, California, Ann. Rev. Inc. U.S.A.
2. Anonymous, 1983, Agrochemical Fate in Food and Environment. Published by I.A.E.A-, Vienna.
3. McEwen, F.L. and G.L. Stephenson, 1979. The Use and Significance of Pesticides in the Environment. John Wiley and Sons Inc.- N.Y.
4. Perry, A.S. 1998. Insecticides in Agriculture and Environment: Retrospects and Prospects. Eljivier, "New York.

ENT 703 ADVANCED INSECT PHYSIOLOGY 3(2-2)

THEORY:

Introduction; advances in physiology of integument, growth, development, diapause, digestion, respiration, circulation, excretion, reproduction, reception and perception; neuromuscular physiology; physiology of locomotion and resistance; hormones, pheromones and light production.

PRACTICAL:

Hormonal control of insect growth, development and breaking of diapause; estimation of digestive enzymes. Oxygen consumption, carbon dioxide production and determination of respiratory quotient. Qualitative and quantitative analysis of haemocytes and free amino acids in haemolymph; determination and estimation of blood proteins, uric acid in excreta and water loss; pheromones as sex attractants; determination of visual, gustatory/olfactory responses and wing beat frequency.

BOOKS RECOMMENDED:

1. Agarwal, O.P., 1994. Perspectives in Entomological Research. Scientific Publishers, India.
2. Blum, M.S., 1985. Fundamentals of Insect Physiology. John Wiley and Sons, N.Y.
3. Chapman, R.F. 1982. The Insects; Structure and Function, 3rd ed. American Elsevier Publishing Co., Inc. N.Y.
4. Howse, P., 1. Stevens and O. Jones, 1998. Insect Pheromones and Their Use in Pest Management. Chapman and Hall, London.
5. Kerkut. G. A. and L. I. Gilbert. 1985. Comprehensive Insect Physiology, Biochemistry and Pharmacology, Vols. 1-12, Pergamon Press, Oxford, New York, Toronto, Sydney, Paris, Frankfurt.
6. Rockstein, M. (Ed.) year. Advances in Insect Physiology Vol. 1-todate. Academic Press, London, N.Y.
7. Tonapi, G.T., 1994. Hxperimental Entomology; An Aid to Laboratory and Field Study. CBS,

Publisher; India.

ENT-704 MICROANATOMY AND HISTOLOGY OF INSECTS 2(0-4)

PRACTICAL:

Use of microtome and other apparatus in the study of microanatomy and histology of insects. Fixation and fixatives. Nuclear and cytoplasmic stains. Preparation of temporary and permanent mounts of various body parts and study of histological structure.

BOOKS RECOMMENDED:

1. Gray, P. 1965. The Microtomists Formulary and Guide. The Blakiston Co., Inc. New York.
2. Smith, D.S. 1968. Insect cells, their structure and function. Olive and Boid, Edinburgh.
3. Tonapai, G. T. 1994. Experimental Entomology - An aid to Laboratory and Field Studies. CBS Publishers and Distributors-Delhi, India.

ENT-705 ADVANCED FOREST ENTOMOLOGY 3(2-2)

THEORY:

Ecological and behavioral aspects of forest insects and their management. Population dynamics of forest trees in relation to phytophagous insects. Monitoring pest populations damaging forest trees; defoliating, sap sucking, terminal, shoot, twig and phloem boring insects, wood boring insects and gall makers.

PRACTICAL:

Collection, preservation and identification of insect groups damaging forest plantations. Development of pest management systems for insects attacking forest trees.

BOOKS RECOMMENDED:

1. Coulson, R.N. and J.A. Witter. 1984. Forest Entomology. Ecology and Management. John Wiley and Sons, New York.
2. Barbosa, P. and M.R. Wagner. 1989. Introduction to Forest and Shade Tree Insects. Academic Press, New York.
3. Dent. D. 2000. Insect Pest Management. 2nd Ed. A.B.I. Publishing Co.
4. Thakur, M. L. 2000. Forest Entomology (Ecology and Management). S. A. 1. Publishing Co.

ENT-706 INSECTS OF MAN AND ANIMALS 3(2-2)

THEORY:

Scope of Medical Entomology. Insects and other arthropods of medical and veterinary importance., their biology and control measures. Management strategies for major insects attacking man and domestic animals. Important diseases of man and animals where insects act as vectors.

PRACTICAL:

Collection, identification and control of different arthropod pests in relation to the diseases of man and domestic animals.

BOOKS RECOMMENDED:

1. Metcalf, R.L. and W.H. Luckman. 1982. Introduction to Insect Pest Management. John Wiley and Sons, New York.
2. James, M.T. and R.F. Harwood. 1969. Herm's Medical Entomology. The Mcamillan Company, Collier Macmillan Limited, London.
3. Pedigo, L.P. 1996. Entomology and Pest Management. Prentice Hall Inc. N.J. 679pp.
4. Wall, R. and D. Shearer. 1997. Veterinary Entomology. Chapman and Hall. London.

ENT-707 CLASSIFICATION OF IMMATURE INSECTS 4(2-4)**THEORY:**

Introduction; collection and preservation of immature stages of insects; preparation of immature insects for identification; identification and classification of immature stages of Ephemeroptera, Plecoptera, Odonata, Diptera, Lepidoptera, Trichoptera, Hymenoptera, Neuroptera and Coleoptera up to family level.

PRACTICAL:

Collection, preservation, preparation and identification of immature stages up to family level.

BOOKS RECOMMENDED:

1. Chu, H.Y., 1983. How to know the Immature Insects. W.M.C. Brown Co., Publishers, Iowa, USA.
2. Peterson, A.R., 1960. Larvae of Insects, Part-1.1. 4th ed. Edwards Brothers Inc., Arbor, Michigan.
3. Peterson, A., 1962. Larvae of Insects, Part-1, 4th ed. Edwards Brothers Inc.; Arbor, Michigan.
4. Stehr, F., 1991. Immature Insects. Vol. I&II. Kendall - Hunt Publishing, U.S.A.

ENT-708 INSECT PEST MANAGEMENT SYSTEMS 3(2-2)**THEORY:**

The pest management concept. Ecological considerations for the collection of data for the management of pest populations. The economics of pest management. Pest management strategies for insects attacking different crops grown in barani tracts of Pakistan. Transgenic and genetically modified crops, insects growth regulators, allelopathy, remote sensing and other currents, development in suppressing insect pests.

PRACTICAL:

Estimation of losses done by insects to various crop plants. Demonstration of pest scouting techniques for insects attacking different crops grown in barani areas. Development of pest management systems for key pests of major crops.

BOOKS RECOMMENDED:

1. Dent, D. 1991. Insect Pest Management. Univ. Arizona Press, USA.
2. Dent, D. 1996. Integrated Pest Management. Chapman and Hall, London
3. Metcalf, R.L. and W.H. Luckman. 1982. Introduction to Insect Pest Management. John Wiley and Sons, New York.
4. Teng, P.S. 1987. Crop Loss Assessment and pest Management. APS Press, Minnesota.
5. Frisbie, R. 1989. Integrated Pest Management systems and Cotton Production. John Wiley and Sons, New York.
6. Inayatullah, Ch. 1987. Integrated Pest Management. PARC, Islamabad.
7. Saxena, S.C. 1992. Biology of Insects. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, Bombay, Calcutta.
8. Upadhyay, R. K., K. G. Mukerji, B. P. Chawla and O. P. Dubey, 1998. Integrated Pest and Disease Management. A. P. H. Publishing Corp. New Delhi.

ENT-709 ADVANCES IN HOST PLANT RESISTANCE 3(2-2)**THEORY:**

Types and classification of resistance. Physio-chemical basis of plant resistance against insects. Epidemiological types of resistance. The use of plant and insect models in host plant resistance. Germplasm sources and needs. Techniques for screening different plant strains (especially in barani areas) showing resistance to insect pests. The relationship of resistant variety development to biotechnology.

PRACTICAL:

Demonstration of techniques for screening crop plants showing resistance to insect pests. Testing of mechanisms of host plant resistance under laboratory and field conditions.

BOOKS RECOMMENDED:

1. Maxwell, F.G. and P.R. Jennings. 1980. Breeding Plants Resistane to Insects. John Wiley and Sons, New York.
2. Barbosa, P. and D.K. Letourneau. 1988. Novel Aspects of Insect Plant Interactions. John Wiley and Sons, New York.

3. Smith, C.M. 1989. Plant Resistance to Insects. John Wiley and Sons, New York.
4. Pedigo, L.P. 1996 Plant Resistance to Insects. Entomology and Pest Management. Prentice Hall, Inc. N.J. pp 679.

ENT-710 INSECT TOXICOLOGY 3(2-2)

THEORY:

Introduction; general concepts of insect toxicology; theory and principles of bioassay; classification of insecticides on the basis of chemical nature and mode of action; chemistry and comparative toxicology of some common insecticides from each group; mechanism of action of major groups of insecticides; phytotoxicity of insecticides; energy production and inhibition by insecticides at various levels; detoxification mechanisms; joint action of insecticides, (synergism and antagonism).

PRACTICAL:

Laboratory equipment used in toxicology experiment; gross symptoms produced by representative insecticide groups; relationship between dosages and responses; use of time-mortality determination in comparing the relative toxicity of insecticides; preparation of spectral transmittance and concentration transmittance curves; chemical assay of insecticides.

BOOKS RECOMMENDED:

1. Gupta, H.C.L., 1999. Insecticides: Toxicology and Uses. Agrotech Publishing Academy, Udaipur.
2. Hassal, K.A., 1990. The Biochemistry and Uses of Pesticides: Structure, Metabolism, Mode of Action and Uses in Crop Protection. BLRS/Macmillan, U.K.
3. Ishaaya, I. and D. Deghecle, 1998. Insecticides With Novel Modes of Action: Mechanism and Application. Norosa Publishing House.. New Delhi, Madras, Bombay, Calcutta, London.
4. Kerkut, G.A. and L. I. Gilbert Year Comprehensive Insect Physiology, Biochemistry and Pharmacology. Pergamon Press. Oxford. N.Y., Toronto, Sydney. Paris, Frankfurt.
5. Pedigo, L.P., 1996. Entomology and Pest Management. Macmillan Publishing Co. N. Y., London.
6. Rockstein, M., 1978. Biochemistry of Insects. Academic Press, N.Y., San Francisco, London.
7. SreeRamulu.U.S., 1995. Chemistry of Insecticides and Fungicides (Second Edition), Oxford & IBH Publishing Co. Pvt. New Delhi, Bombay, Calcutta.
8. Wilkinson, C.F., 1976. Insecticides Biochemistry and Physiology- Heyden, London, New York, Rheine.

ENT-711 INSECTS IN RELATION TO PLANT DISEASES**3(2-2)****THEORY:**

Introduction; identification, biology and control of insect and mite vectors; mode of transmission of plant pathogens by insects and mites; study of causal organisms, etiology, symptoms and control of important fungal, bacterial and viral diseases of crop plants transmitted by insects and mites.

PRACTICAL:

Identification of insect and mite vectors and pathogens; rearing and handling of insect vectors for plant pathological studies. Study of mode of transmission of plant pathogens by insect and mite vectors.

BOOKS RECOMMENDED:

1. Atkins. M. D., 1978. Insects in Perspective. Macmillan Publishing Company, inc. New York.
2. Boner, D.1., D. M. DeLong and C. A. Triplehom, 1981. An Introduction to the study of insects. 5111 ed. Rainhart and Winston. N.Y.
3. Boucias, D.G. 1998. Principles of Insect Pathology. Chapman Hall, London.
4. Jeppson, L.R., H.H. Keifer and E. W. Baker, 1975, Mites Injurious to Economic Plants. Univ. Calif. Press.

ENT-712 INSECT CYTOGENETICS 3(2-2)**THEORY:**

Introduction, cell structure, characteristics and cell division in insects, chromosomes structure, number, diversity and types in insects; chromosomes and parthenogenesis in insects; chromosomes and ecology; modern concept of gene; genedetermined characters; environmental effect on gene expression; sex determination in insects; mutations and variations; genetic engineering; evaluation and speciation in insects.

PRACTICAL:

Study of insect cell, cell division, types and number of chromosomes in important insects like grasshoppers, crickets, cockroaches, flies and dragonflies; study of insect resistance in genetically engineered crops; study of different types of genetic variations in insects; genetical identification of species and biotypes in insects.

BOOKS RECOMMENDED:

1. Sinha, V. and Sunita Sinha. 1984. Cytogenetics. Plant Breeding & Evolution. VANI Educational Books, New Delhi.

2. Demere M. and B.P. Kaufmann. 1967. *Drosophila* guide. Washington D.C. Carnegic Institute of Washington.
3. Bahi, P.I. and P.M. Salimath. 1996. *Genetics, Cytogenetics and Breeding of Crop Plants*. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
4. Ashburner. M., H.L. Carson and J.N. Thompson Jr. 1986. *The Genetics and Biology of Prosphila*. Academic Press. New York.
5. Rinderer, I.T. 1986. *Bee Genetics and Breeding*. Academic Press. New York.

ENT-713 INSECT PATHOLOGY 3(2-2)

THEORY:

Introduction; history definition and scope; resistance and immunity in insects; types of insect pathogens; transmission, host range/persistence and virulence of insect pathogens; types of injuries and methods of infection by pathogens in insects; pathogenic diseases and their diagnosis in insects; extra-cellular and intracellular microbiota of healthy insects; control of microbial diseases of useful insects; role of pathogens in IPM of insects.

PRACTICAL:

Isolation, purification, culture and identification of insect pathogens from the diseased insects; diagnosis of different pathogenic diseases in insects; control of microbial diseases of useful insects; control of insect pests with microbial insecticides; determination of extent of parasitism by pathogens in insects.

BOOKS RECOMMENDED:

1. Boucias, D.G. 1998. *Principles of Insect Pathology*. Chapman Hall, London
2. Burges, H.D. and N.W. Hurrey, 1972, *Microbial control of Insect and Mites*. Academic Press London.
3. Poinar, G.O. Jr. and G.M. Thomas, 1978. *Diagnostic for the Identification of Insect Pathogens*, Press. N.Y.
4. Sleinhous, E.A., 1949. *Principles ol'-Insect Pathology*. McCiraw-Hill Book Co. Inc. New York. 757 pp.
5. Tanada, Y. and H, Kaya, 1992. *Insect Pathology*. Academic Press, New York. 613pp.

ENT-714 INSECT BIOCHEMISTRY 3(2-2)

THEORY:

Introduction; energy metabolism and production in insects; biochemistry of cuticle, muscles, flight, synaptic transmission, light production, biochromes, hormones; insect growth regulators and

diapause in insects; metabolism and role of carbohydrates, proteins and lipids in insects; chemical reactions involved in insect resistance to insecticides, chemical control of insect behaviour; biochemical defences in insects.

PRACTICAL:

Chemical identification of insect species and biotypes; pheromone extraction, its identification and control in insects; hormonal control of insect growth and development.

BOOKS RECOMMENDED:

1. Candy, D.J. and BA, Kilby, 1978, Insect Biochemistry and Function (2nd ed.) C 1. pman and Hall London. 314 pp.
2. Chapman, R.F., 1998. Insects: Structure and Function. 4th ed. American Elsevier. Publ. Co. Inc., New York.
3. Gilmour, D., 1961. The Biochemistry of Insects. Academic Press London, .343 pp.
4. Turner, R.B., 1977. Analytical Biochemistry of Insects. Elsevier Scientific Publishing Company New York. 315 pp.
5. Rockstein. M., 1978. Biochemistry of Insects. Academic Press, New York, U.S.A., 649 pp.

ENT-715 COMPARATIVE INSECT EMBRYOLOGY 3(2-2)

THEORY:

Introduction; structure of insect egg, fertilization of egg; early organization and development; segmentation; development of organs and organ systems; study of comparative embryology indifferent groups of insects.

PRACTICAL:

Identification of different types of insect eggs; structure of an insect egg, study of cleavage, Blastodein germ band, embryonic envelopes and blastokins different eggs; study of insect embryo at different durations.

BOOKS RECOMMENDED:

1. Chapman, R.F., 1998. The insects. Structure and 1-unction. 4th ed. American Elsevier. Pub. Co. Inc., New York.
2. Nagabhushanam, R. and R. Sarojini, 1985. Invertebrate Embryology. Oxford and IBH Publishing Co. New Delhi 580 pp.
3. Richards, O.W. and R.G. Davies, 1984. Imms General textbook of Entomology (10 ed.) Vol. 1 (Structure Physiology and development) Chapman and Hal 1 London.

4. Roeder, K-D., 1963. Insect Physiology 3rd Ed. John Wiley and Sons. Inc. New York.

ENT-716 BIOLOGICAL CONTROL OF INSECT PESTS 3(2-2)

THEORY:

Introduction; history, development and scope of biological control with special reference to Pakistan; ecological basis of biological control; biological characteristics of entomophagous insects; introduction, culture, release and establishment of entomophagous insects; conservation and augmentation of natural enemies; role of micro-organisms in biological control; integration of chemical and biological control.

PRACTICAL:

Collection, laboratory rearing, culturing and identification of parasitoids, predators and micro-organisms of economic importance; study of extent of parasitism / predation of different biocontrol agents.

BOOKS RECOMMENDED:

1. Burges, H.D. and N.W. Hussey, 1971. Microbial control of insects and mites. Academic press, London.
2. De'Bach, 1976. Biological Control of Pests and Weeds, Chapman & Brots.
3. Gunasekaran, M. and D, Weber, 1996. Molecular Biology of the Biological Control of Pests and Diseases of Plants. I-SA Publications. U.S.A.
4. Maramorosch. K., 1991. Biotechnology for Biological Control of pests and Vectors. CRC Press, U. S. A.
5. Pedigo, L. P., 1996. Entomology and Pest Management, 2nd ed. Prentice Hall Intl., London.

ENT-719 SPECIAL PROBLEM 1(1-0)

ENT-720 SEMINAR-(I-II) 1(1-0)