



SELF ASSESSMENT REPORT

**Department of Botany
GGDC KDA Karak**

SELF ASSESMENT REPORT
BS BOTANY PROGRAMME

VOL: III

SESSION : FALL - 2022



DEPARTMENT OF BOTANY
GGDC KDA Karak

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EXECUTIVE SUMMARY OF THE SELF-ASSESSMENT REPORT OF BS BOTANY, DEPARTMENT OF BOTANY, GGDC KDA KARAK

Quality Enhancement Cell (QEC) since its inception in September 2019 , has been active in promoting its core function of bringing standardization to its academic programs to get them in line with the guidelines enunciated by the Higher Education Commission. In this regard, BS Botany programs offered at GGD KDA Karak was selected for Self-Assessment process for the year 2022.

QEC conducted several workshops to create awareness of the Self-Assessment process and its significance in further improving the quality of education at GGD KDA Karak, Self-Assessment process of all the programs was simultaneously initiated. The highlights of SAR of BS English are as follows:

1. Nomination of Program Team Members (PT)

The PT was nominated by the Head of English Department, Ms. Shandana Rafique and approved by Principal GGDC KDA Karak as follows:

- (i) Ms. Shahida Naveed (PTM)
- (ii) Ms. Fatima Bibi (PTM)

2. Submission of SAR Report by PTM

The PTM submitted the report on Monday 22 May, 2023. The QEC Focal Person examined the report, identified shortcomings, and communicated the same to the PT. After incorporating QEC suggestions, the report was finalized on 29 May 2023.

3. Nomination of Assessment Team (AT)

The AT was nominated by the Principal GGDC KDA Karak on 19 May, 2023. Following were the members of the AT:

- (i) Ms. Ayesha Irum
- (ii) Ms. Wajeeha Naimat

4. Date of Submission of AT Report

The Assessment Team visited the department on Monday 5 June, 2023 and the AT Report was submitted on June 12, 2023.

5. AT Findings and Recommendations

Following are the some of the recommendations made by the AT to overcome the major shortcomings in the program:

1. Shortage of subject related books/Periodical journals and daily newspaper at College Library.
2. Students should have access to HEC E-Library
3. Need of computer lab/computer and net facility for research.
4. Need of Multimedia for presentations for teachers and students.
5. Proper funds availability for research.

6. Preparation of Assessment Results Implementation Plan Summary

The AT prepared the Assessment Results Implementation Plan Summary by highlighting the weaknesses of the program and suggesting remedial measures. The Department plans to implement the suggested corre

BS BOTANY PROGRAM AT DEPARTMENT OF BOTANY GGDC KDA KARAK

The concept of Quality Assurance in higher education is not new as it has always been one of the major concerns of institutes providing higher education to establish a system that can ensure and enhance the effectiveness of the teaching and learning processes at work in their respective academic institution, a system that is sustained and can identify areas for improvement at each level by eliminating root cause responsible to cause the problem. Similarly, the education providers have always been concerned to have teams of trained officials who can assess, identify, analyse and rectify the issues and problems arising from any flaw in the system so that the quality of education can be made ensured at all level. Since there is so much expansion of higher education institutions, in the current era, who are offering unique academic programs in varied disciplines. These programs, when offered, need to have a proper quality check at each step from the start to the end to ensure that the processes of enrolment, registration, examination, dissemination of knowledge in the offered areas or specialties, delivery mechanism, assessment and evaluation and all related requirements are of a standard value. To ensure all this, the institutions need to have a well-established and fully functioning QA system that can evaluate the programs against set standards. Quality Assurance applies a series of activities, strategies, approaches and mechanisms to monitor and measure the quality of academic services in any academic institution. Quality Assurance Agency (QAA) of Higher Education Commission (HEC), Pakistan was established in 2005 with the aim to devise policies for monitoring and measuring the maintenance and improvement of the quality in higher education by integrating the element of Program evaluation is a mandatory requirement of Higher education Commission (HEC), Pakistan. All degree and diploma programs, after the completion of each academic cycle, are required to prepare a report called Self-Assessment Report (SAR) based on the parameters prescribed by the HEC. quality in higher education systems and by developing practical guidelines and policies for the enhancement of education in Pakistan through a sustainable and effective QA System to promote quality culture at all levels so as to achieve higher level of academic excellence to meet national and international standards for each program.. Gradual Growth of Quality Assurance Network in Pakistan QAA of HEC took initiative of establishing Quality Enhancement Cells (QEC) in all public and private sector universities in Pakistan to uplift the standards of quality of higher education by implementing uniform guidelines for all degree awarding institutes to attain uniformity across Pakistan. Initially, QECs were established in 30 Public sector universities aiming to implement a quality assured system for all degree programs. Gradually, more universities were included phase wise and now there are more than 86 universities altogether including private and public

sector universities where QECs are fully functioning. Recently Government of KP with the collaboration of HEC Has established Quality enhancement cells in all BS and Non-BS AD degree offering colleges across the Khyber Pakhtunkhwa province, which jointly works under the Directorate of Quality Assurance Program ,HED and Directorate of Quality Enhancement of their respective affiliated universities. QAA,HEC, Pakistan made these QECs responsible to implement Program Evaluation using Self-Assessment Model to evaluate the quality of each degree program. The term 'Program Evaluation', in any academic organization or degree awarding institute, is generally used to define a structured and systematic procedure to monitor the overall effectiveness and efficiency of the program including the efficiency and effectiveness of the teaching and learning processes as well as the adequacy and smooth functioning of the supporting facilities such as library, computer lab, science lab and other related infrastructure and process control facilities or services which help in the attainment of the stated mission and objectives of the program. Program Evaluation has become a major function of QA departments working in higher education institutes. QECs started Program Evaluation through Self-Assessment prescribed by the QAA-HEC.

Self-Assessment Model Prescribed by the HEC

HEC Prescribed Self-Assessment Model to conduct Program Evaluation. Following are the parameters prescribed by the HEC for Self-Assessment:

- ❖ Criterion 1: Program Mission, Objectives and Outcomes (PMOO)
- ❖ Criterion 2: Curriculum Design and Organization(CDO).
- ❖ Criterion 3: Laboratories and Computing Facilities(LCF).
- ❖ Criterion 4: Student Support and Advising (SSA).
- ❖ Criterion 5: Process Control (PC).
- ❖ Criterion 6: Faculty (F).
- ❖ Criterion 7: Institutional Facilities (IF).
- ❖ Criterion 8: Institutional Support (IS).

Each Criterion has an 'Intent' or statement of requirements to be met and is divided into several standards and further divided into Sub Standards which describe how the intents are minimally met. So, all in all, there are

thirty-one standards to be addressed by each degree program, well supported by objective evidences to meet the HEC requirements.

As Government Girls Degree College KDA Karak is affiliated with Khushal Khan Khattak University Karak so it works for quality enhancement and assurance under the directives of DQA, KKKUK as well as DQAP HED KP.

1. BRIEF HISTORY OF GGDC KDA KARAK

Government Girls Degree College KDA Karak is a centre of wisdom, excellence, intellect and beacon of light with the motto “KNOWLEDGE IS LIGHT”, Government Girls Degree College KDA, Karak is an old leading centre of female education in this area. GGDC Karak is well known as an institution of high ambition and strong performance because it has continued to make excellent progress to achieve its goals. It has played a significant role in developing indigenous human resources through its highly productive achievements, both in sciences and humanities. It is striving hard to deal with the diverse needs of society by imparting education in basic fields of science and technology.

This journey of excellence was started as an intermediate college in 1997 in the present building situated in the centre of the Karak Development Township. It was elevated to the degree level in 2005 and this long journey reached to its pinnacle when it was granted the status of BS College in July 2018.

The GGDC Karak has a glorious history of quality and distinction as an institution. During this course, many competent and well-known Principals served this college. It has produced outstanding graduates who are now serving the country in various capacities.

Department of Botany is one of the premier departments of the faculty. Its staff comprises of an Associate Professor and five lecturers in Botany on regular basis and recently.

Botany is among the basic disciplines of natural sciences, the significance of which can hardly be overstated for a developing and an agricultural country like Pakistan. We have few scientists and botanists to enable us to stand side by side with the advanced countries of the world. A specialized course like BS in Botany can inculcate a spirit of research in the students which can, in turn, prove beneficial for our country.

159 students are enrolled since Fall-2018 to Fall-2022 (including 5 batches) in BS Botany program. After completion of two academic years, the BS Program at Department of Botany GGDC KDA Karak was visited for its performance and first volume of SAR was prepared by the Program team member of botany deptt. Dr.Shahida Naveed and submitted to the KKK University and D QA P HED KP. As that was the first-time practice of preparing such a report so, only SAR was prepared but assessment team were neither nominated nor invited to visit the department.

Second volume of SAR BS Botany was prepared the previous year in July 2022 , PT members conducted the feedback surveys and in the light of that data , and by the visit of Assessment team members to the department , an SAR report was compiled and all the relevant documents were shared with QAC HED and Directorate of QEC KKKUK .

This year, in 20023, Volume -III Fall-2022 of SAR BS Botany is prepared by PT members in the light of the AT members visit to Botany Deptt. A comprehensive letter, in the guidelines of AT findings, for compliance will be shared with the Principal ,and a copy of the same with the QEC KKKUK and QAC HED for Information and follow up .

Criterion - 1

Program Mission, Objectives and Outcomes

CRITERION 1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES

STANDARD 1-1

THE PROGRAM MUST HAVE DOCUMENTED MEASURABLE OBJECTIVES THAT SUPPORT FACULTY/COLLEGE AND INSTITUTION MISSION STATEMENT

1-1.1 MISSION STATEMENT OF GGDC KDA KARAK:

Government Girls Degree College Karak pursues the mission to evolve the college as a trusted institution in the district for imparting quality education in a conducive environment, congenial to the needs of its female students hailing from parts of the semi-tribal backward district. The pedagogy encompasses critical thinking, skills development, effective communication, creativity, and cultural awareness in a safe, accessible and affordable arrangement, essentially imbued in cultural and Islamic guidelines.

1-1.1. 2. MISSION STATEMENT OF BOTANY DEPARTMENT:

Serving humanity with the conventional and modern applications of plant sciences.

1-1.1.3. MISSION STATEMENT OF BS BOTANY PROGRAM:

Mission of the BS Botany is to transfer the fundamental and latest knowledge of botany in a conducive teaching environment and to provide facilities for conducting innovative research with a focus on plants and the natural environments to produce enthusiastic and enthusiastic Botany graduates for the uplift of society.

1-1.1.4. BS BOTANY PROGRAM OBJECTIVES:

The objectives of BS Botany program are;

Objectives:

1. To serve the needs of young students who have completed their twelve years of education and are looking for formal education in the field of Plant Sciences.
2. To provide students with concrete foundation in plant sciences by delivering them the theoretical knowledge of classic and applied botany.
3. To produce skilled botany graduates.
4. To produce and enhance communication, technical and logical skills.
5. To prepare graduates for advanced / postgraduate studies.
6. To familiarize students with the basic concept of research work.

1-1.1.5. PROGRAM LEARNING OUTCOMES

The BS Botany program prepares students to attain the educational achievements.

1-1.1.6. LEARNING OUTCOMES OF DEPARTMENT OF BOTANY:

Department of Botany is striving hard to offer a competitive degree at bachelor level. Course contents are constantly modified and updated.

Graduates of our department will be skilled in.

1. Laboratory work
2. Teaching proficiencies
3. Research and Development programs
4. Agricultural and forestry institutes
5. Pharmaceutical industries
6. Herbal industries

1-1.2 ALIGNMENT OF PROGRAM OBJECTIVES WITH DEPARTMENT & COLLEGE MISSION STATEMENTS

The program objectives were developed in alignment with the Department and college mission statements which emphasize to offer need-based education and training program in order to produce highly qualified professionals, entrepreneurs and leaders in their respective fields. The goals and objectives of BS Botany program state that it will produce graduates who will identify, formulate, and solve problems daily life problems related to plant sciences using appropriate methodologies and tools.

1-1.3 MAIN ELEMENTS OF STRATEGIC PLAN

Strategic plan for BS Botany program not only covers the different program contents offered in this program but also covers the curriculum development, concept building by different methods including the theoretical and practical work. The program is designed in a special strategic way that will enable the qualified graduates to perform their duties with confidence. Moreover, this program will enable the successful graduates to undertake higher studies and research. For this purpose, the following steps are followed to achieve the desired objectives of the program:

1-1.4 CURRICULUM DESIGN

The different subjects which are offered in this program vary in its nature to prepare students for every area of the Botany. Students are offered fundamental levels in the initial semester of the degree program while they are offered specialization courses in last semester.

BS Botany program is comprised total of 134 credit hours in which 16 credit hours are for General Education Arts & Humanities , 30 for Math & Basic Sciences, 29 credit hours for Discipline Specific Foundation Courses, 44 credit hours for Major courses , 12 credit hours are for Elective within the major including research project or specialization related subjects, while 03 credit hours are for technical course. The same is summarized in below table.

TABLE1. 1: COURSE TYPE AND CREDIT HOURS

S.NO	Course Type	Credit Hours
1	General Education Arts & Humanities	16
2	Math & Basic Sciences	30
3	Discipline Specific Foundation Courses	29
4	Major courses	44
5	Specialization Subjects	6
6	Research Project/ Internship	06
Total		134

1-1.5 PROGRAM DELIVERY METHODOLOGY

Program delivery methodology includes lectures, practical work, tutorials, assignments, field trips / visits. A notified academic calendar is followed during the semesters. Students are given an opportunity of group discussions for enhancing communication skills. In a more technical term, the courses are delivered through a

pre-planned procedure that comprised of course outline, class timetable, lecture notes, slides sharing and other supportive materials.

1-1.6. CO-CURRICULAR ACTIVITIES

The students of BS Botany program are encouraged to actively participate in the Co-curricular activities which not only enhance their physical wellbeing but also give them the opportunity to work in a team and enhance their emotional intelligence as well.

1-1.7. PROGRAM OUTPUT EVALUATION

Program output is regularly evaluated and measured through regular examinations, assignment's results and final project's results. The marks distributions are as follows:

TABLE1. 2: SUBJECT MARKS DISTRIBUTION

S.NO	Marks	Weightage
1	Mid-term	30
2	Session internal marks	20
3	Final Examination	50
Total		100

The program output evaluation is ensured by a systematic procedure, which comprised of a series of different kinds of evaluation techniques to be used by the instructor at different stages. Like for example, initially the instructor will evaluate the performance of students by internal quiz and assignments, while at the end of semester the instructor will conduct a comprehensive written examination.

1-1.8. Describe how each objective of 'BS Botany' program is aligned with program, department and college mission statements.

Program Objective	Program Mission	Department Mission	College Mission
To produce skilled botany graduates	To transfer the fundamental and latest knowledge of botany in a conducive teaching environment	Serving humanity with the conventional and modern applications of plant sciences.	The pedagogy encompasses critical thinking, skills development, effective communication, creativity, and cultural awareness in a safe, accessible, and affordable arrangement, essentially imbued in cultural and Islamic guidelines.
To produce and enhance communication, technical and logical skills			
To prepare graduates for advanced / postgraduate studies	To produce enthusiastic and enthusiastic Botany graduates for the uplift of society.		
To familiarize students with the basic concept of research work	To provide facilities for conducting innovative research with a focus on plants and the natural environments		

1-1.9. Outline the main elements of the strategic plan to achieve the 'BS Botany' program mission and objectives.

Strategic Plan	Program Mission	Program Objectives
Courses offered at BS Botany program are updated according to new advancement in the field of Technology. Moreover, Botany courses are composed of Theory and Lab.	To transfer the fundamental and latest knowledge of botany in a conducive teaching environment	To produce skilled botany graduates
		To produce and enhance communication, technical and logical skills
Students learning level is measured by different measuring tools	To produce enthusiastic and enthusiastic Botany graduates for the uplift of society.	To prepare graduates for advanced / postgraduate studies
In 7 th and 8 th semesters, competent and enthusiastic students conduct research as an optional choice.	To provide facilities for conducting innovative research with a focus on plants and the natural environments	To familiarize students with the basic concept of research work

1-1.10. PROVIDE FOR EACH OBJECTIVE HOW IT WAS MEASURED, WHEN IT WAS MEASURED AND IMPROVEMENTS IDENTIFIED AND MADE.

‘BS Botany’ Program Objectives Assessment

Objectives	How measured	When measured	Improvement identified	Improvement made
Providing opportunity of learning Botany to female intermediate students	Interview at admission time	At admission time	Written expression of candidates should be checked	Written test will be conducted at admission time .
To produce skilled botany graduates	Final Examination (With GPA achieved). Employment of Students and Feedback from Employers	At the end of program and post-graduation feedback	There should be more opportunities for research work.	Nil
To produce and enhance communication, technical and logical skills	Class Presentation, group discussion and cocurricular activities.	Before conduct of Final term Exam	There be involvement of students in group discussion	
To prepare graduates for advanced postgraduate studies	Guidance about GAT tests /			

To familiarize students with the basic concept of research work	research as optional paper in 7 and 8 semester			
---	--	--	--	--

STANDARD 1-2

THE PROGRAM MUST HAVE DOCUMENTED OUTCOMES FOR GRADUATING STUDENTS. IT MUST BE DEMONSTRATED THAT THE OUTCOMES SUPPORT THE PROGRAM OBJECTIVES AND THAT GRADUATING STUDENTS ARE CAPABLE OF PERFORMING THESE OUTCOMES.

1-2.1 PROGRAM OUTCOMES

(Describe how the program outcomes support the program objectives BS Botany)

Program Outcomes are mentioned below:

1. Students shall be able to go for higher education.
2. Students shall be able to lead, motivate and manage teams.
3. Students shall be able to demonstrate specific knowledge, attitudes, skills and behavior for the welfare of the society.
4. Students will be able to perform jobs in related field.
5. Students shall be able to perform research in related field.
6. Come up with research ideas which fulfill local needs and regional conditions.
7. Boost up of inter- communicative skills.

1-2.2. RELATIONSHIP BETWEEN BS BOTANY PROGRAM OBJECTIVES AND BS BOTANY PROGRAM OUTCOMES

1-2.2 PROGRAM OBJECTIVES AND OUTCOMES MATCHING

THE TABLE 1.4 IS SHOWING THE MATRIX PRESENTING THE MATCH BETWEEN PROGRAM OBJECTIVES AND OUTCOMES OF THE PROGRAM.

Program Outcomes	Program Objectives				
	Produce competent botanists	To impart worthwhile learning in the field	To impart technical and logical skills	Create facilities for post studies	Establish the platform for research
Students shall be able to go for higher education	*	-	-	*	*
Students shall be able to lead, motivate and manage teams	*	-	*	*	*
Students shall be able to demonstrate specific knowledge, attitudes, skills and behaviour for the welfare of the society	*	*	*		---
Students will be able to perform jobs in related field	*	*	*	*	

Students shall be able to perform research in related field	*	*	-	*	*
Come up with research ideas which fulfill local needs and regional conditions.	*	*	*	-	*
Boost up of inter-communicative skills	*	*	*	-	-

1-2.3. DESCRIBE THE MEANS FOR ASSESSING THE EXTENT TO WHICH GRADUATES ARE PERFORMING THE STATED PROGRAM OUTCOMES/LEARNING OBJECTIVES.

The three tools for the assessment of program outcomes/learning objectives are:

1. Employer Survey- These surveys are not part of BS College QEC feedback form.
2. Alumni Survey- These surveys are not part of BS College QEC feedback form.
3. Graduating student survey- 2nd Batch of Botany department has taken final term exam in June 2023 and will hopefully pass out in August -2023. Graduating student survey was conducted in May 2023 before final term exam -2023 and the results are presented below.

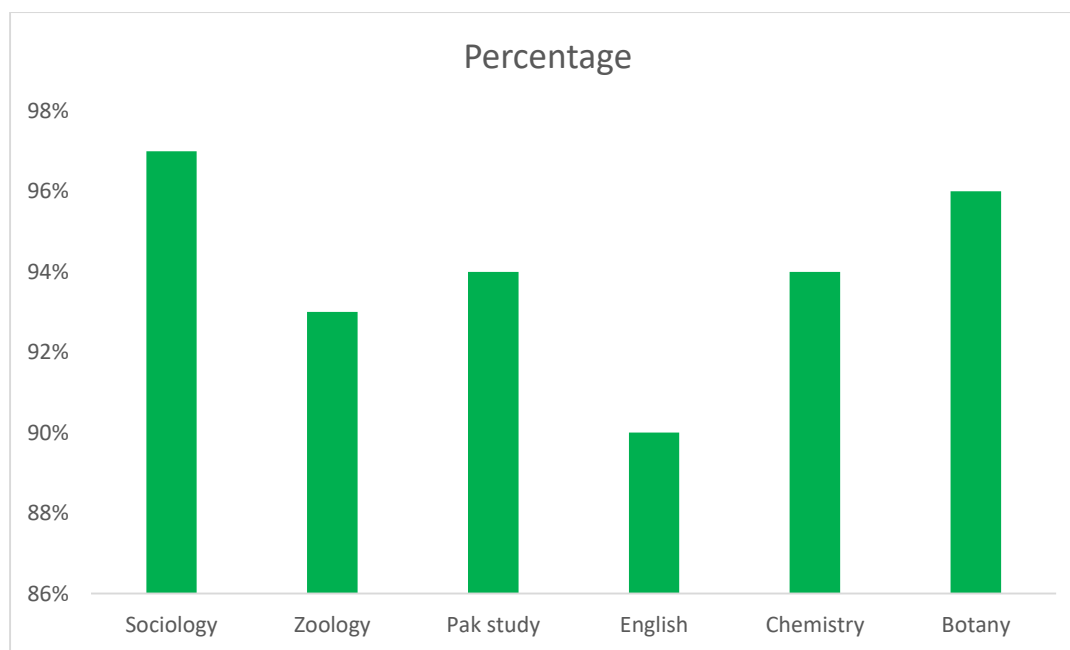
STANDARD 1-3

THE RESULTS OF PROGRAM'S ASSESSMENT AND THE EXTENT TO WHICH THEY ARE USED TO IMPROVE THE PROGRAM MUST BE DOCUMENTED.

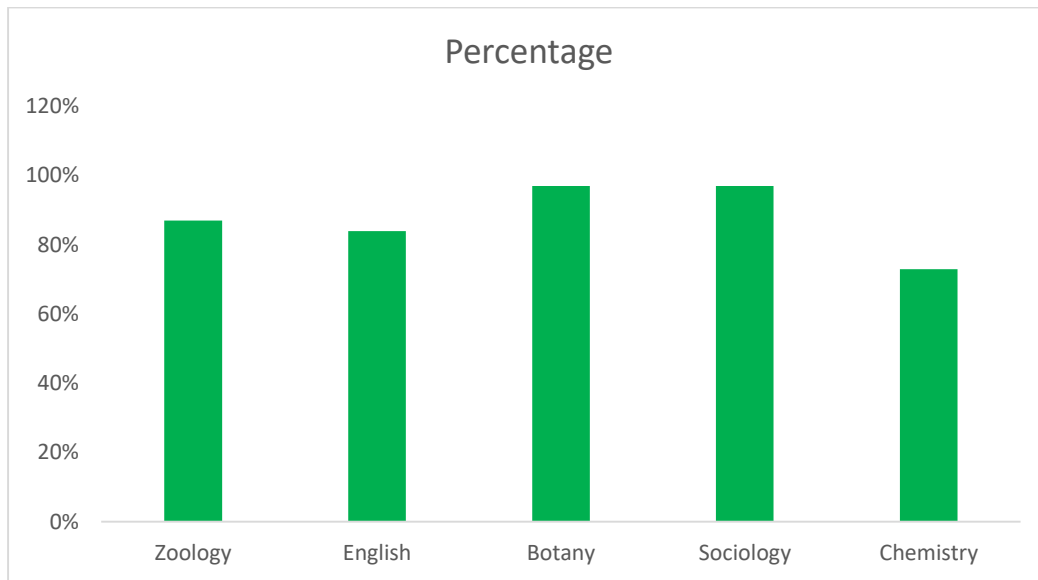
The result of the program assessment is shown below in graphical charts for courses evaluation and teachers' evaluations.

1-3.1 COURSE EVALUATION

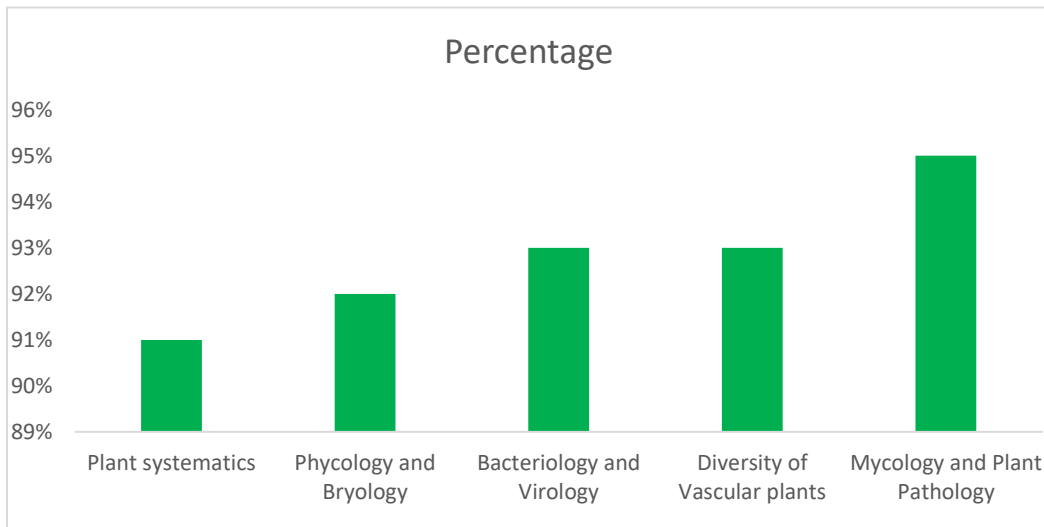
Results of Course evaluation are shown below. The data were collected from students of BS Botany enrolled in different semesters HEC Proforma 1. Students have graded the courses against the course structure, teaching methodology, learning objectives and outcomes and practical implementation of the theory.



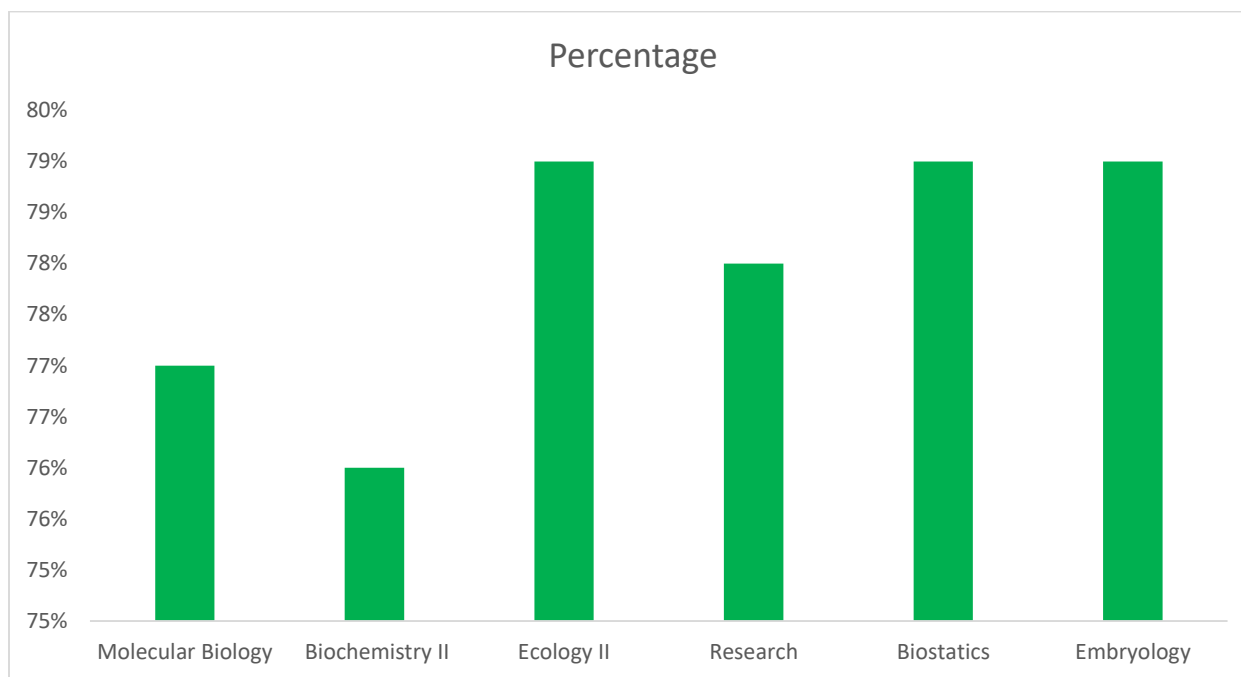
COURSE EVALUATION SUMMARY GRAPH FOR 1ST SEMESTER, FALL 2022



COURSE EVALUATION SUMMARY GRAPH FOR 3RD SEMESTER, FALL 2022

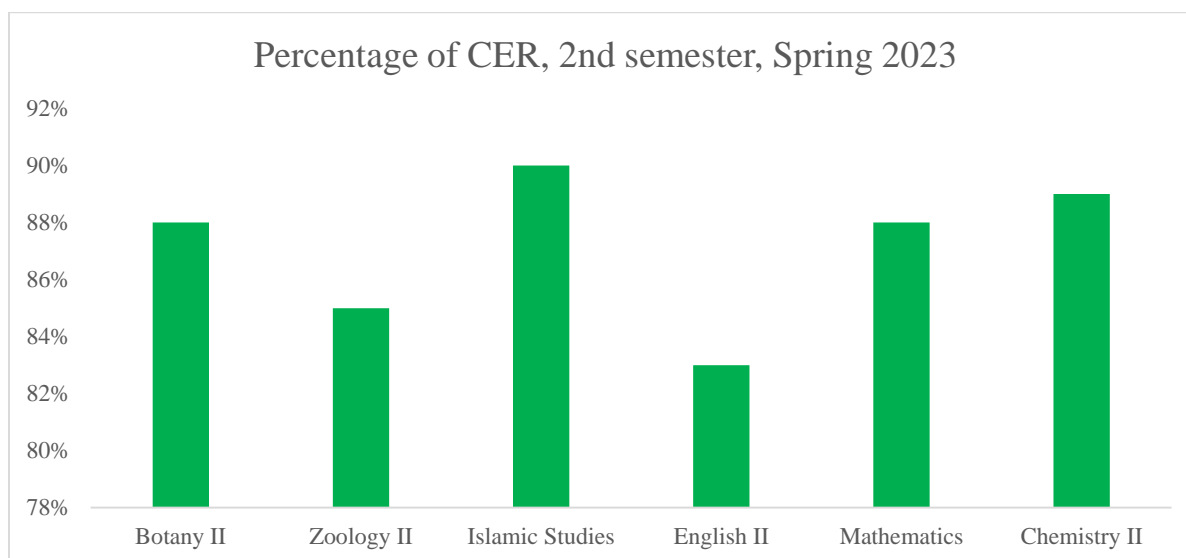


COURSE EVALUATION SUMMARY GRAPH FOR 5TH SEMESTER, FALL 2022

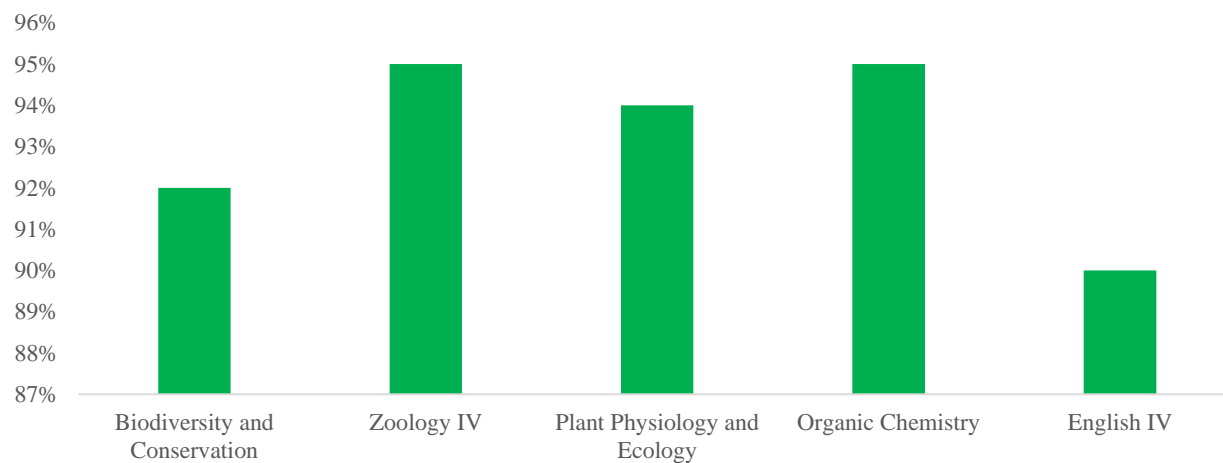


COURSE EVALUATION SUMMARY GRAPH FOR 7TH SEMESTER, FALL 2022

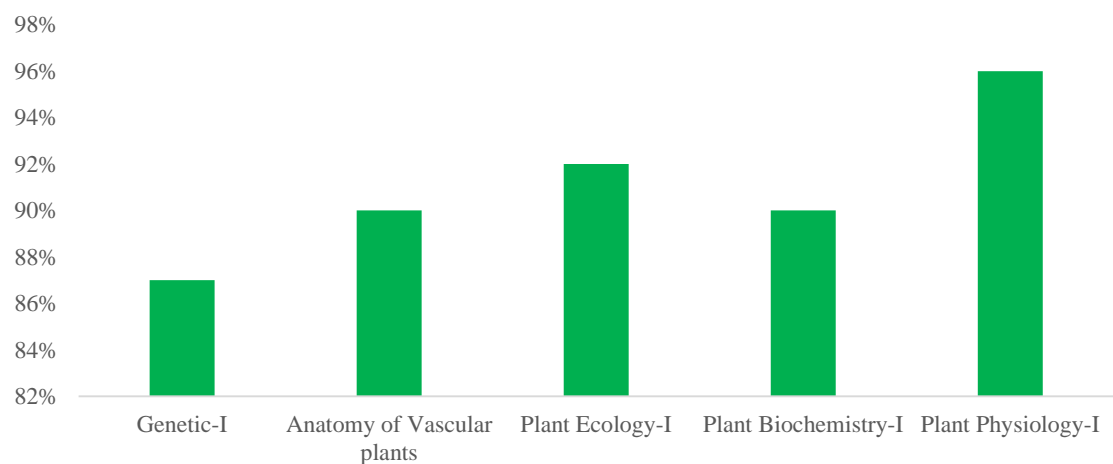
SPRING 2023 COURSE EVALUATION

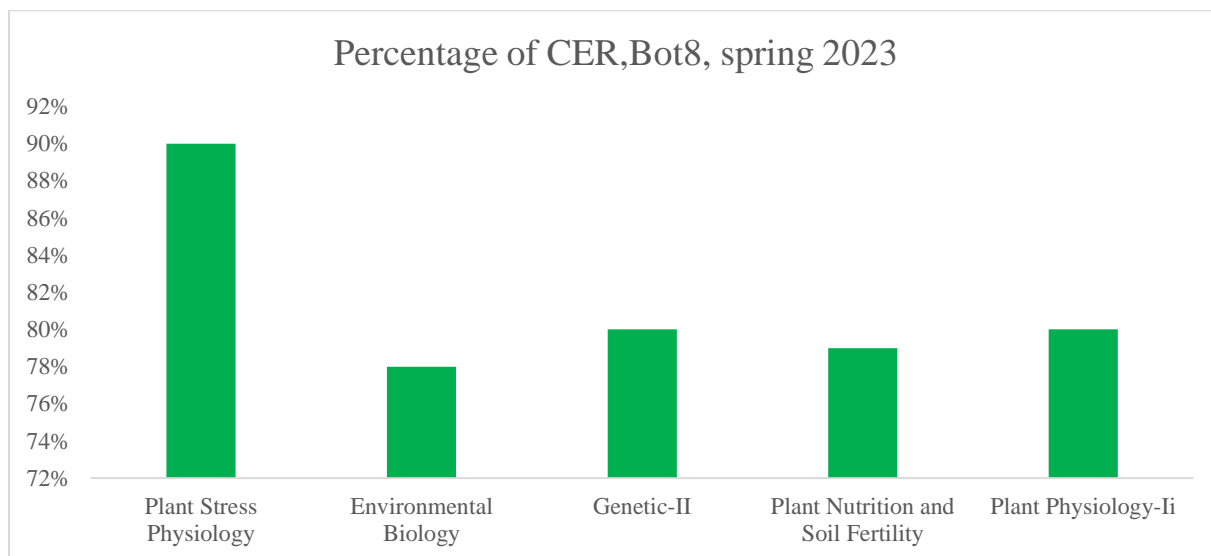


Percentage of CER, 4 semester spring 2023



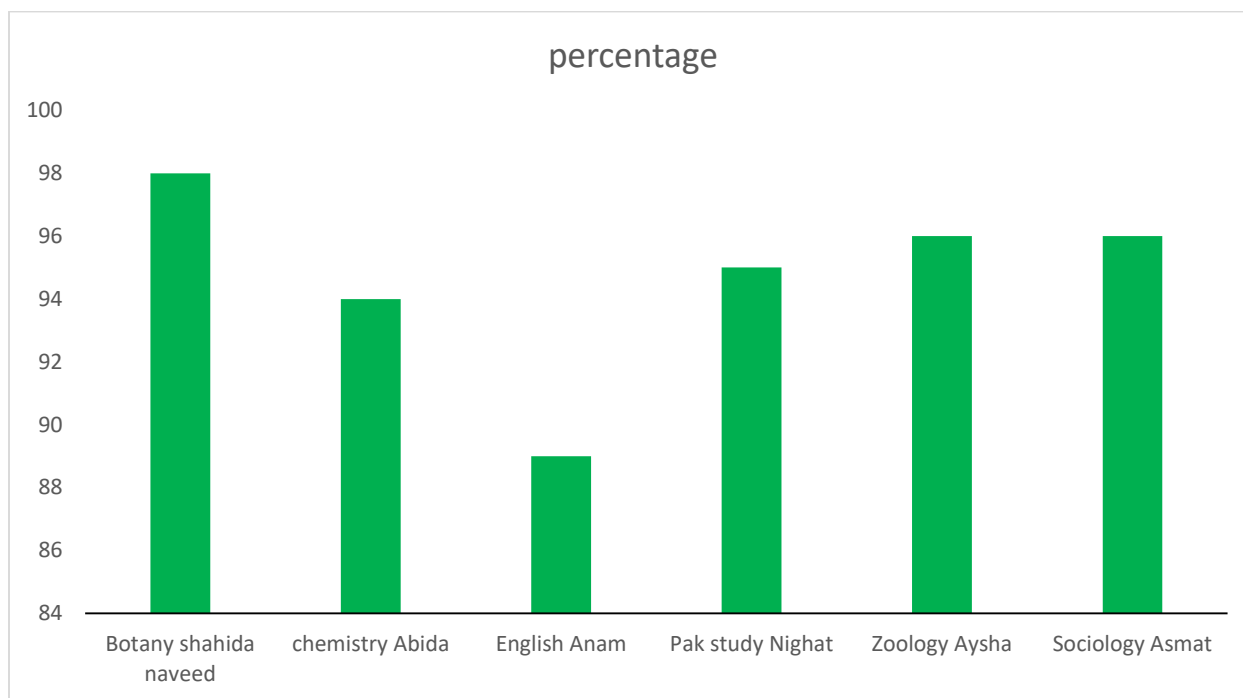
Percentage of CER, bot 6, spring 2023



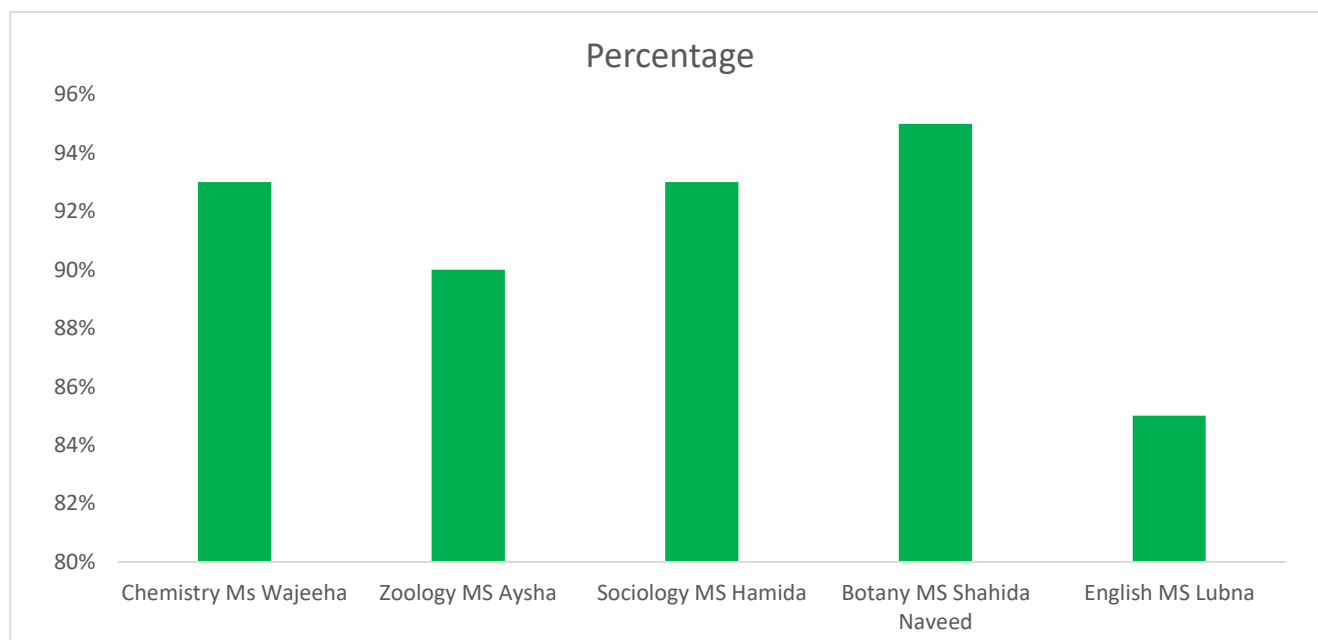


1-3.2 TEACHERS EVALUATION

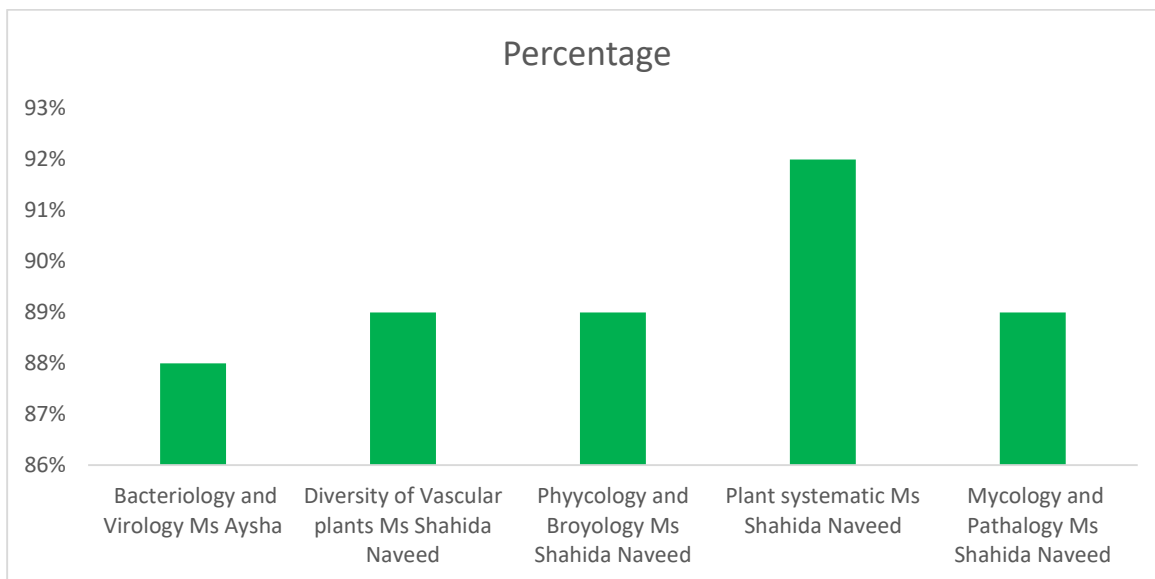
Results of Teacher's evaluation are shown below. The data were collected from students of BS Botany enrolled in different semesterson HEC Proforma 10. Students have graded the instructors against their lecture preparation, punctuality, general behavior, subject knowledge and teaching methodology.



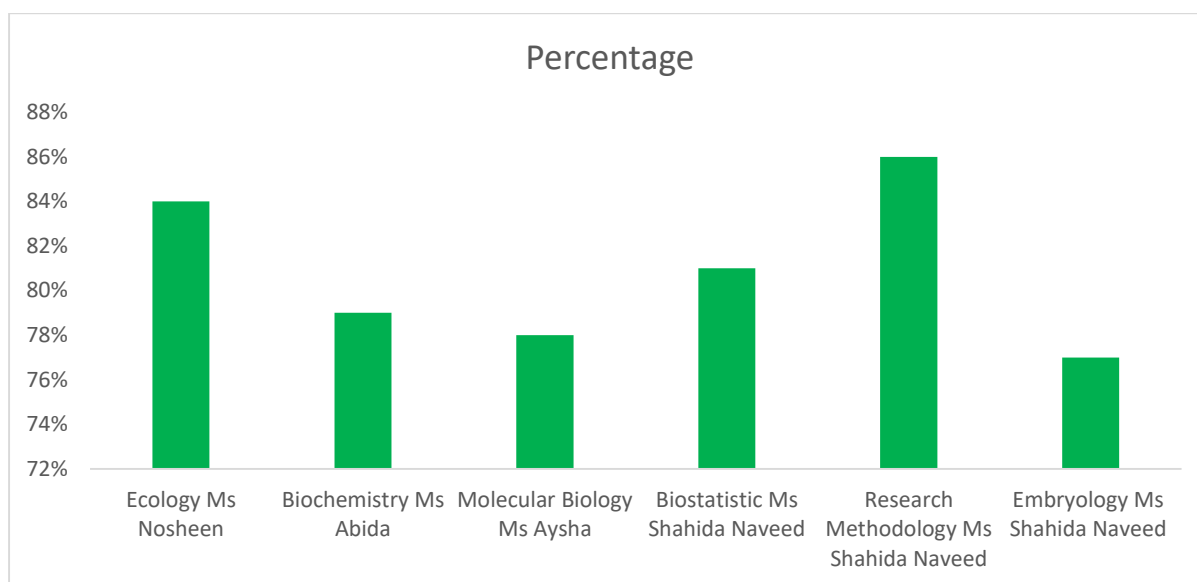
TEACHER EVALUATION SUMMARY GRAPH FOR 1ST SEMESTER BOTANY, FALL 2022.



TEACHER EVALUATION SUMMARY GRAPH FOR 3RD SEMESTER BOTANY, FALL 2022.

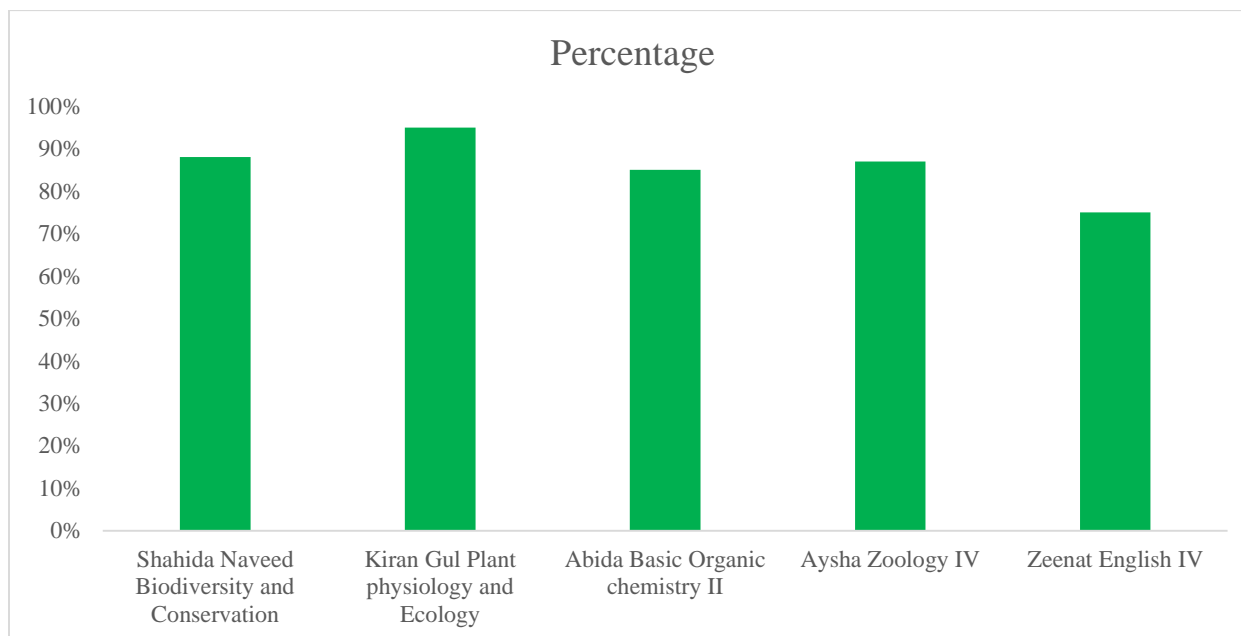
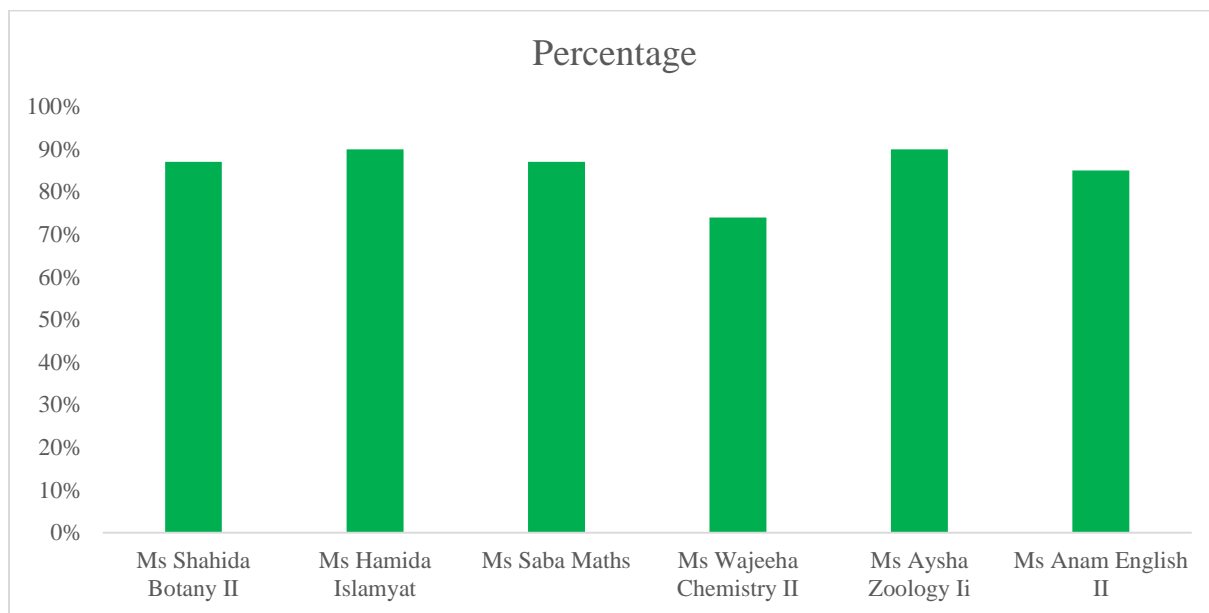


TEACHER EVALUATION SUMMARY GRAPH FOR 5TH SEMESTER BOTANY, FALL 2022.

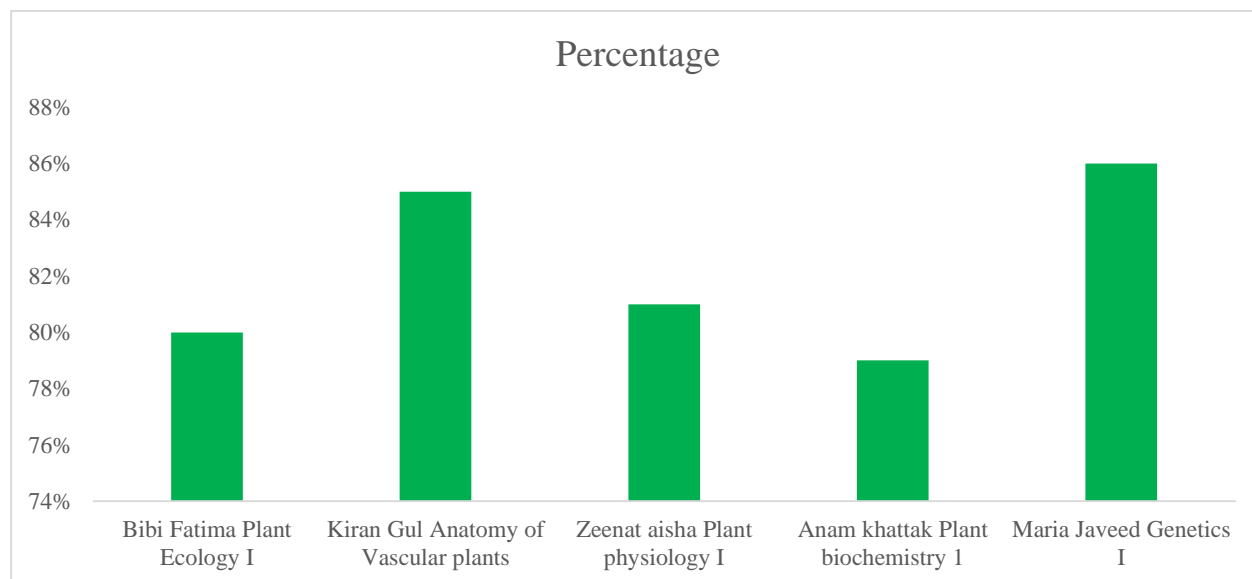


TEACHER EVALUATION SUMMARY GRAPH FOR 7TH SEMESTER BOTANY, FALL 2022.

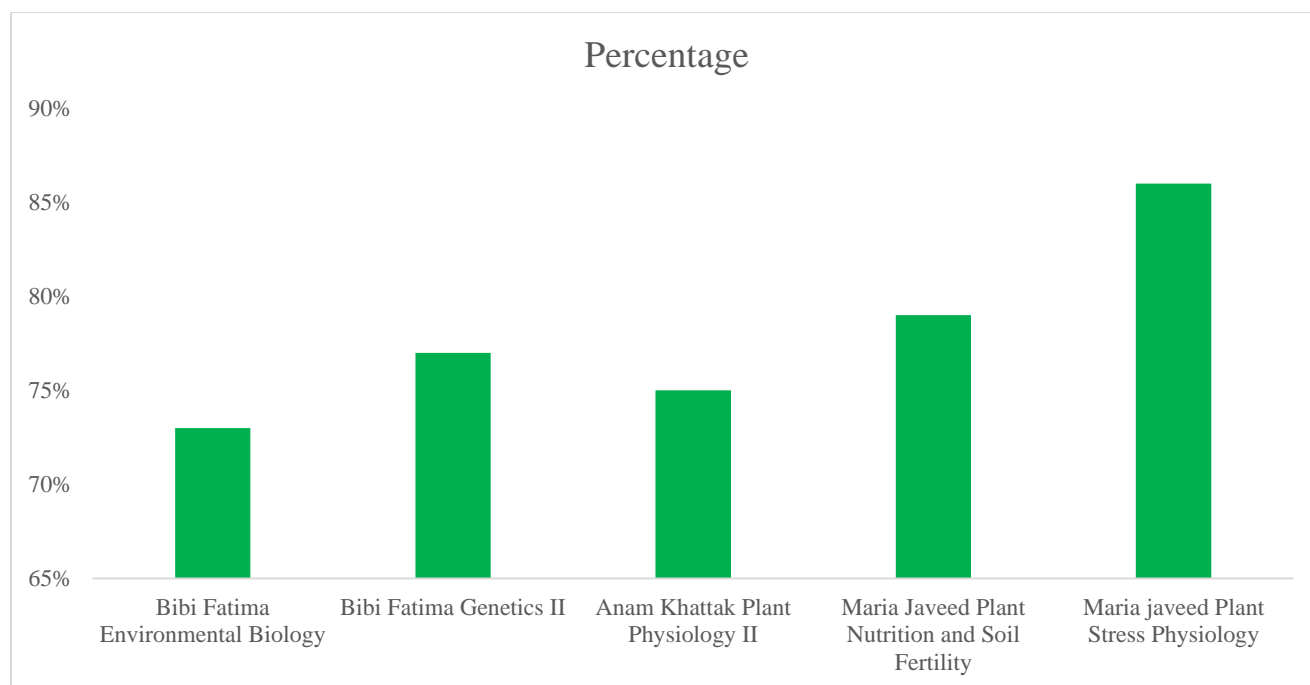
SPRING -2023 TEACHER EVALUATION



TEACHER EVALUATION SUMMARY GRAPH FOR 4TH SEMESTER BOTANY, SPRING 2023.



TEACHER EVALUATION SUMMARY GRAPH FOR 6TH SEMESTER BOTANY, SPRING 2023.

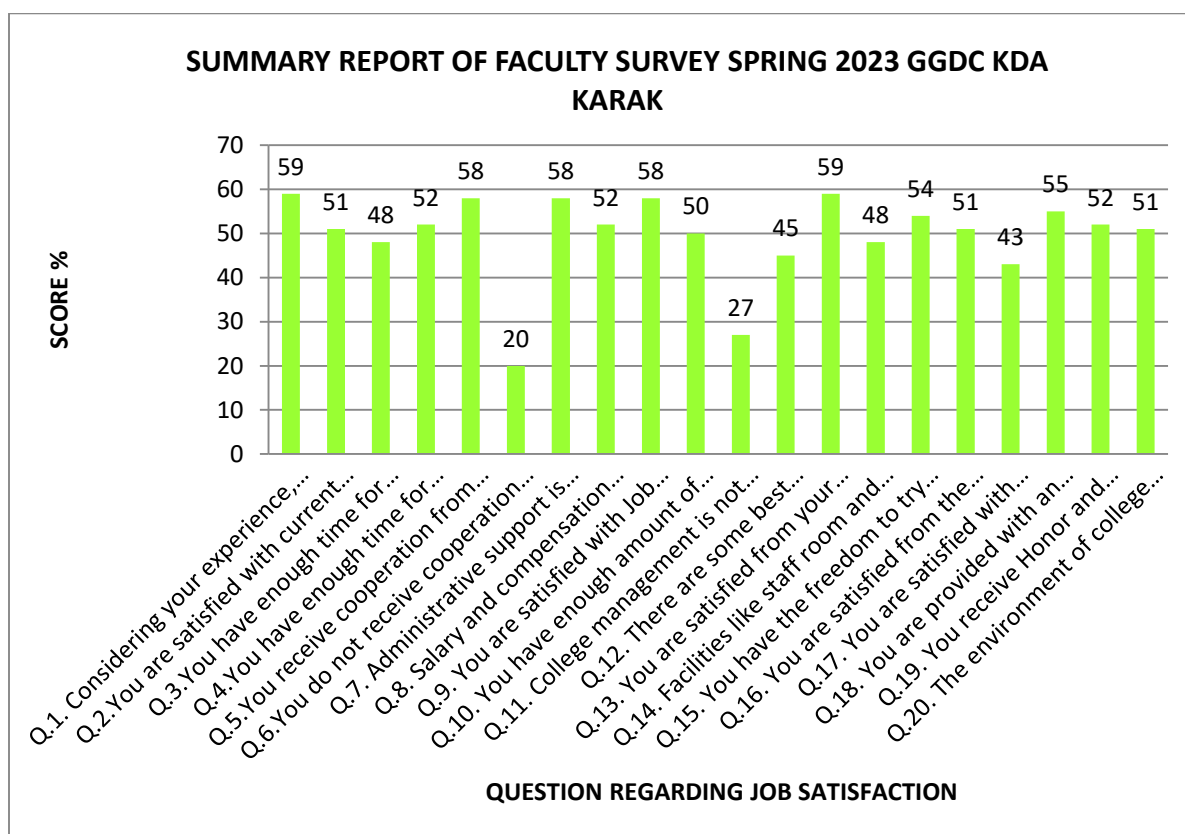


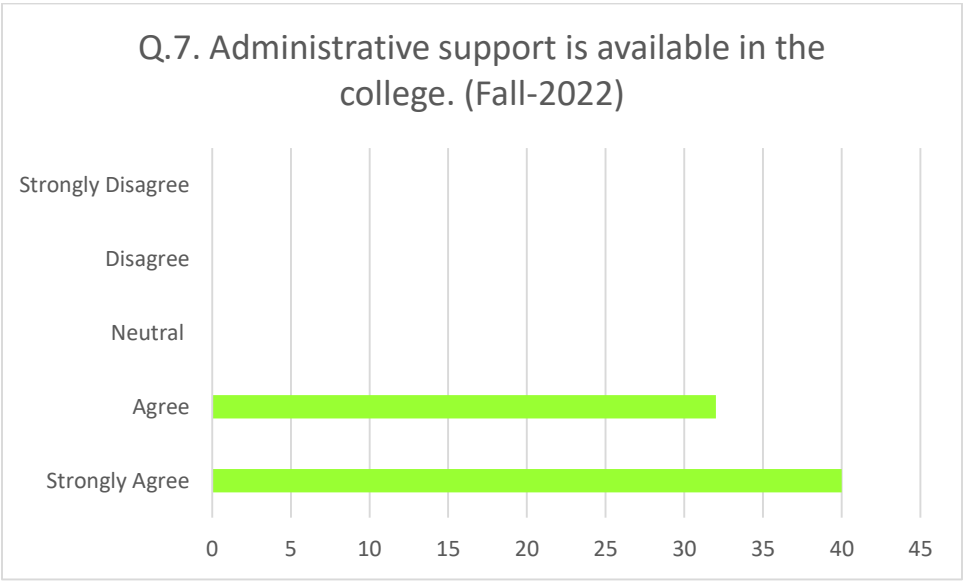
TEACHER EVALUATION SUMMARY GRAPH FOR 8TH SEMESTER BOTANY, SPRING 2023.

1-3.3 FACULTY SURVEY

Results of Faculty Survey is shown in the following graphical chart: The data was collected on HEC Proforma 5 from faculty of GGDC KDA Karak including faculty of Botany department.

Fig. Faculty satisfaction of the administrative services offered by the department/College.





1-3.4. THE STRONG AND WEAK POINTS OF BS BOTANY PROGRAM

BS Botany Program is design to educate students, to meet the challenges of the modern world and to meet the market needs. Since Fall 2018, after the launching of BS Botany program , the following strong and negative points have been detected.

1-3.4.1. STRONG POINTS OF BS BOTANY PROGRAM

Following are the strong points of BS Botany Program at GGDC KDA Karak:

1. Professionally qualified faculty.
2. Courses according to HEC BS curriculum.
3. Affordable fee structure.
4. Recognized degree
5. Timely admission announcement
6. In program BS subject Courses are offered on regular basis.
7. Enough, spacious classrooms furnished with necessities.
8. Research offered in 7th and 8th semesters.
9. Field trips.
10. Participation of students in co-curricular activities.

1-3.4.2. THE WEAK POINTS OF BS BOTANY PROGRAM

Following are the weak points of BS Botany Program at GGDC KDA Karak:

Weakness: Following deficiencies should be fulfilled to enhance teaching learning quality at Botany Department.

- Subject relevant books availability at college library
- Laboratory with basic instruments/chemicals and equipment to ensure
- Lack of infrastructure i.e., E-library, Equipped Laboratories and Computer Labs, and class rooms with basic facility.

1-3.5. LIST SIGNIFICANT FUTURE DEVELOPMENT PLANS FOR THE PROGRAM.

The Department of Botany plans to undertake the following future development plans.

1. Selection criteria for the students to be set tough for the next semester.
2. Addition of more learning resources for the students including
 - a. E-library.
 - b. Purchase of subject relevant Books.
 - c. Fully equipped Laboratory
 - d. Computer Lab
 - e. Frequent Field Trips for study purpose to different universities, pharmaceutical /agricultural industries and field trips for collection.

1-3.6. DESCRIBE THE ACTIONS TAKEN BASED ON THE RESULTS OF PERIODIC ASSESSMENTS.

Following actions have been taken: (e.g., Revision of Road map, Courses list, Course outlineetc)

1. Replacement of Course: Sociology was replaced with Geography but again Fall 2022, Sociology is included instead of Geography by HoD of Botany deptt., KKKUK), though our suggestion is that the choice should be between Geography and Sociology according to faculty availability.
- 2.. Introduction of a ccourse as a foundation course: Though Research methodology is an optional course but upon our suggestion it was included as a foundation course in the courses of 6th semester but again, it is taught as an optional course in 7 or 8th semester.
3. Field trip was arranged to Qilla Bala Hisar in January2023 to give exposure to BS students.
- 4.. weekly Participation in gardening is compulsory social work activity for all BS students.

1-3.7. DESCRIBE MAJOR FUTURE PROGRAM IMPROVEMENTS PLANS BASED ON RECENT ASSESSMENTS.

Following Program improvement tasks are being planned:

1. Access to e- Library of college.
2. Provision of a desktops at department level.

3. Internet connectivity to the desktop at department level
4. Subject relevant books availability at college library.
5. Request to Principal for purchase of basic 1 laboratory instruments/chemicals and equipment to facilitate research activities.

STANDARD 1-4**THE DEPARTMENT MUST ASSESS ITS OVERALL PERFORMANCE PERIODICALLY USING QUANTIFIABLE MEASURES.****1-4.1.1 UNDERGRADUATES ENROLLED IN LAST FOUR YEARS**

A total of 196 students of BS Botany program have been enrolled since the start of the program in Fall 2018, as clear from the Table . As the BS program is still in its infancy stages therefore, the number of students has not increased at bigger level, however, a gradual increase in the number of students has been observed over passage of time.

1-4.1. 2. AVERAGE COMPLETION TIME

Average Completion Time for Bs Botany program is four years, but a maxim of two extra semesters are allowed.

1-4.1.3. STUDENTS' FACULTY EVALUATION

PT members of BS Botany department conducts the teachers' evaluation survey by sharing teacher evolution proforma with the students of different semesters to ensure unprejudiced feedback. The results show the evaluation lies between the graded score of 3 to 4.8 at maximum graded score of 5.0.

The results of TER for spring 2023 are shown graphically, in section 1.3.2.

1-4. 1.4. RESEARCH

BS botany department has offered research as an optional paper to the students of BS 8th semester to enhance knowledge and skills of students to achieve a core program objective. Hopefully, after successful completion of research by BS Bot 8th semester, the research work will be submitted to reputable HEC Recognized journal for publication.

List of research students of BS 8th semester Batch 02 (Fall-2019-Spring-2023) and their research topics department of Botany Government Girls Degree College KDA Karak under the supervision of Ms. Shahida Naveed for fall semester 2022 and spring 2023.

Name of teacher	No of groups	Registration no	Name of student	Topic of research
Ms.Shahida Naveed	1 st	05-GGDCKDA-BOT-F-19, 14-GGDCKDA-BOT-F-19, 21GGDCKDA-BOT-F-19 and 36-GGDCKDA-BOT-F-19	Alia Noureen, Reema, Bushra Akhtar and Bushra Azam	Study of Allelopathy of <i>Ailanthus altissima</i>

	2 nd	11-GGDCKDA-BOT-F-19 29-GGDCKDA-BOT-F-19 38-GGDCKDA-BOT-F-19	Kalsoom, Nazish and Riffat Shaheen	Morphological responses of wheat (<i>Triticum aestivum</i>) And Maize (<i>Zea mayz</i>)To plant derived smoke solution under heavy toxic metal
	3 rd	08-GGDCKDA-BOT-F-19 09-GGDCKDA-BOT-F-19 37-GGDCKDA-BOT-F-19	Ayosha Haneef, Madeeha, and Jalwa Afrooz	Evaluation of the inhibitory effect of <i>Verbisena encilioides</i>
	4 th	07-GGDCKDA-BOT-F-19, 13-GGDCKDA-BOT-F-19 32-GGDCKDA-BOT-F-19	Ronia Rukhsar, Suman Nawaz and Maria Shafiq	Study of the allelopathy potential of <i>Iphiona</i> <i>grantioides</i>

1-4.1.5. COMMUNITY SERVICE

The Faculty of GGDC KDA Karak is always motivating its students and staff to constantly engage in community services. For this purpose, Social work Committee is constituted in the college. Students are motivated to donate their old clothes, books for helping other needy fellow students. Students are motivated to plant different plants as well as maintenance of the various lawns, which are distributed among different semesters of the three departments.

1-4.1.6. STUDENTS/TEACHERS SATISFACTION

In order to know the satisfactory level of students and teachers, various methods have been adopted.

In-Person Discussion: In general meetings with college Principals, staff is encouraged to discuss their issues related to teaching learning openly.

Feed Back through HEC Standard Proformas: Through standard feed back proformas, students and teachers' satisfactory level is measured.

- a. Graduating students survey
- b. Faculty satisfaction survey Figure.

A. GRADUATING STUDENTS SURVEY

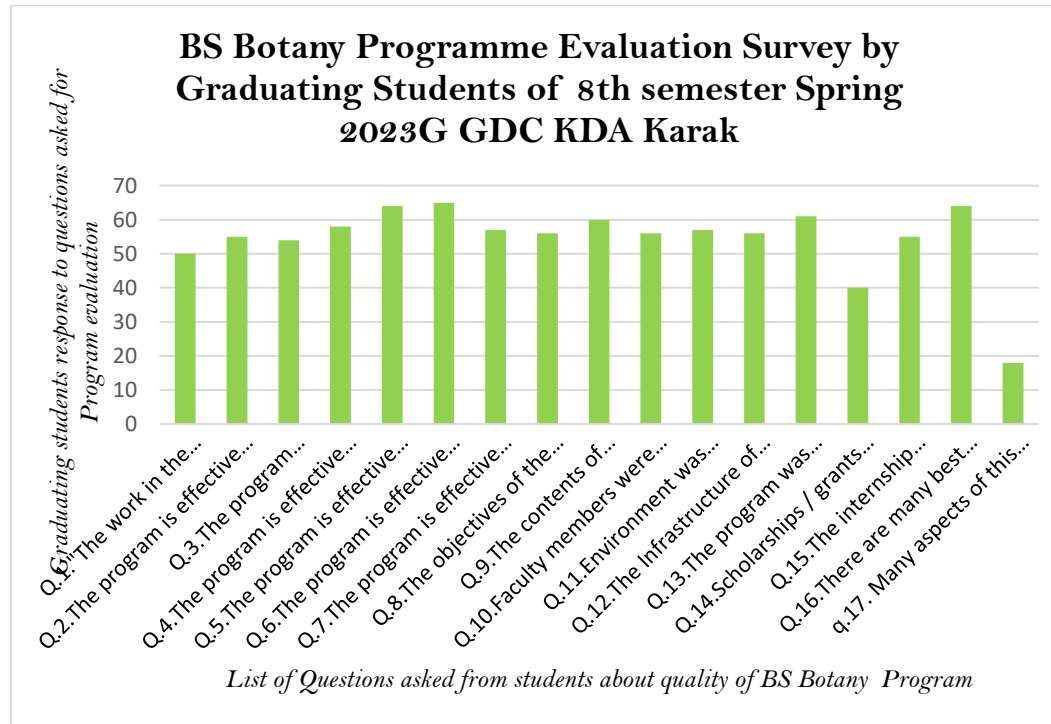
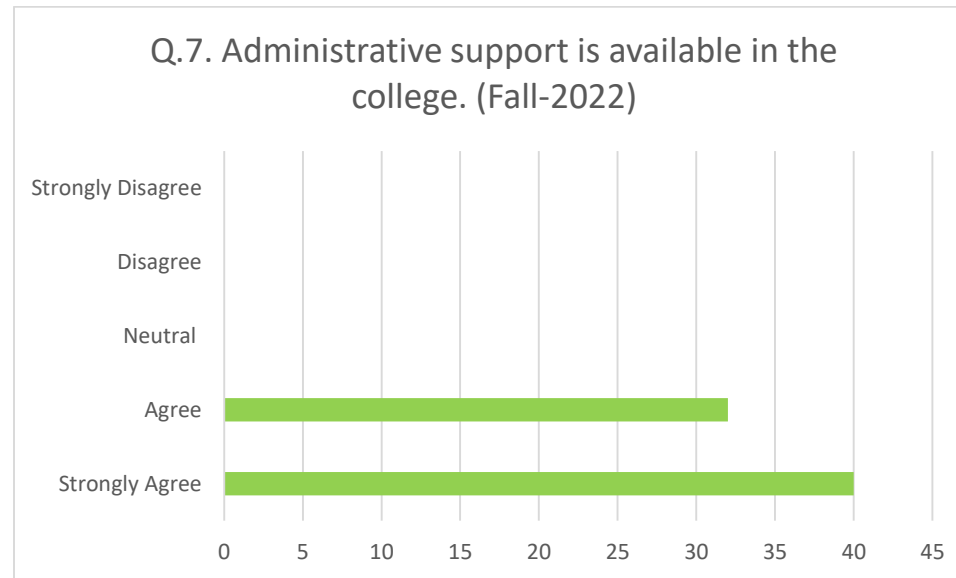


FIG.1-4.1.6.B. GRADUATE STUDENT SATISFACTION OF THE ADMINISTRATIVE SERVICES OFFERED BY THE DEPARTMENT.

/College.

b. RESULTS OF FACULTY SATISFACTION OF THE ADMINISTRATIVE SERVICES OFFERED BY THE DEPARTMENT/COLLEGE.

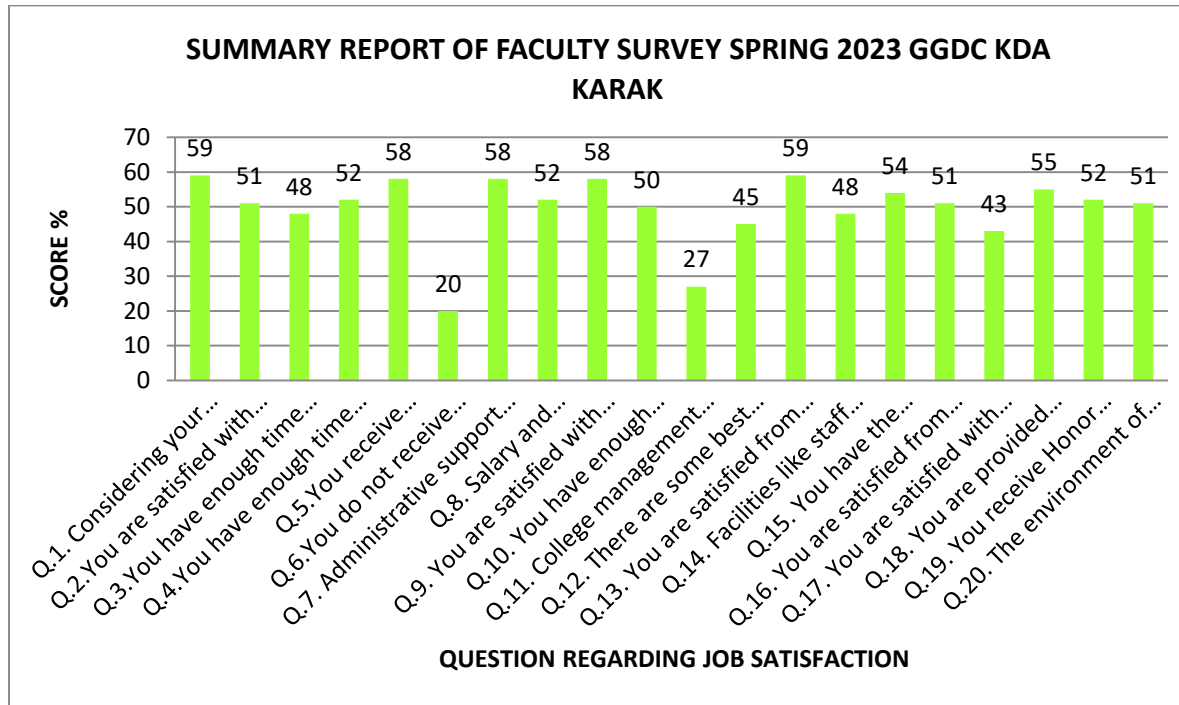


FIG. Results of Faculty satisfaction of the administrative services
offered by the department/College.

STANDARD 1-4-2.**THE DEPARTMENT MUST ASSESS ITS OVERALL PERFORMANCE PERIODICALLY USING QUANTIFIABLE MEASURES****1-4.2.1. ENROLMENT IN BS BOTANY IN LAST THREE (03) YEARS AND STUDENT- FACULTY RATIO:**

Year (Session)	Total Enrolment	Student- faculty ratio	Average time for completing program
Fall -2018	28(new intake)	28-1	4 years
Spring -2019	27(promotes)	27-1	
Fall - 2019	38(new intake) +27(promotes)=65	65-1	4 years
Spring- 2020	promotes 38+25- 2 dropout = 60	60-1	
Fall- 2020	38 (new intake) + promotes 35(3 drop out) +23(2 drop out) = 96	48-1	4 years
Spring 2021	promotes 38 +33(2 drop out) +23 = 94	47-1	

Fall 2021	38(new intake) +(promotes)37(1 drop out) +33+23=63= 131	43-1	4 years
Spring 2022	promotes 128-3 dropouts	32-1	4 years

1-4.2.2. SEMESTER WISE AND STUDENT WISE SUMMARY OF STUDENT PROGRESS IN TERMS OF NEW INTAKE AND PROMOTION.

Semester	1 st	2nd	3rd	4th	5th	6th	7 th	8 th	Total
Fall 2018	27								27
Spring 2019		27							27
Fall 2019	38		25						63
Spring 2020		35		25					60
Fall 2020	38		35		23				96

Spring 2021		38		33		23			94
Fall 2021	38		37		33		23		131
Spring 2022		35		37		33		23	128
Fall 2022	47		31		35		32		145
Spring 2023		38		31		35		32	136

1-4.2.3. EXISTING STUDENTS' RESULT: SEMESTER WISE AVERAGE SGPA AND CGPA

Semes ter	1 st		2nd		3rd		4th		5th		6th		7 th		8 th	
	SGP A	CGP A	SGP A	CGP A	SGP A	CGP A	SGP A	CGP A	SGP A	CGP A	SGP A	CGP A	SGP A	CGP A	SGP A	CGP A
Fall 2018	1.69	1.69														
Spring 2019			2.35	2.09												
Fall 2019	2.98	2.98			3.11	2.55										
Spring 2020			3.75	3.46			3.73	3.20 0								
Fall 2020	3.11	3.11			3.02	3.37			3.40	3.23						
Spring 2021			3.05	3.05			3.75	3.42			3.69	3.31				

Fall 2021	2.74 6	2.82 9			2.99	3.06			3.68	3.08			2.99	3.28		
Spring 2022			2.75	2.85			3.30	3.18			3.52	3.55			3.60	3.51
FALL 2022	?	?			2.72	2.84			3.56	3.58			3.81	3.64		
Spring 2023			await ed				await ed				await ed				await ed	

STANDARD 1-4-2.4.

INDICATE PERCENTAGE OF EMPLOYERS THAT ARE STRONGLY SATISFIED WITH THE PERFORMANCE OF THE DEPARTMENT 'S GRADUATES.

Graduates have been passed out in Sprin 2022 but yet passed out, so no employer survey is possible to be conducted.

STANDARD 1-4-3

INDICATE THE MEDIAN/AVERAGE STUDENT EVALUATION FOR ALL COURSES AND THE % OF FACULTY AWARDED EXCELLENCE IN TEACHING AWARD.

Teacher and course evaluation by students for fall 2021 results are shown in the previous section 1-3 subsection 1-3.1 and 1.3.2.

STANDARD 1-4-4**PERFORMANCE MEASURES FOR RESEARCH ACTIVITIES**

Indicate the % of faculty awarded excellence in research award.

(Survey Form – 6 Section 3 is suggested to use for collection of this information)

Department of Botany GGDC KDA Karak is currently offering only BS Program. and BS Botany research students (F-2018-Spring 2022) have published research articles from their BS research ,

Details of research publications are presented below. Department of Botany GGDC KDA Karak

S. N o	Article Title	Name of Journal	Principal author	Co-Authors	Year
1	Study of Allelopathy of <i>Albizia lebback</i> on the morphological responses of <i>Wheat</i> and <i>Zea mays</i>	Submitted to : The Lighthouse Journal of Natural Sciences - HEART	Sana Shaheen	Shahida Naveed	2023
2	Allelopathic effect of <i>Tamarix aphylla</i> on the emergence and growth parameters of <i>Triticum aestivum</i> and <i>Zea mays</i>	Pure and Applied Biology (PAB): Online ISSN: 2304-2478 https://thepab.org/index.php/journal/index	Naila Khalid	Shahida Naveed	2022

3	Allelopathic effect of <i>Verbicena encelioides</i> on the emergence and growth parameters of <i>Triticum aestivum</i> and <i>Zea mays</i>	Submitted to : Pak. J. Weed Sci. Res. https://www.wssp.org.pk/	Afsheen Khattak	Shahida Naveed	2022
4	Morphological responses of wheat and maize to plant derived smoke solution under salt stress	Pak. J. Weed Sci. Res. https://www.wssp.org.pk/	Farhana Hussain	Shahida Naveed	2022

STANDARD 1-4-5**PLAGIARISM POLICY IMPLEMENTATION:**

- a. Details of Awareness Campaigns / Publicity / Charts, Banners Lectures / Seminar / Workshop etc
- b. Number of 'Turnitin' users in the Deptt;
- c. Number of 'Turnitin' account holders in the Deptt;
- d. Plagiarism cases detected
- e. Details of training session on plagiarism control measures for new faculty members
- f. Number of faculty members using 'Turnitin'
- g. How many Research papers of FMs were checked through 'Turnitin' by HOD?
- h. Are HOD & Senior faculty members satisfied with existing BU policy on Plagiarism control measures?

Though the BS 8th semester students have been introduced with the basic concept of plagiarism and purpose of plagiarism policy and use of Turnitin software but still now our Colleges has no access to Turnitin software .

STANDARD 1-4-6**PRESENT PERFORMANCE MEASURES FOR COMMUNITY SERVICES. THIS MAY INCLUDE NUMBER OF SHORT COURSES PER YEAR, WORKSHOPS AND SEMINARS ORGANIZED:**

Sr. No.	Title of Short course, Workshop/Seminar/Training	Date
1	Faculty Capacity building online training arranged by HEC-HED	7 June - June 2021
2	QAC Training regarding MQS Implementation at BS Colleges arranged by HED – University of Peshawar	24-25 March,2022
3	Workshop regarding SAR preparation, arranged by DQA KKKUK for BS Colleges.	January -2022
4	Workshop regarding SAR preparation, arranged by DQA KKKUK for BS Colleges.	January 2023

STANDARD 1-4.7.

In order to assess the level of satisfaction of faculty members, the Faculty survey was conducted by sharing HEC Prescribed Proforma (Proforma 05: Faculty Satisfaction Survey Form (FSSF))with the faculty members of GGDC KDA Karak, through google forms for Fall 2022. The faculty responses for different questions asked in the questionnaire were summarized in an excel sheet. Below is graphically shown are the result of the responses collected from the Faculty about their level of satisfaction for the administrative services offered by the department/College.

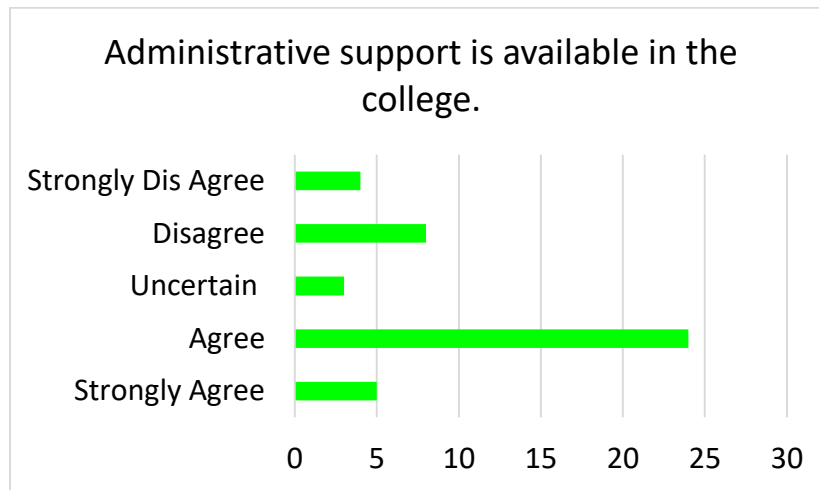


Fig.1-4.7. Faculty satisfaction of the administrative services offered by the department/College.

STANDARD 1-4-8

GRADUATE STUDENT SATISFACTION OF THE ADMINISTRATIVE SERVICES OFFERED BY THE DEPARTMENT.

Graduate Survey (Proforma 03) was conducted in May 2022, to seeks graduating students' input on the quality of education they received in their program and the level of preparation they had at college. The purpose

of this survey was to assess the quality of the academic programs. Students recorded responses are shown by the chart below. The summary of the Graduate survey is attached.

Following are the suggestions given by students for BS Botany program improvement.

1. Though it is best program but still it needs improvement.
2. College needs to update the infra structure and laboratories and more extra activities relevant to courses should be included in the course contents of each course.
3. upgradation of laborites and infrastructure and extra activities for students learning are direly needed for the improvement of this department. Advanced subjects should be added.
4. There should be more focus on practical work.

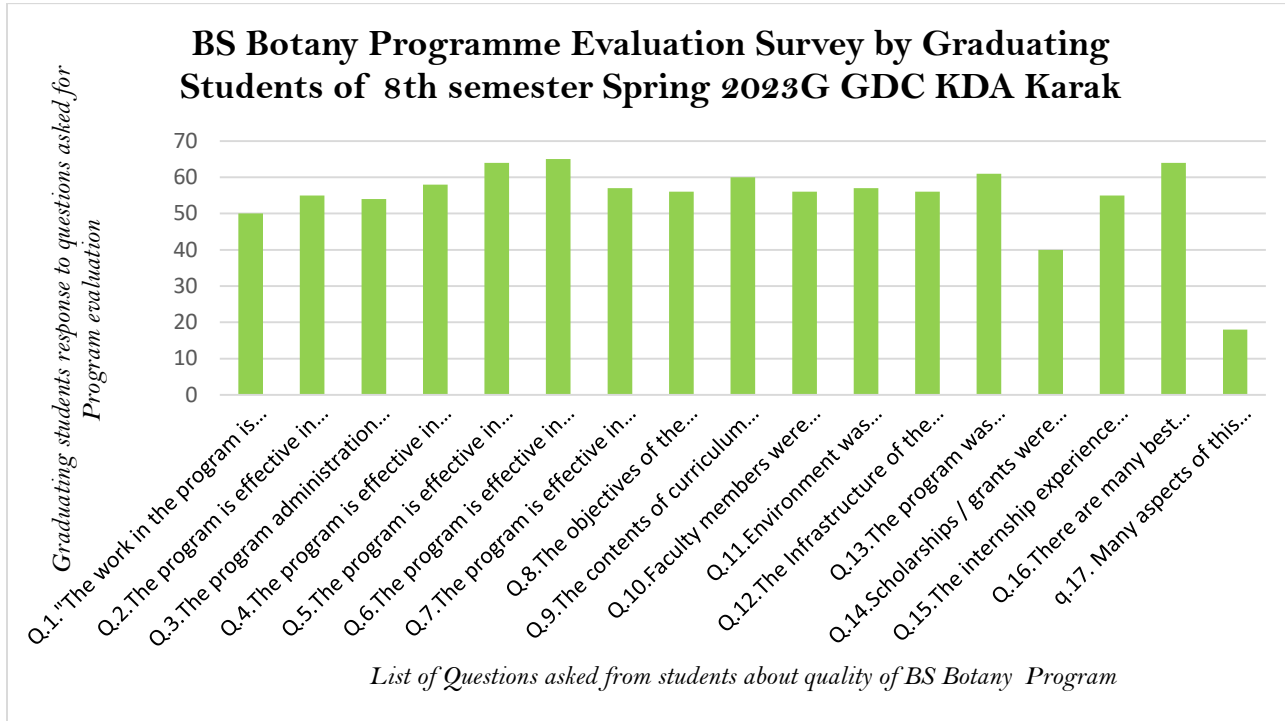


Fig.1-4.8. Graduate Student satisfaction of the administrative services offered by the department.

/College.

Criterion - 2

Curriculum Design and Organization

CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION

2.1 TITLE OF DEGREE PROGRAM: TITLE OF THE DEGREE OFFERED AT DEPARTMENT OF BOTANY GGDC KDA IS BS BOTANY

2.2 DEFINITION OF CREDIT HOURS:

ONE (1) CREDIT HOUR IS ONE (1) HOUR OF THEORY LECTURE OR THREE (3) HOURS OF PRACTICAL/FIELD ASSIGNMENT IN A WEEK.

Duration of Program: The duration for completion of degree of BS Program is 4 Years.

2.3 DEGREE PLAN: In the BS Degree, courses are a mix of Core courses, elective courses, General courses, courses of basic sciences, courses of new technologies and Course of Mathematics.

TABLE2. 1: FOLLOWING IS THE LIST OF CORE COURSES TAUGHT IN THE SELECTED PROGRAM, SHOWN IN SEMESTER.

	Course Code	Course Title	Credit Hours
1	BOT101	Diversity of plants	04

2	BOT102	Plant systematics, anatomy and development/embryology	04
3	BOT211	Cell biology, genetics and evolution	04
4	Bot.213	Plant physiology and ecology	04
5	BOT.214	Foundation-V (Biodiversity & Conservation)	04
6	BOT321	Bacteriology and virology	03
7	BOT322	Phycology and bryology	03
8	BOT323	Mycology and plant pathology	03
9	BOT324	Diversity of vascular plants	03
10	BOT325	Plant systematics	03
11	BOT326	Anatomy of vascular plants	03
12	BOT 327	Genetics-I	03
13	BOT328	Plant biochemistry-I	03
14	BOT329	Plant ecology-I	03
15	BOT330	Plant physiology-I	03
16	BOT331	Research Methodology	02
17	BOT431	Molecular biology	03
18	BOT432	Plant biochemistry-II	03

19	BOT433	Plant ecology-II	03
20	BOT212	Biostatistics	02
21	BOT434	Plant physiology-II	03
22	BOT435	Genetics-II	03
23	BOT436	Environmental biology	03
	Total		74

TABLE2. 2: FOLLOWING IS THE LIST OF OVERALL ELECTIVE COURSES IN THE BS BOTANY PROGRAM. TOTAL 10 ELECTIVE SUBJECTS “30 CREDIT HOURS”). LIST OF ELECTIVE COURSES:

Course codes	Electives	Credit. Hrs	PR / CR
BOT437	ECONOMIC BOTANY	3	None
BOT438	PHARMACOGNOSY AND MEDICINAL PLANTS	3	None
BOT439	PHILOSOPHY OF SCIENCE	3	None
BOT440	PLANT STRESS PHYSIOLOGY	3	None
BOT441	PLANT TISSUE AND CELL CULTURE	3	None

BOT442	PLANT NUTRITION AND SOIL FERTILITY	3	None
BOT443	EMBRYOLOGY OF ANGIOSPERM	3	None
BOT445	SALINITY AND WATER LOGGING	3	None
BOT446	BIOEHTICS	3	None
BOT447	RESEARCH PROJECT	3	None

TABLE2. 3: FOLLOWING IS THE LIST OF OVERALL GENERAL COURSES INCLUDING CONCEPTS OF ARTS/HUMANITY, BASIC SCIENCESAND TECHNOLOGY IN THE BS BOTANY PROGRAM.

	COURSE CODE	COURSE TITLE	CREDIT HOURS
1	ENG101	ENGLISH-I (FUNCTIONAL ENGLISH)	03
2	ENG102	ENGLISH-II (COMMUNICATION SKILLS)	03
3	ENG211	ENGLISH-III (TECHNICAL REPORT, WRITING & PRESENTATION SKILL)	03
4	ENG212	ENGLISH-IV STUDY SKILLS	03
5	CS101	INTRODUCTION TO COMPUTER	03
6	MATH100	MATHEMATICS	03
7	PS101	PAKISTAN STUDIES	02

8	RS 101	ISLAMIC STUDIES	02
9	ZOO101	ZOOLOGY-I-PRINCIPALS OF LIFE -I	03
10	ZOO102	ZOOLOGY-II-PRINCIPALS OF LIFE -II	03
11	ZOO 211	ZOOLOGY-III-INVERTEBRATES	03
12	ZOO 212	ZOOLOGY-IV-CHORDATES	03
13	CHEM101	BASIC INORGANIC CHEMISTRY	03
14	CHEM102	BASIC ORGANIC CHEMISTRY-I	03
15	CHEM211	BASIC PHYSICAL CHEMISTRY-I	03
16	CHEM212	BASIC ORGANIC CHEMISTRY-II	03
17	GEO 101	GEOGRAPHY	03
	TOTAL		48

2.4. CURRICULUM BREAKDOWN:

The curriculum breakdown consists of detail of courses semester wise. It should be kept in mind that there are total 134 credit hours in the BS Botany program. From 1st semester to 4th semester there are 69 credit hours (18 credit hours each semester in 1st and 2nd , 16 in 3rd and 17 in 4th semester). Whereas from 5th till 8th semester there are 65 credit hours (15 credit hours each in 5th and 8th , 17 in 6th and 18 in 7th semester).

Semester		Category (Credit Hours)				
		Math & Basic Science		Core Courses	Humanities & Social Sciences	Technical Electives/Others
1 st Semester	Course Titles	Maths	Basic Science			
	ENG101				03	
	PS101				02	
	ZOO101		03			
	CHEM101		03			
	BOT101			04		
	MATH100	03				
	Total	18 Credit Hours				
Note: Eng101: English I (Functional English), PS101: Pakistan Studies, Zoo101: Zoology-I, Chem101: Basic Inorganic Chemistry, Bot101: Diversity of Plants, Math100: Mathematics						
Semester	Course Titles	Category (Credit Hours)				
		Math & Basic Science		Core Courses	Humanities & Social Sciences	Technical Electives/Others

2 nd Semester		Maths	Basic Science			
	ENG102				03	
	CS101					03
	ZOO102		03			
	CHEM102		03			
	BOT102			04		
	RS 101				02	
Total	18 Credit Hours					
Note: ENG102: ENGLISH-II (Communication Skills), CS101: INTRODUCTION TO COMPUTER, ZOO102: ZOOLOGY-II, CHEM102: BASIC ORGANIC CHEMISTRY-I, Bot102: Plant systematics, anatomy and development/embryology, RS 101: ISLAMIC STUDIES						

3rd Semester & 4th Semester

Semester	Course Titles	Category (Credit Hours)				
		Math & Basic Science		Core Courses	Humanities & Social Sciences	Technical Electives/Others
		Maths	Basic Science			

3 rd Semester	ENG211				03	
	GEO 101		03			
	ZOO 211		03			
	CHEM211		03			
	BOT211			04		
Total	16 Credit Hours					

Note: ENGLISH-III (**Technical Report, Writing & Presentation Skill**), GEO 101: GEOGRAPHY, ZOO 211: ZOOLOGY-III, CHEM211: BASIC PHYSICAL CHEMISTRY-I, BOT211: CELL BIOLOGY, GENETICS AND EVOLUTION

Semester		Category (Credit Hours)				
		Math & Basic Science		Core Courses	Humanities & Social Sciences	Technical Electives/Others
4 th Semester	Course Titles	Maths	Basic Science			
	Eng.212				03	
	Bot.213			04		
	Zoo 212		03			

	Chem211		03			
	Bot.214			04		
Total	17 Credit Hours					

Note: ENG211: English IV , Bot.213: Plant Physiology and Ecology, ZOO 212: General-VII (Animal Diversity-II), CHEM211: Basic Organic Chemistry-II, B0t.214: Foundation-V (Biodiversity & Conservation)

Semester		Category (Credit Hours)				
		Math & Basic Science		Core Courses	Humanities & Social Sciences	Technical Electives/Others
5 th Semester	Course Titles	Maths	Basic Science			
	Bot321			03		
	Bot322			03		
	Bot323			03		
	Bot324			03		
	Bot325			03		
Total	15 Credit Hours					

Note: BOT321: BACTERIOLOGY AND VIROLOGY, BOT322: PHYCOLOGY AND BRYOLOGY, BOT323: MYCOLOGY AND PLANT PATHOLOGY, BOT324: DIVERSITY OF VASCULAR PLANTS, BOT325: PLANT SYSTEMATICS

Semester		Category (Credit Hours)				
		Math & Basic Science		Core Courses	Humanities & Social Sciences	Technical Electives/Others
6 th Semester	Course Titles	Maths	Basic Science			
	Bot326			03		
	Bot 327			03		
	Bot328			03		
	Bot329			03		
	Bot330			03		
	Bot331			03		
Total	18 Credit Hours					

BOT326: Anatomy of vascular plants, BOT 327: Genetics-I, BOT328: Plant Biochemistry-I, BOT329: Plant ecology-I, BOT330: Plant physiology-I, Bot331: Research Methodology

Semester		Category (Credit Hours)				
		Math & Basic Science		Core Courses	Humanities & Social Sciences	Technical Electives/Others
7 th Semester	Course Titles	Maths	Basic Science			
	Bot431			03		
	Bot432			03		
	Bot433			03		
	Bot212			03		
	Bot 4**			03		
	Bot 4**			03		
Total	18 Credit Hours					
Note: BOT431: MOLECULAR BIOLOGY, BOT432: PLANT BIOCHEMISTRY-II, BOT433: PLANT ECOLOGY-II, BOT212: BIostatISTICS, BOT 4**: ELECTIVE-I, RESEARCH PROJECT/ INTERNSHIP/ OPTIONAL PAPER, BOT 4**: ELECTIVE-II						
Semester	Course Titles	Category (Credit Hours)				
		Math & Basic Science		Core Courses	Humanities & Social Sciences	Technical Electives/Others

8 th Semester		Maths	Basic Science			
	BOT434			03		
	BOT435			03		
	BOT436			03		
	BOT4**			03		
	BOT4**			03		
Total	15Credit Hours					
Note: BOT434: PLANT PHYSIOLOGY-II, BOT435: GENETICS-II, BOT436: ENVIRONMENTAL BIOLOGY, BOT4**: ELECTIVE-III, RESEARCH PROJECT/ INTERNSHIP/ OPTIONAL PAPER, BOT4**: ELECTIVE-IV						

STANDARD 2-5:

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

2-5.1 GROUP 1: TECHNOLOGY

CS101: INTRODUCTION TO COMPUTER

2-5.2. GROUP 2: BASIC SCIENCES

ZOO101: ZOOLOGY-I, CHEM101: BASIC INORGANIC CHEMISTRY, ZOO102: ZOOLOGY-II, CHEM102: BASIC ORGANIC CHEMISTRY-I, GEO 101: GEOGRAPHY, ZOO 211: ZOOLOGY-III, CHEM211: BASIC PHYSICAL CHEMISTRY-I, ZOO 212: GENERAL-VII (ANIMAL DIVERSITY-II), CHEM211: BASIC ORGANIC CHEMISTRY-II.

2-5.3 GROUP 3: GENERAL, HUMANITIES AND SOCIAL SCIENCES

ENG101: ENGLISH I (FUNCTIONAL ENGLISH), **PS101: PAKISTAN STUDIES**, **ENG102: ENGLISH-II** (COMMUNICATION SKILLS), **ENGLISH-III** (TECHNICAL REPORT, WRITING & PRESENTATION SKILL), **ENG211: ENGLISH IV**

2.5.4 GROUP 4: MATHEMATICS AND ANALYTICAL SUBJECTS

MATH100: MATHEMATICS, **BOT212: BIostatistics**

2-5.5 GROUP 5: FOUNDATION AND CORE COURSES OF BOTANY

BOT101: DIVERSITY OF PLANTS, **BOT102: PLANT SYSTEMATICS**, **ANATOMY AND DEVELOPMENT/EMBRYOLOGY**, **BOT211: CELL BIOLOGY**, **GENETICS AND EVOLUTION**, **BOT.213: PLANT PHYSIOLOGY AND ECOLOGY**, **BOT.214: FOUNDATION-V (BIODIVERSITY & CONSERVATION)**, **BOT321: BACTERIOLOGY AND VIROLOGY**, **BOT322: PHYCOLOGY AND BRYOLOGY**, **BOT323: MYCOLOGY AND PLANT PATHOLOGY**, **BOT324: DIVERSITY OF VASCULAR PLANTS**, **BOT325: PLANT SYSTEMATICS**, **BOT326: ANATOMY OF VASCULAR PLANTS**, **BOT 327: GENETICS-I**, **BOT328: PLANT BIOCHEMISTRY-I**, **BOT329: PLANT ECOLOGY-I**, **BOT330: PLANT PHYSIOLOGY-I**, **BOT431: MOLECULAR BIOLOGY**, **BOT432: PLANT BIOCHEMISTRY-II**, **BOT433: PLANT ECOLOGY-II**, **BOT434: PLANT PHYSIOLOGY-II**, **BOT435: GENETICS-II**, **BOT436: ENVIRONMENTAL BIOLOGY**,

2-5.6 GROUP 6: RESEARCH AND PROJECTS

BOT 447: RESEARCH PROJECT (I AND II), BOT331: RESEARCH METHODOLOGY

Courses/Groups of Courses	Program Objectives				
	1	2	3	4	5
	Produce competent botanists	To impart worth learning in the field	To impart technical and logical skills	Create facilities for post studies	Establish the platform for research
Group 1: Technology			*		
Group 2 : Basic Sciences	*	*			
Group 3 : General, Humanities and Social Sciences		*	*	*	
Group 4: Mathematics and Bio- State	*	*	*		
Group 5: Foundation and Core courses of Botany	*	*			*

<div>GROUP 6 :</div> <div>RESEARCH AND</div> <div>PROJECTS</div>	*	*		*	*
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STANDARD 2-6:
THEORETICAL BACKGROUND, PROBLEMS ANALYSIS AND SOLUTION DESIGN MUST BE STRESSED WITHIN THE PROGRAM’S CORE MATERIAL.

Table2. 3: Matching the elements and courses

Elements	Courses
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Theoretical background	BOT101: DIVERSITY OF PLANTS, BOT102: PLANT SYSTEMATICS, ANATOMY AND DEVELOPMENT/EMBRYOLOGY, BOT211: CELL BIOLOGY, GENETICS AND EVOLUTION, BOT.213: PLANT PHYSIOLOGY AND ECOLOGY, BOT.214: FOUNDATION-V (BIODIVERSITY&CONSERVATION), BOT321: BACTERIOLOGY AND VIROLOGY, BOT322: PHYCOLOGY AND BRYOLOGY, BOT323: MYCOLOGY AND PLANT PATHOLOGY, BOT324: DIVERSITY OF VASCULAR PLANTS, BOT325: PLANT SYSTEMAT BOT326: ANATOMY OF VASCULAR PLANTS, BOT 327: GENETICS-I, BOT328: PLANT BIOCHEMISTRY-I, BOT329: PLANT ECOLOGY-I, BOT330: PLANT PHYSIOLOGY-I, BOT431: MOLECULAR BIOLOGY, BOT432: PLANT BIOCHEMISTRY-II, BOT433: PLANT ECOLOGY-II, BOT434: PLANT PHYSIOLOGY-II, BOT435: GENETICS-II, BOT436: ENVIRONMENTAL BIOLOGY, ZOO101: ZOOLOGY-I, CHEM101: BASIC INORGANIC CHEMISTRY, ZOO102: ZOOLOGY-II, CHEM102: BASIC ORGANIC CHEMISTRY-I, GEO 101: GEOGRAPHY, ZOO 211: ZOOLOGY-III, CHEM211: BASIC PHYSICAL CHEMISTRY-I, ZOO 212: GENERAL-VII (ANIMAL DIVERSITY-II), CHEM211: BASIC ORGANIC CHEMISTRY-II.
Problem analysis	MATH100: MATHEMATICS, BOT212: BIOSTATISTICS, ENGLISH-III (TECHNICAL REPORT, WRITING & PRESENTATION SKILL),
Solution design	BOT 447: RESEARCH PROJECT (I AND II), BOT331: RESEARCH METHODOLOGY, CS101: INTRODUCTION TO COMPUTER

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STANDARD 2-7: THE CURRICULUM MUST SATISFY THE CORE REQUIREMENTS FOR THE PROGRAM, AS SPECIFIED BY THE RESPECTIVE ACCREDITATION BODY

BS Botany program is under accreditation by HEC. The program fulfils the requirement of Higher Education Commission (HEC). The courses taught in the program is according to the guidelines of HEC. The following table shows credit hours assigned to each category.

Table2. 4: Allocation of credit hours to respective courses

Program BS Botany	General Education Arts & Humanities	Math & Basic Sciences	Discipline Specific Foundation Courses	Major courses	Elective within the major including research project	Others / Technical	Total Courses/Credit hours
No of courses	6	10	8	15	4	1	44
Credit Hours	16	30	29	44	12	03*	134

*Introduction to Computing

STANDARD 2-8: THE CURRICULUM MUST SATISFY THE MAJOR REQUIREMENTS FOR THE PROGRAM, AS SPECIFIED BY HEC, THE RESPECTIVE ACCREDITATION BODY/COUNCILS

The department follows the curriculum approved by BOS of KKKUK /HEC for BS Botany program.

STANDARD 2-9: THE CURRICULUM MUST SATISFY GENERAL EDUCATION, ARTS, AND PROFESSIONAL AND OTHER DISCIPLINE REQUIREMENTS FOR THE PROGRAM, AS SPECIFIED BY THE RESPECTIVE ACCREDITATION BODY/COUNCIL.

The students are required to take all the subjects set in the course curriculum and recommended by the academic council.

STANDARD 2-10 INFORMATION TECHNOLOGY COMPONENT OF THE CURRICULUM MUST BE INTEGRATED THROUGHOUT THE PROGRAM

Information Technology (IT) plays vital role in higher education. Therefore, it is given due importance in the curriculum. The IT related courses are taught in the program to fully equip the students with new technologies in the market. In order to equip the students with computer and IT skills subjects are offered as integral part of the program. In addition to this application of different subjects are set through laboratory practical.

Table2. 5: Detail of IT related courses

S.No	IT Courses	Credit hours
1	CS101: INTRODUCTION TO COMPUTER	03

STANDARD 2-11: ORAL AND WRITTEN COMMUNICATION SKILLS OF THE STUDENT MUST BE DEVELOPED AND APPLIED IN THE PROGRAM.

The oral and written communication skills of the students have given importance in the program curriculum. The following courses are included in the program curriculum. In order to develop writing and communication skills the subject of communication skills has been introduced. Students give presentations as part of their preparations to remove out hesitation.

Table2. 6: courses for written communication

S.No	Subjects for oral written communication skills	Credit hour
1	Eng101: English I (Functional English)	03
2	ENG102: ENGLISH-II (Communication Skills)	03
3	ENGLISH-III (Technical Report, Writing & Presentation Skill)	03
4	ENG211: English IV Study Skills and Time management	03

CRITERION 3: LABORATORY AND COMPUTING FACILITY

3.1. DESCRIBE THE LABORATORY/ COMPUTER FACILITIES THAT ARE AVAILABLE FOR USE IN THE PROGRAM UNDERASSESSMENT.

Students of BS Botany Program are provided with the following labs.

Sr . No	Laboratory Title	Location	Objectives	Adequacy for instruction	Course Taught	Major Apparatus/ Major Equipment	Safety Regulations
1	Botany Lab.	Science Block ,GGDC KDA Karak	To provide students to perform basics practicals of botany.	Guidance is provided at start of practicals	Diversity of plants. Plant systematics , anatomy and developmental embryology	Light / Binocular stereo microscope, Electric stirrer , Weighing Balance, Glassware, Chemicals, Prepared slides,specimens, Dry ovan	Safety regulations are followed and are regularly reminded to the students

2	Zoology Lab	Same as above	To provide students to perform basics practicals of zoology.	Guidance is provided at start of practicals	Zoology-I Zoology-II Zoology-III Zoology-IV	Prepared slides, specimens, Spectrophotometer Digital weighing balance, stuffed animals	Safety regulations are followed and are regularly reminded to the students
3.	Chemistry Lab.	Same as above	To provide students to perform basics practicals of Chemistry	Guidance is provided at start of practicals	Chemistry-I Chemistry-II Chemistry-III Chemistry-IV	800-CE centrifuge Hot plate, Oven, Autoclave, Distillatory pH meter Water Bath	Safety regulations are followed and are regularly reminded to the students

Standard 3-2. Laboratory manuals/documentation/Instruction for experiments must be available and readily accessible to faculty and students.

The above three mentioned labs are maintained and taken care of three lab assistants and lab attendents. At the time of practicals ,students are guided,facilitated by the lab personels.

The students of BS Botany program are in a desperate need of Computer lab where where students can search on internet the material they need for assignments, presentations and can compose their assignments, thesis and where courses of technology can be taught. Similarly a multimedia lab is also needed for lectures demonstration, seminars and presentation.

STANDARD 3-3. THE ABOVE THREE MENTIONED LABS ARE MAINTAINED AND TAKEN CARE OF THREE LAB ASSISTANTS AND LAB ATTENDANTS. AT THE TIME OF PRACTICAL'S, STUDENTS ARE GUIDED, FACILITATED BY THE LAB PERSONALS.

Sr. No.	Title of the Laboratory	Support Personnel	Level of support	Nature and extent of instructional support
1	Botany Lab.	Ms.Shahana	Lab Incharge(Lab Assistant)	Guidance and provision of practical materials /supervision
2	Zoology Lab	Ms.Hijran	Lab Incharge(Lab Assistant)	Guidance and provision of practical materials /supervision
3	Chemistry Lab.	Ms.Fouzia	Lab Incharge(Lab Assistant)	Guidance and provision of practical materials /supervision

STANDARD 3-4

THE COLLEGE COMPUTING INFRASTRUCTURE AND FACILITIES MUST BE ADEQUATE TO SUPPORT PROGRAM'S OBJECTIVES

BS BOTANY DEPARTMENT IS IN DIRE NEED OF A COMPUTER LAB TO GIVE STUDENTS BASIC EDUCATION OF TECHNOLOGIES AND FACILITATE THEM IN ORDER TO ACHIEVE THE LEARNING OUTCOMES OF BS BOTANY PROGRAM. AT PRESENT THERE IS NO SUCH FACILITY AVAILABLE AT DEPARTMENT OF BOTANY.

CRITERION 4: STUDENT SUPPORT AND COUNSELING

The BS Botany program was launched in Fall 2018 at GGDC KDA Karak. Currently it has five batches of enrolled students, so far i.e., Batch 01 (Fall-2018- Spring- 2022), Batch 02 (Fall 2019 -Spring 2023), Batch 03 (Fall-2020 - Spring 2024) , Batch 04 (Fall 2021-Spring 2025) and Batch 05 (Fall2022-Spring 2026). The batch 01 students have completed their degree in June 2022. Though college administration is trying its best to provide good learning facilities and environment to students but still due to lacking of funds, the departments is lagging behind in providing basics and need of the day facilities to its BS students.

STANDARD 4-1

COURSES MUST BE OFFERED WITH SUFFICIENT FREQUENCY AND NUMBER FOR STUDENTS TO COMPLETE THE PROGRAM IN A TIMELY MANNER

BS Botany program at Department of Botany follow the BS Botany curriculum approved by Department of Botany of KKKUK. The courses offered are a mix of arts-social sciences, Mathematical and basic sciences, foundation and major courses and optional/elective courses in a specific logical order, causing no delay in the completion of the degree program. Elective courses are offered after the mid half of the degree program for which the students need to pass all the pre-requisite courses first. Cross departmental courses are offered with help of English department, or by visiting instructors.

STANDARD 4-2

COURSES IN THE MAJOR AREA OF STUDY MUST BE STRUCTURED TO ENSURE EFFECTIVE INTERACTION BETWEEN STUDENTS, FACULTY AND TEACHING ASSISTANT.

BS Courses offered at Botany department are taught by permanent or hired faculty members. Course allocation is made under the direction of head of the department and courses are allocated to the teachers in their respective fields.

During the semester, all faculty members are available to guide the students. Teachers guide/ counsel the students in the class and labs. They also provide counseling during students counseling hours. Students feed back about course contents and instructor is sought after the completion of courses during each semester. Faculty of botany Department try its best to support their students to complete the program efficiently per the schedule and students have complete support from their course teacher/instructor and course instructor fully corporate with the students to give them timely advices regarding subject related field and career. Students have close interaction with their teachers for the guidance related to prepare their assignments and presentations. Each instructor adopts her way to interact with his students either in the class or during the office hours. However no proper procedure is adopted for student teacher interaction. Improvement needs in this area to fulfill the requirement

STANDARD 4-3

GUIDANCE ON HOW TO COMPLETE THE PROGRAM MUST BE AVAILABLE TO ALL STUDENTS AND ACCESS TO ACADEMIC ADVISING MUST BE AVAILABLE TO MAKE COURSE DECISIONS AND CAREER CHOICES.

At the satrat of each semester students are guided about the courses in which the students wants to be registered by the HoDs , controller of Exam and QEC FP. Further they are provided guidance about the degree requirements and about the career choices.

Furthermore:

1. All the teachers of the department/college are available in college up to 02:00 pm, to guide students about courses.
2. Department / college notice board is always updated with new events, activities in the college about academic activities of Botany Department as well as in the college.
3. Teachers have made What's App groups with students, and course relevant material is shared with students to satisfy their queries regarding courses and Use electronic media to show documentaries, Practical work and pictures to enhance the curriculum quality.

CRITERION 5: PROCESS CONTROL

The admission criterion for BS program is set by the Directorate of Higher Education, Kp following the guidelines of HEC. In each Department there is an Admission committee which is responsible for the monitoring of admission process. The admission is done once a year, in fall semester.

STANDARD 5-1. THE PROCESS BY WHICH STUDENTS ARE ADMITTED TO THE PROGRAM MUST BE BASED ON QUANTITATIVE AND QUALITATIVE CRITERIA AND CLEARLY DOCUMENTED.

5-1.1 ADMISSION PROCEDURE OF BS BOTANY

1. The admission to BS Botany program is advertised once in a year soon after the result declaration of FA/FSc/Intermediate examination. The admission is advertised in all known daily newspaper of the country. All the eligible candidates fulfilling the requirement can apply for the program within the specified date mentioned in advertisement.
1. Prospectus and admission forms can be obtained from the Admission Office of GGDC KDA Karak. Departmental Admission Committee of Botany Department is for the initial documents verification of the candidates. After a thorough scrutiny and sorting, the names of eligible candidates are notified.
2. Female candidates having domicile of District Karak are eligible for admission.
3. Maximum age limit is 20 years on the last date of receipt of applications for BS Botany Program.
4. Age relaxation shall be granted in special cases by the Competent Authority up to 2 years.
5. The admission to BS program will be on merit to be based on academic performance in intermediate and other factors as may be prescribed by the competent authority.
6. A candidate may apply for three disciplines/subjects on a single form, but she must prioritize her options in the admission form.
7. Once submitted, no changes/modifications are acceptable in the admission form.
8. A candidate gets to lose her right for admission, if she provides false information in the admission form. Moreover, if the documents attached were found fake, they would be considered guilty of gross misconduct and such act shall be highly condemned.

9. The applicant having 3rd division or having obtained marks less than 45% are not eligible to apply.
 10. Any candidate who was punished (major penalty) by her parent institution/university, for the act of indiscipline and objectionable activities, will not be allowed admission in the college.
 11. A student at the time of first admission/enrolment with any communicable disease or mental or physical disability which may stand in the way of her selected field of study may be denied admission
 12. The candidates and their parents have to give an undertaking to the effect that they will abide by the Rules and Regulations of the college and such other instructions as may be issued by the competent authority from time-to-time.
 13. Each student has to submit an affidavit not to take part in political activities detrimental to the academic environment of the college.
 14. The final authority of admission is with the Principal. The admission committee is a recommendatory body.
6. All the admissions are made online. The detailed procedure is given on the HED /College website and community is made aware about admissions through social and print media.
7. The admission will be granted on open merit on the basis of following formula:

Total marks in F.sc + marks obtained in the major subject (where applicable). However, *Hafiz-e-Quran will be given additional marks.

DOCUMENTS TO BE SUBMITTED WITH THE ADMISSION FORM:

The following documents must be submitted with the completed application form:

1. Three recent color passport sized photographs, dully attested.
2. Attested copies of Detailed Marks Certificate.
3. Attested copies of provisional/ original certificates.
4. Attested copy of character certificate.
5. Attested copy of CNIC of the applicant/father/ guardian.
6. Migration certificate
7. Original undertaking on judicial stamp paper of Rs. 20/- each, duly attested by politician first class magistrate as PS specimen provided in the prospectus (admitted candidates only).

8. Disable applicants applying against the reserved seats must attach the relevant documents of eligibility with the form.

5-1.2. ELIGIBILITY CRITERIA FOR ADMISSION:

FA/ FSc /Intermediate or equivalent examination with at least 45% marks. The selected candidates for admission must present their original documents before the committee on the announced date.

5-1.3. ALLOCATION OF SEATS:

Table 5. 1: Distribution of seats in department is given as under:

Category	Allocation of Seats
Open Merit	40
District local	20
District Non Local	20

5-1.4. MIGRATION POLICY:

A student from another educational institution, who intends to migrate to the college , shall meet the following requirements:

- 1.A genuine and plausible reason for migration.
- 2.Production of a certificate of good character from her parent institution.
- 3.Production of detailed marks certificate and syllabi of courses she studied for equivalence purposes.
- 4.Migration certificate from the institution/University last attended.

5-1.5. CREDIT TRANSFER POLICY:

1. Students desiring to transfer their credits, earned at other institutions, will be accepted under the following conditions:
2. Credits have been earned from institutions recognized / accredited by HEC.
3. Original transcript is produced along with photocopy.

4. Course outlines, duly signed by the institute, should be produced for evaluation.
5. Credits will be acceptable for undergraduate courses passed with at least 'C' grade / 2.0 out of 4.0 GP or equivalent.
6. Credits from other institution will be evaluated by the equivalence/evaluation committee on a course-to-course basis with the courses offered by the University.
7. Letter grades / grade points of the transferred courses will not be counted towards CGPA of courses of the University.
8. The transferred courses will appear in the full transcript of the College .
9. Character certificate, from the last attended institution, stating that the student has not been expelled on misconduct, indiscipline, undesirable activities, may be produced.
10. In case of acceptance and willingness of the student for admission, he will have to produce migration certificate from the last attended institution.

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 AND MONITORING STUDENTS

In each department student file of all admitted students is maintained and keep it updated .The record include the Name, Father's Name, Date of Birth, Permanent address, CNIC No. of the candidate, DMC of SSC and intermediate Examination, details of any other examination and result of every University Examination.

Morover , the list of courses is offered for a particular semester. Students are facilitated to fill their Course registration proformas by their consultant. Course code, Course title and name of the instructor.

Academic Progress of Students: In semester system, monitoring of student progress is evaluated by tests, surprise quizzes, assignments, class presentation, projects and final exam at the end of the semester.

Internal Evaluation: Attendance + Class participation = 5 %

Class Presentation = 5 %

Home Assignment = 10 %,

Test and Quizzes = 10 %

Mid Term = 25 %

Final Term = 40 % In addition to the above criteria, the experts of the subject can add any addition modes of evaluation as required by the nature of the subject.

5-2.2 STUDENTS MONITORING AND PROGRESS EVALUATION

Students are evaluated through assignments, quizzes, presentations, mid-term exam and final examination at the end of each semester. Moreover, 75% attendance is mandatory for every student to sit in semester final examination.

Table 5. 2: Internal Evaluation

Evaluation Criteria	% of Marks
Class Presentation, Home Assignment, Quizzes etc + Attendance	1+2+3+4= 20
Mid term	30
Final Term	50
Total	100

Student Progress Monitoring is carried out by quantifying the final GPA. The department takes different measures if a student failed to achieve the desired CGPA 2.0. Only qualified students in each semester are allowed to join the next semester.

GRADING SYSTEM

Grading Policy

Marks % age	Letter grades	Grade point
90 – 100	A+	4.00
85 – 89	A	4.00
80 – 84	A-	3.66 – 3.93
75 – 79	B+	3.33 – 3.55
70 – 74	B	3.00 – 3.26
65 – 69	B-	2.66 – 2.93
60 – 64	C+	2.33 – 2.59
56 – 59	C	2.00 – 2.25
54 – 55	C-	1.66 – 1.83
52 – 53	D+	1.30 – 1.48
50 – 51	D	1.00 – 1.15
49 and below	F	0.00

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.

(Describe the process used to ensure that highly qualified faculty is recruited to the Program.)

Recruiting Process: For in colleges, the recruiting body is Public service commission , so vacant and newly created positions are advertised in the national newspapers, applications are received by the PCS office, scrutinized by the Scrutiny Committee, and call letters are issued to the short-listed candidates on the basis of experience, qualification, publications and other qualities/activities as determined by the service rules of PCS .

Regular: Written screening test is conducted by PCS for short listing of new lecturer in BPS-17. The Pass candidates are interviewed by an interview panel. The names of selected candidates are recommended to the Higher Education, Government of KP for final appointment.

Visiting: Faculty is temporary hired whenever required and the positions are advertised on social media or national newspaper. Applications are received by the college clerk and Hiring committee of each department and applications are scrutinized. Short listed candidates are called for interview and on qualifying the merit criteria, the recommended candidates are finally approved by the principal.

Table 5. 3: Faculty's Recruitment, Training, and Evaluation

Faculty	Policy	Process
---------	--------	---------

Recruitment 1. Permanent 2. Visiting	As per Service Rules for civil servant's recruitment, Govt. of Pakistan.	Through Public Service Commission and approval by the Secretary Higher Education, KP. Through HOD & Principal (on visiting basis).
Evaluation	As per HEC guidelines (Periodically	Evaluation by students through Quality Enhancement Cell (QEC) and Self-assessment by the faculty. (At the end of each semester).
Promotion	As Per Service Rules for civil servants promotion Govt. of KP	Through Provincial selection board (PSB) and approval by the Secretary Higher Education .

The performance of the faculty members is monitored regularly and continuously by the Principal , and it is evaluated annually through ACRs (Annual Confidential Report) .There was no systematic process before to evaluate the faculty members, now after establishment of QEC each faculty member is evaluated by the students via "Teacher Evaluation Questionnaire". at the end of each semester.

STANDARD 5-4

THE PROCESS AND PROCEDURES USED TO ENSURE THAT TEACHING AND DELIVERY OF COURSES MATERIAL TO THE STUDENTS EMPHASIZES ACTIVE LEARNING AND THAT COURSE LEARNING OUTCOME ARE MET. THE PROCESS MUST BE PERIODICALLY EVALUATED TO ENSURE THAT IT IS MEETING ITS OBJECTIVES

Process and Procedure to ensure active learning

Process to ensure teaching and delivery of course material:

- Time table is strictly followed by all faculty members. The HODs of the department frequently gets feedback from the students during the semester.
- Students are shown their test and papers in the show off session after every test and quiz, this process is made sure by the HoDs. Students can see their papers marked by the teacher and view it.

All the relevant materials (Tests, Assignments and Quizzes) of evaluation are submitted to the office of the HoD. It purpose to ensure that the grading is transparent

- Award list of all sessional and final term papers is submitted to the controller of examination and copies are left in the department.

Furthermore the students give feedback on Performa number 1 (Student Course Evaluation Questionnaire) regarding course contents and how it was delivered. Through Performa number 10 (Teacher Evaluation Form) students evaluate and comment on teacher's efforts, put in to deliver the course contents, her general conduct in the class, the environment, instructor, maintains and extra efforts, she makes to satisfy students, thirst for knowledge. Faculty feedback is also taken on HEC Performa number 2 (Faculty Course Review Report) and Performa number 5 (Faculty Survey) which is a very useful activity to evaluate the course contents, learning and teaching environments and overall teachers satisfaction level. Course evaluation by teachers also indicates what percentage of desired outcome has been achieved by the course contents and what needs to be improved or changed. The feedback is discussed with the instructors and HoDs for improvements in the weak areas, identified by the students

STANDARD 5-5

THE PROCESS THAT ENSURES THAT GRADUATES HAVE COMPLETED THE REQUIREMENTS OF THE PROGRAM MUST BE BASED ON STANDARDS, EFFECTIVE AND CLEARLY DOCUMENTED PROCEDURES. THE PROCESS MUST BE PERIODICALLY EVALUATED TO ENSURE THAT IT IS MEETING ITS OBJECTIVES.

5-5.1 REQUIREMENT FOR AWARD OF DEGREE:

The BS botany Students enroll in BS Botany program must get 2.0 CGPA in order to complete BS program by passing of all 44 courses including relevant specialization and Project in minimum FOUR years from the date of first admission. Besides this, it is the responsibility of each student to fulfill the following graduation requirements:

1. The student has earned the mandatory credit hours of the degree program.
2. The student has passed all the core, supporting and compulsory courses of the degree program.
3. The student has met his financial and material obligations towards the institution and affiliating University and there is nothing outstanding against him.
4. The student produces clearance certificates from all concerned sections.

5-5.2 AWARD OF DEGREE:

1. A candidate who passes all the examinations with the prescribed CGPA shall be awarded degree by the University.
2. The Controller of Examinations will issue Provisional Certificate till issuance of final degree by the University.
3. The character certificate to students will be issued by the Head of the concerned department.

CRITERION 6: FACULTY:

STANDARD 6-1

There must be enough full time faculty who are committed to the Program to provide adequate coverage of the Program areas/courses with continuity and stability. The 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 level through graduate work in the discipline

Faculty of BS Botany Department is qualified and they take interest in teaching the offered courses up to the satisfaction level of students. Following are the brief details of the departments' faculty members.

COMPLETE THE FOLLOWING TABLE INDICATING PROGRAM AREAS AND NUMBER OF FACULTY IN EACH AREA.

Faculty Distribution by Program Areas

Program Area of Specialization	Courses in the area and average number of sections per year	Number of Faculty members in each area	Number of Faculty members with degree
Ecology, Plant Taxonomy, Anatomy, Economic Botany , Pharmacognosy	02, 02, 01, 01, 01	02	01 PhD 01 M Phil

Plant Physiology	02	01	01 MPhil
Genetics	02	01	01 MPhil
Total		04	04

Table 6.1 Faculty Distribution by Program Area

S.No	Name	Designation	Qualification	Major Area of Interest	No. of Research Papers
1	Dr.Shahida Naveed	Assistant Professor	PhD	Pharmacognosy	30
2	Ms.Palwasha Maqbool	Hired Faculty	M.Phil	Plant Physiology	01
3	Ms.Naila Hayat	Hired Faculty	M.Phil	Plant Genetics	02
4	Ms.Saba Ahmad	Hired Faculty	M.Phil	Medicinal Plants	01
5	Ms.Rafia Gul	Hired Faculty (Fall 2021)	BS		Nil
6	Ms.Shagufta Naz	Hired Faculty (Fall 2020)	BS	Allelopathy	

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.

As the research activities have been started recently at the BS Botany Deptt. By the students of 8th semester which gives ample opportunity to both students and teachers to be engaged and update their knowledge .

STANDARD 6-3

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

Faculty members are receiving attractive salaries. The teachers teaching courses to BS classes are getting BS remuneration and honorarium as an incentive for BS Teaching.

For job satisfaction, the HED ensures fair, timely promotion as per criteria provided in the civil servant rules of KP government.

STANDARD 6-4

Academic Visits/Workshops/ Conferences/Meeting:

6.5.1. LIST AND DETAIL OF WORKSHOPS/SEMINARS/VIDEO CONFERENCES/MEETINGS BY FACULTY IN LAST TWO YEARS:

1. Mandatory training Program(MTP-63) arranged by HEART-HED Peshawar from 15 February-16 March,2021.
2. Capacity Building Training (3 weeks) arranged by HED and HEC June 2021.
3. Training (2 weeks) on under graduate education policy arranged by HED at University of Peshawar on 24 - 25 March 2022

The following workshops were attended by nominated faculty members.

- One day training regarding SAR Preparation arranged by DQA – KKKUK February,2022.

- One week capacity building training arranged by HEC March 2022
- Two days capacity building training arranged by HEC March 2022
- One day training regarding Undergraduate Education policy arranged by DQA – KKKUK and HEC 26 May,2022.

CRITERION 7: INSTITUTIONAL FACILITIES

STANDARD 7-1. THE INSTITUTION MUST HAVE THE INFRASTRUCTURE TO SUPPORT NEW TRENDS IN LEARNING SUCH AS E-LEARNING

As the BS Program is recently launched at GGDC KDA Karak , so basic infrastructure and adequate facilities of e-learning are lacking . However the following facilities are available to the students in the college.

7-1.1 BUS FACILITY

The university provides bus facility to the student and staff on payment.

7-1.2 HOSTEL FACILITY

The college has an on campus hostel facility for the female staff and students .

7-1.3. DESCRIBE INFRASTRUCTURE AND FACILITIES THAT SUPPORT NEW TRENDS IN LEARNING.

- Internet Access / Digital Library Access = No access to internet facility at Library
 - Total Internet Bandwidth available to all the students in the Department. = Not available
- Audio-Video Facilities = Recently 1 Multimedia is purchased.
- Number of Computers available per student = Not available
- Indicate how adequate the facilities are.
 - The BS Botany is lacking the above basic learning facilities.

- This deficiency has been mentioned in the subsection of section 1-3 on the basis of suggestions given by BS Graduating students (F-2018-S-2022) for BS Program improvement. improvement

STANDARD 7-2

The Library must possess an up-to-date technical collection relevant to the Program and must be adequately staffed with professional personal

Describe the adequacy of the library's technical collection.

Books

1. Though library has books relevant to botany subject, which are issued to students on students, request but still the books are not enough and more updated books are needed to be stocked in the library. Till now no such Journals, magazines or periodicals are prescribed yet. However, in future plan availability of books is being kept as a key element of the Future plan.

Newspapers = No newspaper for faculty or students.

Describe the support rendered by the library.

Sr. No.	Name	Designation	Qualification	Experience

1	Ms.Hussan Bahar	Librarian	M.SC Library Sciences	10 years
2	Ms. Zaina	Asisstant Professor	M.A in Pashto Language	10 years +

Photocopy Facility = One photocopier recently purchased available at clerk office, which is used for q.papers printing too.

LIBRARY EQUIPMENT

Personal Computers	No
Laser Printer 2035p & 1022n	No
Bar Code Reader	No
Photocopy machine	No
Scanner	No
Magnetic Security Gate	No
CCTV Camera's	No
UPS	No
CD Stacker	No
Laptop	No

- **No Internet connection available in the college Library.**

2. Books and Thesis Search Terminals = Not available .
3. New Arrivals = Since 2016 ,no new book purchase took place.
4. A/V Section = No A/V Section
5. Library Orientation
6. Access to National and International Data-Bases = No access
7. List of Encyclopedias available in the library = nil

STANDARD 7-3

Class-Room must be adequately equipped and offices must be adequate to enable faculty to carryout their responsibilities.

(Describe the adequacy of th classrooms.)

At current classrooms are sufficient for three BS Departments with four batches in each are enrolled in the college and in addition intermediate classes of F.SC I and F.SC II

Describe the adequacy of faculty offices:

The Botany department lacks individual faculties' offices. Details of available offices are given in the table below.

Currently the following faculty offices are available at GGDC KDA College.
--

Principal Office	1
Vice Principal Office	1
BS Coordinator Office:	BS Coordinator Share office with V. Principal
HoD English:	No Office, have only one cup board in the staff room.
HoD Urdu:	No Office, have only one cup board in the staff room.
HoD Botany:	Side Room of Botany Lab is used as HoD Office.

CRITERION 8: INSTITUTIONAL SUPPORT

CRITERION -8: INSTITUTIONAL SUPPORT

STANDARD 8-1: SUPPORT AND FINANCES FOR FACULTY AND SCHOLARS.

THERE MUST BE SUFFICIENT SUPPORT AND FINANCIAL RESOURCES TO ATTRACT AND RETAIN HIGH QUALITY FACULTY AND PROVIDE THE MEANS FOR THEM TO MAINTAIN COMPETENCE AS TEACHERS AND SCHOLARS

The institutional support is provided by the Government of KP to colleges for the smooth running of BS /Degree programs however the budget provision is still insufficient to meet all the basic needs of the BS Degree. Recently MERIT CUM NEED based scholarships aid has been granted to students of Botany , but still there is need of research grants as currently no financial support for research students and research supervisor is available. Department has separate office, however, department needs a staff room for teachers, separate computers, independent printer, AC / Heater and Telephone to further improve the efficiency and effectiveness of faculty.

STANDARD 8-2: THERE MUST BE AN ADEQUATE NUMBER OF HIGH QUALITY GRADUATE STUDENTS, RESEARCH ASSISTANTS AND PH. D. STUDENTS.

In Department of Botany GGDC KDA Karak, only BS Program is offered, M.S/M.Phil and Ph.D is not yet offered at GGDC KDA Karak. Currently, 23 students , enrolled in BS Botany Program will be graduated in July, 2022.

Table. Provide the number of graduate students, research assistants and Ph. D students for the last three years.

Year	students	Research Assistants	Graduate students	Total
2022	23	Nil	23	23

Table. Provide the faculty: graduate student ratio for the last three years.

Year	Total No. of Faculty	Total Number of Graduate Students
2010	3	23

STANDARD 8-3

FINANCIAL RESOURCES MUST BE PROVIDED TO ACQUIRE AND MAINTAIN LIBRARY HOLDINGS, LABORATORIES AND COMPUTING FACILITIES.

(Same as described in 7.2)

Though library has books relevant to botany subject, which are issued to students on students, request but still the books are not enough and more updated books are needed to be stocked in the library. Till now no such Journals, magazines or periodicals are prescribed yet. However, in future plan availability of books is being kept as a key element.

Newspapers = No newspaper for faculty or students.

Photocopy Facility

One photocopier recently purchased is available at clerk office, which is used by faculty members for papers printing .

LIBRARY EQUIPMENT:

Personal Computers	No
Laser Printer 2035p & 1022n	No

Bar Code Reader	No
Photocopy machine	No
Scanner	No
Magnetic Security Gate	No
CCTV Camera's	No
UPS	No
CD Stacker	No
Laptop	No

No Internet connection available in the college Library .

1. Books and Thesis Search Terminals = Not available .
2. New Arrivals = Since 2016 ,no new book purchase took place.
3. A/V Section = No A/V Section
4. Library Orientation
5. Access to National and International Data-Bases = No access

6. Other Facilities

7. List of Encyclopedias available in the library = Nil

Describe the resources available for laboratories/computing facilities.

(SAME AS DESCRIBED IN CRITERION 3 SUBSECTION 3.1).

Students of BS Botany Program are provided with the following labs.

Sr . No	Laboratory Title	Location	Objectives	Adequacy for instruction	Course Taught	Major Apparatus/ Major Equipment	Safety Regulations
1	Botany Lab.	Science Block ,GGDC KDA Karak	To provide students to perform basics practicals of botany.	Guidance is provided at start of practicals	Diversity of plants. Plant systematics , anatomy and developmental embryology	Light / Binocular stereo microscope, Electric stirrer , Weighing Balance, Glassware, Chemicals, Prepared slides,specimens, Dry ovan	Safety regulations are followed and are regularly reminded to the students

2	Zoology Lab	Same as above	To provide students to perform basics practicals of zoology.	Guidance is provided at start of practicals	Zoology-I Zoology-II Zoology-III Zoology-IV	Prepared slides, specimens, Spectrophotometer Digital weighing balance, stuffed animals	Safety regulations are followed and are regularly reminded to the students
3.	Chemistry Lab.	Same as above	To provide students to perform basics practicals of Chemistry	Guidance is provided at start of practicals	Chemistry-I Chemistry-II Chemistry-III Chemistry-IV	800-CE centrifuge Hot plate, Oven, Autoclave, Distillatory pH meter Water Bath	Safety regulations are followed and are regularly reminded to the students

BS BOTANY DEPARTMENT IS IN DIRE NEED OF A COMPUTER LAB TO GIVE STUDENTS BASIC EDUCATION OF TECHNOLOGIES AND FACILITATE THEM IN ORDER TO ACHIEVE THE LEARNING OUTCOMES OF BS BOTANY PROGRAM. AT PRESENT THERE IS NO SUCH FACILITY AVAILABLE AT DEPARTMENT OF BOTANY.

SUGGESTIONS FOR FUTURE

Due to deficiencies mentioned above regarding computing facilities and laboratories , both faculty at department and students are negatively affected. Moreover, the faculty has no access to HEC database or other softwares or websi

SUMMARY:

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

The program mission, objectives and outcomes are assessed, and strategic plans are presented to achieve the goal, which are again measurable through definite standards. Programme outcomes appeared to be highly relevant. The results of proforma no. 10 of Fall-2018 to Fall 2021 show the scores of evaluations by students for all teachers of the Department of Botany. The results of proforma no.1 presents the scores evaluation by the students for all courses offered by the Department of Botany from Fall-2018 to Fall2021. The overall analysis based on proformas no. 1 & 10 clearly highlights that students were satisfied with the contents and teaching material of courses offered by the department as well as by the teaching abilities of course instructors.

The curriculum of BS Botany fully satisfies the core requirements for the programme as specified by the HEC. The information technology component of the curriculum has been applied by offering course of Computer. Curriculum design and update is regularly initiated by the affiliating University .

Infrastructure of the GGDC KDA Karak is though adequate to some extent for running BS degree programs. But still there is dire need of new class rooms construction and updating of classes and Labs.

Institutional facilities were measured through Criterion 3; infrastructure and facilities, classrooms, faculty offices, computing facility support, short comings regarding funding and facilities in research laboratories and safety arrangements are highlighted. Institutional facilities for the upgradation and strengthening of existing laboratories facilities for quality research out-put are highly desired. The process of admission is well established and followed as per rules and criteria set by HED, University and HEC. As regards the process control covering admission, registration, recruiting policy, courses and delivery of material, academic requirements, performance and grading, university as well as Higher Education Commission have set forth appropriate rules, which are properly followed. Work load of teachers is according to HED work load policy. Still there are issues regarding infrastructure, institutional support, financial support for research, availability of internet and access to teaching material, and due to these insufficiencies BS Botany program is lagging behind to meet its learning outcomes in letter and spirit.

Focal Person QEC and team has been working with enthusiasm in conductance of faculty survey, course evaluation and teacher evaluation on predefined Performa's and later on analyze them and guide teachers according to the result of these surveys to bring new techniques and quality in their lecture presentation.

FOR THE IMPROVEMENT IN DEPARTMENTAL INFRASTRUCTURE, SOME SUGGESTIONS SRE HERE:

- Training sessions should be organized by the administration to improve the quality of education to be delivered.

- Supporting staff of the department should also be trained to enhance the maintenance of laboratories.
- Laboratories should be upgraded and well furnished with advance equipment.
- Number of faculty members should be upgraded according to needs requirements.
- Research activities should be incorporated.
- Botanical Gardens should also be there for future preservations of various species.
- College must have an access to e-library.

ANNEXURE:A.1.

ASSESSMENT TEAM CHECK LIST

Quality Enhancement Cell

Check list for Assessment Team

Department Name: Department of Botany Date of Visit: June 5, 2023
 Name of AT Members: (1) Mr. Ayesha Irum (2) Mr. Wajeeha Naimat

I. PROGRAM MISSION, OBJECTIVE AND OUTCOMES

1. Has the department documented program vision?
☒ (1) Yes/clearly (2) Incompletely/vaguely (3) No
2. Has the department documented program mission?
☒ (1) Yes/clearly (2) Incompletely/vaguely (3) No
3. Has the department documented program objective?
☒ (1) Yes/clearly (2) Incompletely/vaguely (3) No
4. Has the department documented program outcomes?
☒ (1) Yes/clearly (2) Incompletely/vaguely (3) No
5. How many steps has the department taken to fulfill program mission?
 (1) None (2) Very few ☒ (3) Some (4) Many
6. How many steps has the department taken to fulfill program objectives?
 (1) None (2) Very few ☒ (3) Some (4) Many
7. How many steps has the department taken to achieve program targeted outcomes?
 (1) None (2) Very few ☒ (3) Some (4) Many
8. How many significant future plans have been devised for the development of the programme?
 (1) None (2) ☒ Very few (3) None
9. Does the department have its own assessment method?
☒ (1) Yes, Well established (2) Yes, but not well established (3) Not at all
10. How many faculty members are aware of program vision and mission?
 (1) None (2) Some (3) Mostly ☒ (4) All
11. How many faculty members are aware of program objective and outcome?
 (1) None (2) Some (3) Mostly ☒ (4) All
12. How many students are satisfied with the courses being taught at the institute?
 (1) 25% (2) 50% (3) 75% ☒ (4) above 75%

II. CURRICULUM DESIGN AND ORGANIZATION

1. When was the curriculum last revised?
☒ (1) Four years ago (2) Three years ago (3) Two years ago (4) One year ago
2. Is the curriculum approved by PMDC?
 (1) No (2) Yes, in some subjects (3) ☒ Completely HEC- approved
3. Is the curriculum designed and organized helpful to achieve the program objectives?
 (1) No (2) To some extent ☒ (3) Yes
4. Are the advances in the discipline included in the curriculum?
 (1) No ☒ (2) To some extent (3) Yes
5. How many courses meet programme objectives?
 (1) All ☒ (2) Many (3) Very few (4) None

- (1) 25% (2) 50% (3) 75% (4) above 75%

7. How much does the curriculum satisfy the general education, arts and professional and other discipline requirements for the programme as specified by the respective accreditation body?

- (1) 25% (2) 50% (3) 75% (4) above 75%

8. How many IT courses are included in the programme?

- (1) None (2) Only One (3) Two Courses (4) More than Two courses

9. What is the duration of IT courses being taught?

- (1) One semester (2) Two semesters (3) More than Two Semesters (4) Any other. Please specify _____.

10. What is the level of students' performance in IT skills?

- (1) Very good (2) Good (3) Average (4) Poor

11. How many courses are included to develop oral and written communication skills of students?

- (1) None (2) Only One (3) Two Courses (4) More than Two courses

12. What is the duration of communication skills courses being taught?

- (1) One semester (2) Two semesters (3) More than Two Semesters (4) Any other. Please specify _____.

13. What is the level of students' language proficiency?

- (1) Very good (2) Good (3) Average (4) Poor

III. LABORATORIES AND COMPUTING FACILITIES

1. How many laboratories are there in the department?

- (1) None (2) One (3) Two to three (4) More than three

2. What is the over all condition of labs?

- (1) Very well organized (2) Poorly organized (3) Very well equipped (4) Poorly equipped

3. How many laboratories are not fully furnished?

- (1) More than three (2) Three to Five (3) One to Three (4) None
Please name them as well. _____.

4. How many scientific instruments are not functional?

- (1) Six or more (2) Three to Five (3) One to Three (4) None

Please List them: _____, _____, _____.

5. Are the computing facilities available for faculty members?

- (1) No (2) To some extent (3) Yes, Available to all

6. Are the computing facilities adequate and available for students?

- (1) No (2) To some extent (3) Yes, Available to all

7. Is Internet facility available for the students?

- (1) No (2) Available but not for all (3) Yes. Available to all

8. Do the computing facilities support the computing component of the programme?

- (1) 25% (2) 50% (3) 75% (4) above 75%

9. Is there adequate personnel support for instructions and maintenance of the laboratories?

- (1) Yes (2) To some extent (3) Not at all

10. Are laboratory manuals/documentation/instructions for experiments available and accessible to faculty and students?

Are the support staff and faculty aware of the safety rules and laboratory ethics?
☒ (1) Yes, very well (2) To some extent (3) Not at all

12. Do all the laboratories possess fire extinguishers and other safety measures?
 (1) Yes, all (2) Yes, but few ☒ (3) Not at all

13. How many computer experts are in the department?
 (1) None (2) One ☒ (3) Two (4) Three or more

IV. STUDENT SUPPORT AND ADVISING

1. Are the faculty members available after the lecture time to advise or guide students?
☒ (1) Yes, Always (2) Some time (3) Never

2. Does the department provide guidance to all the students on how to complete the program, to make course decisions and career choices?
 (1) Yes (2) To some extent (3) No

3. Does the department extend extra-curricular and co-curricular activities to students?
 (1) No ☒ (2) To some extent (3) To a great extent

4. How often required courses are offered?
☒ (1) Once a year (2) Every Semester

5. How often elective courses are offered?
☒ (1) Once a year (2) Every Semester

6. Do students have access to professional counseling when necessary?
☒ (1) Yes, All the time (2) Rarely (3) Not at all

V. PROCESS CONTROL

1. When was the last admission criteria revised?
☒ (1) Last year (2) Two years back (3) More than five years back

VI. FACULTY

1. How many faculty members are Post-doctorate?
☒ (1) None (2) One (3) Two (4) Three or more

2. How many faculty members are PhD?
 (1) None ☒ (2) One (3) Two (4) Three or more

3. How many faculty members are MS/M. Phil?
 (1) None (2) One ☒ (3) Two (4) Three or more

4. How many faculty members are FCPS or Equivalent?
☒ (1) None (2) One (3) Two (4) Three or more

5. How many faculty members have earned international / national / institutional awards?
 (1) None ☒ (2) One (3) Two (4) Three or more

6. How many faculty members have earned international / national / institutional fellowship?
☒ (1) None (2) One (3) Two (4) Three or more

7. Is the teaching load adequate on faculty?
☒ (1) Yes (2) Some what (3) Not at all.

8. How many research papers have been published by the faculty in recognized journals?
 (1) None (2) Up to 5 (3) Up to 10 (4) More than 10

9. How many books chapters have been written by the faculty?

10. How many conferences, workshop or symposia have been conducted by the department?
 (1) None (2) Up to 2 (3) Up to 4 (4) More than 4

11. How many teachers have participated in conferences / symposia / workshops?
 (1) None (2) Up to 3 (3) Up to 6 (4) More than 6

12. Have all faculty members prepared their resume in line with HEC guidelines?
 (1) None (2) Some (3) More than half (4) All

13. Are the faculty members current and active in their discipline and have they necessary technical depth and breadth to support the program?
 (1) None (2) Some Members (3) More than half (4) All

14. Are there enough faculty members to provide continuity and stability to cover the curriculum adequately and effectively?
 (1) Yes (2) To some extent (3) No

15. Are. There any existing faculty development Programmes at the departmental/ university level?
 (1) Yes (2) No

16. How often faculty Programmes are evaluated?
 (1) On yearly Basis (2) After the completion of each programme years (3) After 2-3

17. How many faculty members are satisfied with their jobs?
 1) 25% (2) 50% (3) 75% (4) above 75%

VII. INSTITUTIONAL FACILITIES

1. Are there enough number of classrooms in the department?
 (1) No (2) To some extent (3) Yes

2. Are classrooms well furnished?
 (1) No (2) To some extent (3) Well furnished

3. Is there audio-visual facility available in each classroom?
 (1) No (2) Yes (3) To some extent.

4. Are there enough numbers of offices in the department for teachers and office work?
 (1) No (2) Yes (3) To some extent

5. Is there any seminar / conference room in the department?
 (1) No (2) Yes

6. Is there enough number of books in the relevant subjects in the library?
 (1) No (2) Yes

7. Are books easily available for all students and faculty?
 (1) Yes, Always (2) Some time (3) Never

8. Is the library staff professional and supportive?
 (1) Yes, Always (2) Yes but Occasionally (3) Not at all

VIII. INSTITUTIONAL SUPPORT

1. Is the department satisfied with the grant it receives from the university?
 1) Yes, (2) To some extent (3) Not at all

2. Does the department receive grant from other organizations?
 (1) No (2) Yes

- IX. Your over all comments about the performance of the department / college
(Please use separate sheet / back of the sheet if required)

The department is working very hard. The department is supportive, its outcome and students performance is. All the member and principal is fully satisfied.

- X. Areas for improvements identified by you:
(Please use separate sheet / back of the sheet if required)

There is need of related books in the library.
Labs should be well equipped.
I.T knowledge and skills should be introduced.

Miss Aysha Ismail
Associate Professor
Zoology
Jh DC KDA Kanda

ANEXXURE.A2.

Program Name: Bas Botany GGDC KDA KARAK

AT : Ms.Ayesha Irum Associate Professor of Zoology, GGDC KDA KARAK

AT : Ms.Ayesha Irum Associate Professor of Zoology, GGDC KDA KARAK, : Ms. Wajeeha Naimat Assisstant Professor of Chemistry , GGDC KDA KARAK

Criterion 1 – Program Mission, Objectives and Outcomes		Weight = 0.05
S #	Factors	Score
1	Does the Program have documented measurable objectives that support faculty / college and institution mission statements?	4
2	Does the Program have documented outcomes for graduating students?	4
3	Do these outcomes support the Program objectives?	3
4	Are the graduating students capable of performing these outcomes?	4
5	Does the department assess its overall performance periodically using quantifiable measures?	5
6	Is the result of the Program Assessment documented?	6
Total Encircled Value (TV)		26
SCORE 1 (S1) = [TV / (No. of Questions * 5)] * 100 * Weight		4.33
Criterion 2 – Curriculum Design and Organization		Weight = 0.20
S #	Factors	Score
1	Is the curriculum consistent?	4
2	Does the curriculum support the program's documented objectives?	4
3	Are theoretical background, problem analysis and solution design stressed within the program's core material?	5
4	Does the curriculum satisfy the core requirements laid down by NAEAC?	4
5	Does the curriculum satisfy the major requirements laid down by HEC and the NAEAC?	5
6	Does the curriculum satisfy the professional requirements as laid down by the NAEAC?	4
7	Is the information technology component integrated throughout the program?	5
8	Are oral and written skills of the students developed and applied in the program?	4
Total Encircled Value (TV)		35
SCORE 2 (S2) = [TV / (No. of Questions * 5)] * 100 * Weight		17.50
Criterion 3 – Laboratories and Computing Facilities		Weight = 0.10
S #	Factors	Score
1	Are laboratory manuals / documentation / instructions etc. for experiments available and readily accessible to faculty and students?	4
2	Are there adequate number of support personnel for instruction and maintaining the laboratories?	5
3	Are the university's infrastructure and facilities adequate to support the program's objectives ?	4
Total Encircled Value (TV)		13
SCORE 3 (S3) = [TV / (No. of Questions * 5)] * 100 * Weight		8.67
Criterion 4 – Students Support and Advising		Weight = 0.10
S #	Factors	Score
1	Are the courses being offered in sufficient frequency and number for the students to complete the program in a timely manner?	5
2	Are the courses in the major area structured to optimize interaction between the students, faculty and teaching assistants?	5
3	Does the university provide academic advising on course decisions and career choices to all students?	5
Total Encircled Value (TV)		15
SCORE 4 (S4) = [TV / (No. of Questions * 5)] * 100 * Weight		10.00
Criterion 5 – Process Control		Weight = 0.15
S #	Factors	Score
1	Is the process to enroll students to a program based on quantitative and qualitative criteria?	4
2	Is the process above clearly documented and periodically evaluated to ensure that it is meeting its objectives?	4
3	Is the process to register students in the program and monitoring their progress documented?	4
4	Is the process above periodically evaluated to ensure that it is meeting its objectives?	4
5	Is the process to recruit and retain faculty in place and documented?	4

6	Are the processes for faculty evaluation & promotion consistent with the institution mission?	4
7	Are the processes in 5 and 6 above periodically evaluated to ensure that they are meeting their objectives?	4
8	Do the processes and procedures ensure that teaching and delivery of course material emphasize active learning and that course learning outcomes are met?	4
9	Is the process in 8 above periodically evaluated to ensure that it is meeting its objectives?	4
10	Is the process to ensure that graduates have completed the requirements of the program based on standards and documented procedures?	4
11	Is the process in 10 above periodically evaluated to ensure that it is meeting its objectives?	4
	Total Encircled Value (TV)	44
	SCORE 5(S5) = [TV / (No. of Questions * 5)] * 100 * Weight	12.00
Criterion 6 – Faculty		Weight = 0.20
S #	Factors	Score
1	Are there enough full time faculty members to provide adequate coverage of the program areas / courses with continuity and stability?	3
2	Are the qualifications and interests of faculty members sufficient to teach all courses, plan, modify and update courses and curricula?	4
3	Do the faculty members possess a level of competence that would be obtained through graduate work in the discipline?	4
4	Do the majority of faculty members hold a Ph.D. degree in their discipline?	4
5	Do faculty members dedicate sufficient time to research to remain current in their disciplines?	4
6	Are there mechanisms in place for faculty development?	4
7	Are faculty member motivated and satisfied so as to excel in their profession?	4
	Total Encircled Value (TV)	27
	SCORE 6(S6) = [TV / (No. of Questions * 5)] * 100 * Weight	15.43
Criterion 7 – Institutional Facilities		Weight = 0.10
S #	Factors	Score
1	Does the institution have the infrastructure to support new trends such as e-learning?	3
2	Does the library contain technical collection relevant to the program and is it adequately staffed?	3
3	Are the class rooms and offices adequately equipped and capable of helping faculty carry out their responsibilities?	2
	Total Encircled Value (TV)	8
	SCORE 7(S7) = [TV / (No. of Questions * 5)] * 100 * Weight	5.33
Criterion 8 – Institutional Support		Weight = 0.10
S #	Factors	Score
1	Is there sufficient support and finances to attract and retain high quality faculty?	5
2	Are there an adequate number of high quality graduate students, teaching assistants and Ph.D. students?	0
	Total Encircled Value (TV)	5
	SCORE 8(S8) = [TV / (No. of Questions * 5)] * 100 * Weight	5.00
	OVERALL ASSESSMENT SCORE (S1+S2+S3+S4+S5+S6+S7+S8) =	78.26

ANEXXURE.A.3.

Department of Botany
Assessment Results Implementation Plan Summary

AT Finding	Corrective Action	Implementation Date	Responsible Body	Resources Needed
→ Books		Session 23-25	College + HED	Funds
→ Infrastructure		Session 23-25	College + HED	Funds
E-Library		Session 23-25	HED + HEC	Funds
→ Computer - Lab		Session 23-25	HED	Funds
→ office accessories		"	HED	Funds
→ equipped Lab.	Letter to HED	"	HED	Funds

Chairman's Comments The department is doing excellent job. Its performance is very good but some areas need improvements.

Name and Signature

Name:- Ms. Ayesha Irum *Ayesha Irum*

QEC Comments

By the arrival of new faculty to Dept. of Botany, the quality has been enhanced and more improvement is expected in the future.

Name and Signature

Dr. Shahida Hameed *Shahida Hameed*

Date:- June 12, 2023

ANEXXURE: B

COURSE OUTLINE FOR BS BOTANY

YEAR ONE/ **First Semester**

Course Code	Course Title	Credit Hours
ENG101	ENGLISH-I (Functional English)	03
PS101	PAKISTAN STUDIES	02
ZOO101	ZOOLOGY-I	03
CHEM101	BASIC INORGANIC CHEMISTRY	03
BOT101	DIVERSITY OF PLANTS	04
MATH100	MATHEMATICS	03
	Total	18

YEAR ONE/ **2nd semester**

Course Code	Course Title	Credit Hours
ENG102	ENGLISH-II (Communication Skills)	03
CS101	INTRODUCTION TO COMPUTER	03
ZOO102	ZOOLOGY-II	03
CHEM102	BASIC ORGANIC CHEMISTRY-I	03
BOT102	PLANT SYSTEMATICS, ANATOMY AND DEVELOPMENT/EMBRYOLOGY	04
RS 101	ISLAMIC STUDIES	02

Total Credit Hours Per Semester	18
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YEAR TWO/ 3rd Semester

Course Code	Course Title	Credit Hours
ENG211	ENGLISH-III (Technical Report, Writing & Presentation Skill)	03
GEO 101	GEOGRAPHY	03
ZOO 211	ZOOLOGY-III	03
CHEM211	BASIC PHYSICAL CHEMISTRY-I	03
BOT211	CELL BIOLOGY, GENETICS AND EVOLUTION	04
	Total	16

Year two/4th semester

Course Code	Course Title	Credit Hours
ENG211	ENGLISH-IV	03
Bot.213	Plant Physiology and Ecology	04
ZOO 212	General-VII (Animal Diversity-II)	03
CHEM211	BASIC Organic CHEMISTRY-II	03
BOt.214	Foundation-V (Biodiversity & Conservation)	04
	Total	17

Year three/ 5th Semester

Course Code	Course Title	Credit Hours
BOT321	BACTERIOLOGY AND VIROLOGY	03
BOT322	PHYCOLOGY AND BRYOLOGY	03
BOT323	MYCOLOGY AND PLANT PATHOLOGY	03
BOT324	DIVERSITY OF VASCULAR PLANTS	03
BOT325	PLANT SYSTEMATICS	03
	Total	15

Year three/ 6th semester

Course Code	Course Title	Credit Hours
BOT326	ANATOMY OFVASCULAR PLANTS	03
BOT 327	GENETICS-I	03
BOT328	PLANT BIOCHEMISTRY-I	03
BOT329	PLANT ECOLOGY-I	03
BOT330	PLANT PHYSIOLOGY-I	03
BOT331	Research Methodology	02
Total		17

Year four/7th semester


BOT431	MOLECULAR BIOLOGY	03
BOT432	PLANT BIOCHEMISTRY-II	03
BOT433	PLANT ECOLOGY-II	03
BOT212	BIOSTATISTICS	03


BOT 4**	ELECTIVE-I, RESEARCH PROJECT/ INTERNSHIP/ OPTIONAL PAPER	03
BOT 4**	ELECTIVE-II	03
Total		18


Year four/8th semester

Course Code	Course Title	Credit Hours
BOT434	PLANT PHYSIOLOGY-II	03
BOT435	GENETICS-II	03
BOT436	ENVIRONMENTAL BIOLOGY	03
BOT4**	ELECTIVE-III, RESEARCH PROJECT/ INTERNSHIP/ OPTIONAL PAPER	03
BOT4**	ELECTIVE-IV	03
	Total	15

ANNEXURE: C: HEC APPROVED BS BOTANY CURRICULUM

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Course code & title	English I (Functional English)
Course Code	EG101
Cr. Hrs.	3(3+0)
Pre-requisite	
Specific objectives of the course: This course aims to enhance language skills and develop critical thinking in the students.	
Course outlines	
Basics of Grammar Parts of speech and use of articles Sentence structure, active and passive voice Practice in unified sentence Analysis of phrase, clause and sentence structure Transitive and intransitive verbs Punctuation and spelling Comprehension Answers to questions on a given text Discussion General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students) Listening To be improved by showing documentaries/films carefully selected by subject teachers Translation skills Urdu to English Paragraph writing Topics to be chosen at the discretion of the teacher Presentation skills Introduction	
Reference Materials	Latest editions of following books 1. Functional English a) Grammar 1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0 194313492 2 Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0 194313506 b) Writing 1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41. c) Reading/Comprehension 1. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	Pakistan Studies
Course code	PS 101
Cr. Hrs.	2(2+0)
Specific objectives of the course: <ul style="list-style-type: none">Develop vision of historical perspective; govern contemporary Pakistan, ideological backgroundStudy the process of governance, national arising in the modern age and posing challenge	
Course outline	
<p>1. Historical Perspective a. Ideological rationale with special reference to Sir S Khan, Allama Muhammad Iqbal and Quaid-e-azam Muhammad Ali Jinnah. b. Factors leading to Muslim separatism c. People and Land i. Indus Civilization ii. Muslim advent iii. Location and geo-physical features. 2. Government and Politics in Pakistan Political and constitutional phases: a. 1947-58 b. 1958-71 c. 1971-77 d. 1977-88 e. 1988-99 f. 1999 onward 3. Contemporary Pakistan a. Economic institutions and issues b. Society and social structure c. Ethnicity d. Foreign policy of Pakistan and challenges e. Futuristic outlook of Pakistan</p>	
Reference Materials	<p>Latest editions of following books</p> <ol style="list-style-type: none">Burki, Shahid Javed. State & Society in Pakistan, The Macmillan Press Ltd 1980.Akbar, S. Zaidi. Issue in Pakistan’s Economy. Karachi: Oxford University Press, 2000.S.M. Burke and Lawrence Ziring. Pakistan’s Foreign policy: An Historical analysis. Karachi: Oxford University Press, 1993.Mehmood, Safdar. Pakistan Political Roots & Development. Lahore, 1994.Wilcox, Wayne.The Emergence of Banglades., Washington: American Enterprise, Institute of Public Policy Research, 1972.Mehmood, Safdar. Pakistan Kayyun Toota, Lahore: Idara-e- Saqafat-e-Islamia, Club Road, nd.Amin, Tahir. Ethno - National Movement in Pakistan, Islamabad: Institute of Policy Studies, Islamabad.Ziring, Lawrence. Enigma of Political Development. Kent England: WmDawson & sons Ltd, 1980.Zahid, Ansar. History & Culture of Sindh. Karachi: Royal Book Company, 1980.Afzal, M. Rafique. Political Parties in Pakistan, Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.Sayeed, Khalid Bin. The Political System of Pakistan. Boston: Houghton Mifflin, 1967.Aziz, K.K. Party, Politics in Pakistan, Islamabad: National Commission on Historical and Cultural Research, 1976.Muhammad Waseem, Pakistan Under Martial Law, Lahore: Vanguard, 1987.Haq, Noor ul. Making of Pakistan: The Military Perspective. Islamabad: National Commission on Historical and Cultural Research, 1993.

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	PRINCIPLES OF ANIMAL LIFE-I
Course code	Zoo101
Cr. Hrs.	3(2+1)
Specific objectives of the course: <ul style="list-style-type: none">The course aims to impart knowledge and understanding of:	

- The concept and status of Zoology in life sciences and the common processes of life through its biochemical and molecular processes.
- The structure and function of cell organelles and how common animal cell diversified in various tissues, organs and organ systems.
- Biochemical mechanisms eventually generating energy for animal work.
- Animals and their relationship with their environment.

Course outline

Scope of Zoology: Introduction; significance and applications of zoology; animal diversity; the scientific method; environment and world resources. The Chemical Basis of Animal Life: Brief introduction to biomolecules; carbohydrates, lipids, proteins, and nucleic acids.

Cellular Organization: Structure of animal cells, cell membrane, cytoplasm and its organelles: ribosomes, endoplasmic reticulum, Golgi apparatus, lysosomes, mitochondria, cytoskeleton, cilia and flagella, centrioles and microtubules, vacuoles; the nucleus: nuclear envelope, chromosomes and nucleolus.

Animal tissues: Types: epithelial, connective, muscle and nervous tissue; organs and organ systems.

Enzymes: Structure, types; function and factors affecting their activity; cofactors and coenzymes.
Energy Harvesting: Aerobic and anaerobic respiration: glycolysis, citric acid cycle and electron transport chain; fermentation, the major source of ATP.

Reproduction and Development: Types; asexual and sexual, gametogenesis, fertilization, metamorphosis, zygote and early development.

Ecological Concepts: Ecosystem, types, homeostasis, biomes, food chain, food web, energy flow and thermodynamics; biogeochemical cycles, and limiting factors, populations and communities, human population growth, pollution, resource depletion and biodiversity.

Practicals

1. Tests for different carbohydrates, proteins and lipids.
Note: Emphasis on the concept that tests materials have been ultimately obtained from living organisms and constituted their body.
2. Study of the prepared slides of epithelial tissue (squamous, cuboidal, columnar), connective tissue (adipose, cartilage, bone, blood), nervous tissue and muscle tissue (skeletal, smooth and cardiac).
Note: Prepared microscopic and/or projection slides and/or CD ROM computer projections must be used.
3. Plasmolysis and deplasmolysis in blood. Preparation of blood smears.
4. Protein digestion by pepsin.
5. Ecological notes on animals of a few model habitats.
6. Field observation and report writing on animals in their ecosystem (a terrestrial and an aquatic ecosystem study).


Reference Materials	Latest editions of following books	
	1.	Miller, S.A. and Harley, J.B. 2005. Zoology, 6 th Ed. (International), Singapore: McGraw-Hill.
	2.	Molles, M.C. 2005. Ecology: Concepts and Applications. 6 th Ed. McGraw Hill, New York, USA.
	3.	Hickman, C.P., Roberts, L.S. and Larson, A. 2004. Integrated Principles of Zoology, 12 th Ed. (International), Singapore: McGraw Hill.
	4.	Campbell, N.A. 2002. Biology. 6 th Ed. Menlo Park, California: Benjamin/Cummings Publishing Company, Inc.
	5.	Miller, S.A. 2002. General Zoology Laboratory Manual. 5 th Ed. (International), Singapore: McGraw Hill.
	6.	Hickman, C.P. and Kats, H.L. 2000. Laboratory Studies in Integrated Principles of Zoology. Singapore: McGraw Hill.
	7.	Odum, E. P. 1994. Fundamentals of Ecology. 3 rd Ed. W.B




Khushal Khan Khattak University, Karak


Department of Botany

Title	Diversity of Plants
Course code	BOT101
Cr. Hrs.	4(3+1)
Specific objectives of the course:	
<ul style="list-style-type: none"> To introduce the students to the diversity of plants and their structures and significance. 	
Course outline	
<p>Comparative study of life form, structure, reproduction and economic significance of:</p> <ol style="list-style-type: none"> Viruses, General account, Structure and Life cycle, with special reference to TMV, Prion and viroid. Bacteria and Cyanobacteria, General account, Structure, Nutrition and Reproduction, Economic importance; Algae (Pigment system, Thallus structure, Reproduction and Classification) Fungi Introduction to Zygomycota, Ascomycota, Basidiomycota and Deuteromycota, their economic importance. Lichens Bryophytes <ol style="list-style-type: none"> Hepaticae Anthocerotae Musci Pteridophytes. <ol style="list-style-type: none"> Psilopsida Lycopsida Sphenopsida Pteropsida Gymnosperms, General account, reproduction and Classification. Angiosperms, General account. 	
Lab Outline:	
<p>Culturing, maintenance, preservation and staining of microorganisms. Study of morphology and reproductive structures of the types mentioned in theory. Identification of various types mentioned from prepared slides and fresh collections.</p>	
Reference Materials	<ol style="list-style-type: none"> Latest editions of following books Lee, R. E. 1999. Phycology. Cambridge University Press, UK Prescott, L. M., Harley, J. P. and Klein, A. D. 2004. Microbiology, 3rd Ed. WM. C. Brown Publishers. Alexopoulos, C. J., Mims, C. W. and Blackwell, M. 1996. Introductory Mycology. 4th Ed. John Wiley and Sons Publishers. Agrios, G. N. 2004. Plant pathology. 8th Ed. Academic Press London. Vashishta, B. R. 1991. Botany for degree students (all volumes). S. Chand and Company. Ltd. New Delhi. Andrew, H. N. 1961. Studies in Paleobotany. John Willey and Sons. Ingrouille, M. 1992. Diversity and Evolution of Land Plants. Chapman & Hall. Mauseth, J. D. 2003. Botany: An Introduction to Plant Biology 3rd Ed., Jones and Bartlett Pub. UK Marti, J. Ingrouille & Plant: Diversity and Evolution. 2006 CUP Taylor, T. N. & Taylor, E. D. 2000. Biology and Evolution of Fossil Plants. Prentice Hall. N. Y. Hussain, F. 2012. A Text Book of Botany and Biodiversity. Pak Book Empire.


<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	MATHEMATICS
Course code	MATH100
Cr. Hrs.	3(3+0)
Specific objectives of the course: <ul style="list-style-type: none">To prepare the students , not majoring in mathematics with the essential tools algebra to apply the concept and the technique in their respective discipline	
Course outline	
Real number system ; introduction to real number system and their properties . Complex numbers ; Introduction to complex number and their algebra Linear equation; Introduction to linear equation and their solution Quadratic equation ; Introduction to quadratic and their solution solution , nature of roots, cube roots of unity . Matrices; introduction to matrices, types , matrix inverse , determinant , solution of system of linear equation . Sequence and series ; Brief introduction to sequence and series Binomial theorem ; Binomial theorem with rational and irrational indices, trigonometry , fundamental of trigonometry, trigonometry identities	
Referen ce Material	Latest editions of following books 1.Mathematics part 1(KPK TEXT BOOK) 2..Swokowsky, E W, fundamentals of algebra and trigonometry (6 th edition)

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	Basic Inorganic Chemistry-I
Course code	CHEM101
Cr. Hrs.	3(3+0)
Specific objectives of the course:	
Course outline	
1. The Periodic Law and Periodicity Development of periodic table; Electronic configuration and classification of elements based on s, p, d, and f orbital's, group trends and periodic properties in s, p, d and f block elements i.e., atomic radii, ionic radii, ionization potentials. Electron affinities and electronegativities. Redox potential series and its applications.	
2. Chemistry of the s-Block elements a. Hydrogen and hydrides Orto and para hydrogen, their inter conversion, physical and chemical properties of hydrogen, atomic hydrogen & its isotopes, important types of hydrogen, hydrides and its types. b. Alkali metals (Group-I A). Occurrence, general characteristics of alkali metals, chemical reactions and important compounds of Lithium and Sodium, Diagonal relationship between lithium and magnesium. c. Alkaline Earth Metals (Group-IIA) Occurrence, preparations and general characteristics of alkaline earth metals, compounds alkaline earth metals like Beryllium and Calcium, comparison between alkali and alkaline earth metals and diagonal relationship between Beryllium and Aluminum.	
3. Chemistry of Halogens and Noble gases Anomalous behaviour of fluorine. Industrial preparation of chlorine. Preparation, properties, structures and uses of xenon fluorides; Commercial uses of noble gases.	

Reference Materials	Latest editions of following books	
	1.	Huheey J.E., Keiter E.A. Keiter R.L. and Medhi O.K. “Inorganic Chemistry: Principles of Structure and Reactivity” Pearson Inc. South Asia, 4 th Ed. (2009).
	2.	Douglas B.E., McDaniel D.H. and Alexander J.J. “Concepts and Models of Inorganic Chemistry” John Wiley & Sons, Inc. Canada, 3 rd Ed. (1994).
	3.	Cotton F.A., Wilkinson G. Murillo C.A. and Bochmann M. “Advance Inorganic Chemistry” John Wiley & Sons, Inc. New York, 6 th Ed. (2004).
	4.	Hill J.W. and Petrucci R.H. “General Chemistry” Prentice-Hall, Inc. (1996).
	5.	Vogel A.I. “A Text Book of Micro and Semimicro Qualitative Inorganic Analysis” Longman Green & Co. (1995).
	6.	Harris D.C. “Quantitative Chemical Analysis” W.H. Freeman and Company USA, 8 th Ed. (2010).

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	English II (Communication Skills)
Course code	ENG102
Cr. Hrs.	3(3+0)
Specific objectives of the course: Enable the students to meet their real life communication needs.	
Course outline	
Basics of Grammar Parts of speech and use of articles Sentence structure, active and passive voice Practice in unified sentence Analysis of phrase, clause and sentence structure Transitive and intransitive verbs Punctuation and spelling Comprehension Answers to questions on a given text Discussion General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students) Listening To be improved by showing documentaries/films carefully selected by subject teachers Translation skills Urdu to English Paragraph writing Topics to be chosen at the discretion of the teacher Presentation skills Introduction	
Reference Materials	Latest editions of following books
	1. Functional English
	a) Grammar
	1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0 194313492
	2 Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0 194313506
	b) Writing
	1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.
	c) Reading/Comprehension
	1. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	Introduction to Computer
Course code	CS101
Cr. Hrs.	3(3+0)
Specific objectives of the course:	
Course outline	
<p>1. INTRODUCTION TO COMPUTERS Definition/Meaning of Computer, its Characteristics, History, Generations of Computers; Computer Hardware and its Peripherals, New Hardware and Peripheral’s Installation. (Hands-On), Basic Architecture of Computer System; Software – its Types, Basic Operations. General Installation guidelines. (Hands-On); Concepts of Computer Virus, Worms, Hacking, Spam etc. and Use of Anti-virus Techniques/Software</p> <p>2. INTRODUCTION TO OPERATING SYSTEM (MICROSOFT WINDOWS XP or other Latest) Basic concepts regarding Systems Software and OS, and OS (Windows) Installation, Repair, Recovery Using Windows Environment. (Hands-On) · Windows XP or other Features · Start Menu, Task Bar, System Tray · Control Panel, its basic items · Printing · Managing Files and Folders · Windows Explorer · Opening Documents / Files · Copying and Moving Files · Deleting Files and Folders · Controlling the View Detail Level Customizing the Tool Bars</p> <p>3. WORD PROCESSING BASICS Types of Documents created with a Word Processing Program (MS Word); An overview of the Menus in MS Word; Principal Features of a Word Processing Program (Hands-On); In-depth Knowledge and Competence on various operations of MS Word</p> <p>4. SPREADSHEET APPLICATIONS Spreadsheet basics, its vocabulary, and principles; Usage of functions, macros, sorting, formatting, generating charts, pivot tables. Financial Management related Formula’s Implementation and Statistics related Formula’s Implementation. Cell Formatting, Print Previewing / Printing of selected Data; Insert and Name Worksheets; Import Spreadsheet Reports and Charts into Word Processing Documents; Set up and Analyze Itemized lists of numbers e.g. various types of budgets / financial statements; concept of Financial Modelling on worksheet.</p> <p>5. DATABASE APPLICATIONS Define the Purpose, and Components of Database; Plan a simple Two-table Database; Cardinality of Relationship; Creating Tables; Creating Relations of the Tables; Use Wizards to enter and to search Data; To create a Report; Enter Data in a form; Creating Module using Microsoft Access; Using simple Queries in Wizard; Privacy / Security Issues related to Databases; Create Data Base Using Microsoft SQL Server 2000 or latest.</p> <p>6. PRESENTATIONS THROUGH POWERPOINT Examine Purpose, Examples of a Presentation; Explain Components of a Presentation; Outline a Presentation and Apply good Design Principles; Apply and Modify a Design Template; Add Clip Art, Charts, SOUND to a presentation; Formatting a slide Show; Applying Slide Background, Color, Style, Transitions – visual, text; Running a Slide Show</p> <p>7. BASICS OF NETWORKING</p> <ul style="list-style-type: none">• Use of Networks; Its Common Types/Classes• Data Communication Modes; Using Telephone Lines, Modems• Wireless Networks• Network Security Issues <p>8. INTERNET & E-MAIL BASICS</p> <ul style="list-style-type: none">• <input type="checkbox"/> Introduction to the Internet, the terminology, its advantages and disadvantages; Security on the Internet – Tools & Tips; IT Issues; Privacy; Ethics and Legal Framework.	
Reference Materials	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Understanding Computers by Deborah Morley and Charles Parker Latest Edition2. Fundamentals of Computers By V. Rajaraman Latest Edition3. Capron, H.L. Computers, Tools for an Information Age, Prentice Hall Publishers, Latest Edition4. Gralla, Preston ‘How The Internet Works’, Que Publishers Latest Edition5. Kinkoph, Shery How to use Microsoft Office XP. Sams Publishing Latest Edition6. Grauer, Robert T. & Barber, Maryam, Exploring Office XP, Volume1. Prentice Hall Publishers Latest Edition

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	PRINCIPLES OF ANIMAL LIFE–II
Course code	ZOO102
Cr. Hrs.	3(2+1)
Specific objectives of the course: The course will impart knowledge and understanding of: <input type="checkbox"/> Cell division and its significance in cell cycle. <input type="checkbox"/> Concepts and mechanisms of inheritance pattern, chromosome and gene linkage and molecular basics of genetics. <input type="checkbox"/> Animal behaviour and communication. <input type="checkbox"/> Theories of evolution, gene flow and mechanism of evolution with reference to animal diversity.	
Course outline	
Cell Division: Cell cycles: Mitosis and meiosis; control of the cell cycle. Inheritance Patterns: Mendelian genetics; inheritance patterns; gene, structure, chemical composition and types. Chromosomes and Gene Linkage: Eukaryotic chromosomes; linkage and crossing over; chromosomal aberrations. Cellular Control: DNA: the genetic material; DNA replication in prokaryotes and eukaryotes; control of gene expression in eukaryotes; gene mutation; recombinant DNA technologies and their applications. Animal Behavior: Behaviour and its types, proximate and ultimate causes; anthropomorphism; development of behavior; learning; factors controlling animal behavior; communication; behavioral ecology; social behavior. Evolution: A Historical Perspective: Theories of evolution: Natural selection Lamarckism and neo larmarckism, Darwinism and neo Darwinian. Evolution and Gene Frequencies: Hardy-Weinberg principle; evolutionary mechanisms: population size, genetic drift, gene flow, de Vries mutation theory and rates of evolution, polymorphism; species and speciation; molecular evolution; mosaic evolution. Practicals 1.. Study of mitosis in onion root tip. 2.Study of meiosis in grasshopper testis (students should prepare the slide). 3.Problem based study of Mendelian ratio in animals. 4.Multiple alleles study in blood groups. 5.Survey study of a genetic factor in population and its frequency. 6.Study of karyotypes of Drosophila, mosquito. 7. Study of cytochemical detection of DNA in protozoa and avian blood cell. 8. Study to demonstrate nervous or endocrine basis of behaviour (conditioned reflex or aggression or parental behavior). 9. Study to demonstrate social behaviour (documentary film be shown, honey bee, monkey group in a zoo).	
Reference Materials	Latest editions of following books 1. Pechenik, J.A. 2012. Biology of Invertebrates, 4 th Edition (International), Singapore: McGraw Hill. 2. Hickman, C.P., Roberts, L.S., Larson, A. 2004. Integrated Principles of Zoology, 11 th Edition (International). Singapore: McGraw Hill. 3. Miller, S.A., Harley, J.B. 2002. Zoology, 5 th Edition (International), Singapore: McGraw Hill. 4. Miller, S.A. 2002. General Zoology Laboratory Manual. 5 th Ed. (International). Singapore: McGraw Hill. 5. Campbell, N.A. 2002. Biology. 6 th Edition. Menlo Park, California: Benjamin/Cummings Publishing Company, Inc. 6. Kent, G.C., Miller, S. 2000. Comparative Anatomy of Vertebrates. New York: McGraw Hill. 7. Hickman, C.P., Kats, H.L. 2000. Laboratory Studies in Integrated Principles of Zoology. Singapore: McGraw Hill.



Khushal Khan Khattak University, Karak
Department of Botany


Title	Plant Systematics, Anatomy and Development/ Embryology
Course code	BOT102
Cr. Hrs.	4(3+1)
Specific objectives of the course: To understand: 1. Various systems of classification, identification and nomenclature of Angiosperms 2- Structures and functions of tissues and organs at embryonic level.	
Course outline	
a) Plant systematics 1. Introduction to Plant Systematics: aims, objectives and importance. 2. Classification: brief history of various systems of classification. 3. Brief introduction to nomenclature, importance of Latin names and binomial system with an introduction to International Code of Botanical Nomenclature (ICBN).Vienna code. 4. Morphology: a detailed account of various morphological characters root, stem, leaf, inflorescence, flower, placentation and fruit types. 5. Diagnostic characters, economic importance and distribution pattern of the following families: 1. 1.Brassicaceae (Cruciferae) 2. Fabaceae (Leguminosae) 3. Rosaceae 4. Asteraceae (Compositae) b) Anatomy 1. Cell wall: structure and chemical composition 2. Concept, structure and function of various tissues like: i. Parenchyma ii. Collenchyma iii. Sclerenchyma iv. Phloem Epidermis (including stomata and trichomes) v. Xylem 3. Meristem: types 4. Vascular cambium 5. Primary and secondary growth of dicot stem, periderm 6. Characteristics of wood: diffuse porous and ring porous, sap and heart wood, soft and hard wood, annual rings. c) Development/Embryology 1. Early development of plant body: 2. Capsella bursa-pastoris 3. Structure and development of Anther Microsporogenesis, Microgametophyte 4. Structure of Ovule Mega sporogenesis Megagametophyte 5. Endosperm formation 6. Parthenocarpy 7. Polyembryony Lab Outline: Plant Systematics 1. Identification of families given in syllabus with the help of keys. 2. Technical description of common flowering plants belonging to families mentioned in theory. 3. Field trips shall be undertaken to study and collect local plants. 4. Students shall submit 40 fully identified herbarium specimens. Anatomy and Embryology	


<div><div>1. Study of stomata and epidermis.</div><div>2. Tissues of primary body of plant.</div><div>3. Study of xylem 3-dimensional plane of wood.</div><div>4. T. S of angiosperm stem and leaf.</div><div>5. Anatomy of germinating seeds</div><div>6. Study of pollens</div></div>	
<div>Books Recommended</div>	<div><div>Latest editions of following books</div><div><div>1) Hameed ullah Muhammad, “Emergence of Islam” , IRI, Islamabad</div><div>2) Hameed ullah Muhammad, “Muslim Conduct of State”</div><div>3) Hameed ullah Muhammad, ‘Introduction to Islam</div><div>4) Mulana Muhammad Yousaf Islahi,”</div><div>5) Hussain Hamid Hassan, “An Introduction to the Study of Islamic Law” leaf Publication Islamabad, Pakistan.</div><div>6) Ahmad Hasan, “Principles of Islamic Jurisprudence” Islamic ResearchInstitute, International Islamic University, Islamabad (1993)</div><div>7) Mir Waliullah, “Muslim Jrisprudence and the Quranic Law of Crimes” Islamic Book Service (1982)</div><div>8) H.S. Bhatia, “Studies in Islamic Law, Religion and Society” Deep & Deep Publications New Delhi (1989)</div></div></div>




Khushal Khan Khattak University, Karak
Department of Botany

Title		Basic Organic Chemistry-I
Course code		CHEM102
Cr. Hrs.		3(3+0)
Specific objectives of the course:		
Course outline		
<p>1. Basic Concepts in Chemical Bonding: Localised and delocalised bonding; concept of hybridization, VSEPR Theory, Dipole moment; Inductive effect, resonance; resonance energy; rules of resonance; resonance effect, Steric inhibition of resonanc, Hyperconjugation; tautomerism; hydrogen bonding.</p> <p>2. Open Chain Hydrocarbons:: Nomenclature, Preparation, properties and reactions of alkanes, alkenes and alkynes.</p> <p>3. Closed Chain Hydrocarbons:: Nomenclature, Synthesis, reactions and relative stability of small and medium sized cycloalkanes, preparation and reactivity of naphthalene.</p> <p>4. Alkyl Halides: Nomenclature, Preparation and reactions of alkyl halides, Grignard’s Reagent: Preparation, structure and applications in the synthesis of Alkanes, alcohols and carboxylic acids and Esters.</p>		
Reference Materials	Latest editions of following books	
	1.	Younas, M., Text Book of Organic Chemistry, Ilmi Kutab Khana, Lahore 2 nd Edition, 2005.
	2.	Rehman, A, Text Book of Organic Chemistry, Caravan Book House Lahore, 2008
	3.	March, J., Advanced Organic Chemistry, Wiley, New York, 6 th Ed, 2007.
	4.	Pine, S.H., Organic Chemistry, McGraw-Hill, New York, 5 th Ed 1987
	5.	Solomon’s, T. W. G., Fundamentals of Organic Chemistry, Wiley, New York, 10 Ed, 2011
	6.	Chughtai, F. A., Organic reaction, Majid book Depot, Lahore/Faisalabad, 2 nd Ed.
	7.	Morrison R. T. and R.N. Boyd, Organic Chemistry, Allyn and Bacon, London, 6 th Ed, 1999.
	8.	Wade G.L, Text book Organic Chemistry 5 th Edition Pearson, 6 th Ed, 2006.
	9.	Vogal., A. I., A Text Book of Practical Organic Chemistry, Longman, London, 5 th Ed 1989.
	10.	Clarke, H. T. and D. Haynes., A Hand Book of Organic Analysis, Edward Arnold, London, 5 th Ed 1989.
	11.	Mann, F. G and B. C. Sauners, Practical Organic Chemistry, Longman, London, 2009.
	12.	Shriner, R. L., D.Y. Curtin, R.C. Fuson, and T.C. Morrill, The Systematic Identification of Organic Compounds, Wiley, New York, 1940
	13.	Rehman, A., Experimental Organic Chemistry, The caravan Book House, Lahore, 2008

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	English III (Technical Report, Writing & Presentation Skill)
Course code	ENG211
Cr. Hrs.	3(3+0)
Specific objectives of the course: Enhance language skills and develop critical thinking	
Course outline	
Presentation skills Essay writing Descriptive, narrative, discursive, argumentative Academic writing How to write a proposal for research paper/term paper How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency) Technical Report writing Progress report writing Note: Extensive reading is required for vocabulary building	
Reference Materials	Latest editions of following books Technical Writing and Presentation Skills a) Essay Writing and Academic Writing 1. Writing. Advanced by Ron White. OxfordSupplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing). 2. College Writing Skills by John Langan. Mc=Graw-Hill Higher Education. 2004. 3. Patterns of College Writing (4 th edition) by LaurieG. Kirszner and Stephen R. Mandell. St. Martin'sPress. b) Presentation Skills c) Reading The Mercury Reader. A Custom Publication. Compiledby norther Illinois University. General Editors: JaniceNeulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	Geography
Course code	GEO101
Cr. Hrs.	3(3+0)
Specific objectives of the course:	
Course outline	
---Definition, scope and main component of GeographyBasic concept about GeographyPakistan, its location of geographically and absolutely Administrative division of Pakistan Physical land scape of Pakistan -----The universe ---Basic properties of earth as a land -----Theories regarding the origin of earth ---Latitude and longitude, Time distribution of the world ...rotation and revolution of earth and other related phenomena ----solar system, galaxy and milk way Atmosphere -----atmosphere, its composition, structure, Temperature of atmosphere and other related phenomenon, Head budget World distribution of temperature (tropical zone, temperate and Frigid Zone) Pressure of atmosphere, world pressure belt, world wind circulation system and type of wind Precipitation and types Environmental process, Ozone layer depletion, green house effect, acid rain, desertification	
Reference Materials	Latest editions of following books Christopherson, R.W. (2000), Geo-systems, Prentice-Hall, Inc, USA. De Blij, H. J and Muller, P.O. (1996), Physical Geography of the global Environment, USA, John Wiley and Sons Inc. Diwan A.P. & D.K. Arora (1995), Origin of the Ocean, Anmol Publisher, Delhi. Gabler, R.E, Sager, R.J and Wise, D.L. (1997), Essentials of Physical Geography, Saunders College Publishing, New York. Kendrew, (1961), Climates of the continents, Longman London/New York King, CAM (1980), Physical Geography, Oxford, Basil Blackwell Mcliveen, J.F.R. (1992), Fundamentals of Weather and climate, Prentice Hall New Jersey Miller, E.W. (1985), Physical Geography, Columbus, Charles E. Merrill Miller, G.T. (1996), Living in the Environment, Principles, connections and solutions, Wadsworth Monkhouse, F.J. (1996), Principles of Physical Geography, Hodder & Stoughton, London Rathor, A. Hamid (1996), Tabhi Geographia, Islamabad Muqtadra Qaumi Zaban

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	Animal Diversity: Invertebrates
Course code	ZOO211
Cr. Hrs.	3(2+1)
Specific objectives of the course: The course is designed to provide students with: <input type="checkbox"/> Taxonomic characteristics and classification of each phylum <input type="checkbox"/> Concepts of evolutionary relationship of animal kingdom <input type="checkbox"/> Knowledge about animal kingdom, emphasizing their phylogenetic relationships and simple to complex mode of animal life	
Course outline	
Introduction: Architectural pattern of an animal, taxonomy and phylogeny, major subdivisions of animal kingdom with evolutionary perspective.	

Animal-Like Protists: The Protozoa; life within a single plasma membrane; symbiotic life-styles. Protozoan taxonomy: (up to phyla, subphyla and super classes, wherever applicable). Pseudopodia and amoeboid locomotion; cilia and other pellicular structures; nutrition; genetic control and reproduction; symbiotic ciliates; further phylogenetic considerations.

Multicellular and Tissue Levels of Organization: origins of multicellularity; animal origins. Phylum porifera: cell types, body wall, and skeletons; water currents and body forms; maintenance functions; reproduction. Phylum Cnidaria (coelenterata) the body wall and nematocysts; alternation of generations; maintenance functions; reproduction and classification up to class. Phylum Ctenophora; further phylogenetic considerations.

Triploblastics and Acoelomate Body Plan: Phylum Platyhelminthes: classification up to class; the free-living flatworms and the tapeworms; Phylum Nemertea; Phylum Gastrotricha; further phylogenetic considerations.

Pseudocoelomate Body Plan: Aschelminths: general characteristics; classification up to phyla with external features; feeding and the digestive system; other organ systems; reproduction and development of Phylum Rotifera and Phylum Nematoda; Phylum Kinorhyncha. Some important nematode parasites of humans; further phylogenetic considerations.

Molluscan Success: relationships to other animals; origin of the coelom; molluscan characteristics; classification up to class. The characteristics of shell and associated structures, feeding, digestion, gas exchange, locomotion, reproduction and development, other maintenance functions and diversity in gastropods, bivalves and cephalopods; further phylogenetic considerations.

Annelida: The Metameric Body Form: relationship to other animals, metamerism and tagmatization; External structure and locomotion, feeding and the digestive system, gas exchange and circulation, nervous and sensory functions, excretion, regeneration, reproduction and development in different classes; further phylogenetic considerations.

Arthropods: Blueprint for Success: classification and relationships to other animals; metamerism and tagmatization; the exoskeleton; metamorphosis; classification up to class; further phylogenetic considerations; phylogeny and adaptive diversification.

Echinoderms: relationships to other animals; echinoderm characteristics; classification up to class. Maintenance functions, regeneration, reproduction, and development; further phylogenetic considerations.

Lesser Invertebrates: The lophophorates, entoprocts, cycliophores, and chaetognaths.

Practicals

Museum study of representative Phyla, Permanent slide preparations

1. Study of Euglena, Amoeba, Entamoeba, Plasmodium, Trypanosoma,
2. Paramecium as representative of animal like protists. (Prepared slides).
3. Study of sponges and their various body forms.
4. Study of principal representative classes of Phylum Cnidaria.
5. Study of principal representative classes of Phylum Platyhelminthes.
6. Study of representative of Phylum Rotifera, Phylum Nematoda.
7. Study of principal representative classes of Phylum Mollusca.
8. Study of principal representative classes of Phylum Annelida.
9. Study of principal representative classes of groups of Phylum Arthropoda.
10. Brief notes on medical/economic importance of the following:
11. Plasmodium, Entamoeba histolitica, Leishmania, Liverfluke, Tapeworm, Earthworm,
12. Silkworm, Citrus butterfly.


Reference Materials	Latest editions of following books
	1. Hickman, C.P., Roberts, L.S., Larson, A. 2011. Integrated Principles of Zoology, 15 th Ed. (International). Singapore: McGraw Hill.
	2. Miller, S.A., Harley, J.B. 2011. Zoology, 8 th Ed. (International), Singapore: McGraw Hill.
	3. Pechenik, J.A. 2010. Biology of Invertebrates, 4 th Ed. (International), Singapore: McGraw Hill.
	4. Campbell, N.A. 2002. Biology, 6 th Ed. Menlo Park, California: Benjamin/Cummings Publishing Company, Inc.
	5. Miller, S.A., 2002. General Zoology Laboratory Manual. 5 th Ed. (International). Singapore: McGraw Hill.
	6. Hickman, C.P., Kats, H.L. 2000. Laboratory Studies in Integrated Principles of Zoology. Singapore: McGraw Hill.




Khushal Khan Khattak University, Karak
Department of Botany

Title	Cell Biology, Genetics and Evolution
Course code	BOT211


Cr. Hrs.		4(3+1)
Specific objectives of the course: To understand: 1. Structure and function of cell. 2. Nature of genetic material and hereditary process 3. Familiarization with evolutionary processes.		
Course outline		
a) Cell Biology 1. Structure and Function of Bio-molecules i. Carbohydrates ii. Lipids iii. Proteins iv. Nucleic Acids 2. Cell: Cell theory, cell types (prokaryotes, eukaryotes), basic properties of cell. 3. Brief description of following cell organelles i Cell wall ii Cell membrane iii Nucleus iv Endoplasmic reticulum v Plastids vi Mitochondria vii Ribosomes viii Dictyosomes ix Vacuoles 4. Reproduction in somatic and embryogenic cell, mitosis, meiosis and cell cycle 1. Genetics Introduction, scope and brief history of genetics. Mendelian inheritance; Laws of segregation and independent assortment, back cross, test cross, dominance and incomplete dominance. Molecular genetics; DNA replication. Nature of gene, genetic code, Transcription, translation, protein synthesis, regulation of gene expression (e.g. lac operon). 3. Chromosomal aberrations; Changes in the number of chromosomes. Aneuploidy and Euploidy. Changes in the structure of chromosomes, deficiency, duplication, inversion and translocation. c) Evolution: Introduction and theories.		
Lab Outline: Cell Biology 1. Study of cell structure using compound microscope and elucidation of ultrastructure from electron microphotographs 2. Measurement of cell size. 3. Study of mitosis and meiosis by smear/squash method and from prepared slides. 4. Study of chromosome morphology and variation in chromosome number. 5. Extraction and estimation of carbohydrate, protein, RNA and DNA from plant sources. Genetics 1. Genetical problems related to transmission and distribution of genetic material. 2. Identification of chromosomes in plant material. Carmine/orcein staining. 3. Determination of blood groups		
Reference Materials	Latest editions of following books 1. Hoelzel, A. R. 2001. Conservation Genetics. Kluwer Academic Publishers. 2. Dyonsager, V. R. (1986). Cytology and Genetics. Tata and McGraw-Hill Publication Co. Ltd., New Delhi. 3. Lodish. H. 2001. Molecular Cell Biology. W. H. Freeman and Co. 4. Sinha, U. and Sinha, S. (1988). Cytogenesis Plant Breeding and Evolution, Vini Educational Books, New Delhi. 5. Strickberger, M. V. (1988), Genetics, MacMillan Press Ltd., London. 6. Carroll, S. B., Grenier, J. K. and Welnerbee, S. D. 2001. From DNA to Diversity - Molecular Genetics and the Evolution of Animal Design. Blackwell Science. 7. Lewin, R, 1997. Principles of Human Evolution. Blackwell Science. 8. Strickberger, M. W. 2000 Evolution. Jones & Bartlet Publishers Canada 9. Ingrouille M. J. & B. Eddie. 2006. Plant Diversity and Evolution. Cambridge University Press. 10. Bruce Albert et al. 2009. Essential cell biology. Garland Sciences Publishers.	

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	Basic Physical Chemistry-I
Course code	CHEM211
Cr. Hrs.	3(3+0)
Specific objectives of the course:	
Course outline	
<p>1. Physical States of Matter (Gaseous State) Gas laws, deviation of real gases from ideal behavior, Van der Waal’s equation of state, critical phenomena, Critical temperature, pressure and volume, Liquefaction of gases, Law of corresponding states.</p> <p>2. Physical States of Matter (Liquid State) Physical properties of liquids, vapor pressure, Surface tension, Viscosity, Parachor value, Rheochor value and their applications, Refractive index, molar refraction and its applications, Dipole moment its determination and applications.</p> <p>3. States of Matter (Solid State) Solids and their classification, Unit cells, Bragg’s methods of crystal structure analysis, X-ray crystallography of Physical sodium chloride, powder method of crystal structure analysis.</p> <p>4. Chemical Thermodynamics-I Definition of some common thermodynamic terms, System and surrounding, Zeroth law of thermodynamics, First law of thermodynamics and its applications to internal energy, Enthalpy and heat capacity, concept of reversible and irreversible processes, worked done and the change in the internal energy during the isothermal and adiabatic processes in ideal gases, Carnot cycle.</p> <p>5. Chemical Kinetics-I Introduction, Rate of reaction, Factorse affecting rate of reaction, Rate law for chemical reactions, Order of reaction and Molecularity, half life and Energy of activation.</p>	
Reference Materials	Latest editions of following books <div>1- General Chemistry, Darrell, D. Ebbing, 10th Ed., (2012).</div> <div>2- Physical Chemistry, Atkin, 9th Ed., (2010).</div> <div>3- Practical Chemistry, O.P. Pandey, D.N. Bajpai and S. Giri., (2009).</div> <div>4- Physical Chemistry, Robert J. Silbey and Robert A. Alberty 4rd Ed., (2006).</div> <div>5- Fundamental concepts in Physical Chemistry, Devendra Nath Thakur, (2001).</div> <div>6- Essentials of Physical Chemistry, B. S. Bahl, Arun Bahl, G. D. Tuli., 24th Ed., (2000).</div> <div>7- Physical Chemistry, R.L Madan and G. D. Tuli., (1999).</div> <div>8- Experiments in physical chemistry Shoemaker, D.P. Nibbler and C.W. Garland, (1996), 6th Ed., McGraw Hill, Inc.</div>

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	English IV
Course code	ENG212
Cr. Hrs.	3(3+0)
Specific objectives of the course: Study Skills is a collection of study techniques that will make students’ learning more effective. The subject, thus, will have its impact on the whole degree program of the students.	
Course outline	
<div><div>A. Study Habits, Study Place, Study Time (Time Management)</div><div>B. Concentration</div><div>C. Motivation</div><div>D. Note- Taking & Note Making Techniques</div><div>Techniques: Symbols, abbreviations, mind maps etc., Reading Notes, Lecture Notes</div><div>E. Using Library</div></div>	

<p>The Card Catalog, Using the Card Catalog Efficiently, The Call Slip, eference Works, Encyclopedias, Yearbooks, Dictionaries, Atlases, Bibliographies, Some Common Reference Works, Periodicals, The Readers Guide</p> <p>F. Using Dictionary How to find a word, Word Grammar, Pronunciation, Idioms, Common Spelling Problems</p> <p>G. Reading Skills Intensive Reading, Extensive Reading, Reading Surveys</p> <p>Sub Skills in Reading Vocabulary, Inference, Coherence, Cohesion, Close exercises, Skimming, Scanning, Predicting, Organization</p> <p>H. Writing Skill Writing paragraph: Topic Sentence, Support, Conclusion, Types of paragraph: Paragraph of Analysis, Paragraph of Description, Paragraph of Comparison and Contrast, Paragraph of analogy, Paragraph of Definition, Punctuation Marks, Discourse Markers, Essay: Definition & Types</p> <p>J Writing an Outline</p> <p>K Learning the Vocabulary of English Word Formation, Changing Parts of Speech, Present and Past Participles as Adjectives, Word Stems, Guessing Meanings from Context, Recording the Meanings of Words, Fixing the Meanings of Words</p> <p>K Preparing for Examination How to prepare for Examinations, Physical Preparation, Emotional Preparation, Review Preparation, How to take an Examination, Types of Examinations, Objective Examinations, Subjective (or Essay-Type) Examinations</p>	
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Reference Materials	Latest editions of following books
	<ul style="list-style-type: none">➤ Buzan, T. (1982) Use Your Head (Rev .Ed.)➤ Grellete, F. (1981) Developing Reading Skills, Cambridge.➤ Jordon. R.R Academic Writing Course, London: Collins.➤ Nuttal. (1981) Teaching Reading Skills in a FL. London.➤ Pineas, A (1982) Writing in English, New York: Macmillan.➤ Wallace, M.J. (1980) Study Skills in English. Cambridge: Cup➤ Yorkey, R.C. (1970) Study Skills for Students of English as a Second Language

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	ANIMAL DIVERSITY: CHORDATES
Course code	ZOO212
Cr. Hrs.	3(2+1)
Specific objectives of the course: The course aims to: <ul style="list-style-type: none">• Provide understanding about taxonomic characteristics and classification of each phylum• Develop concepts of evolutionary relationship of animal kingdom• Provide knowledge and understanding about the different animal groups with special emphasis on their phylogenetic relationships	
Course outline Protochordates: Structure, anatomy and organ systems; reproduction; life histories and metamorphosis; phylogenetic relationships; further phylogenetic considerations. Fishes: Vertebrate Success in Water: phylogenetic relationships; Agnatha and Gnathostomata: locomotory adaptations, nutrition and the digestive system, circulation, gas exchange, nervous and sensory functions, excretion and osmoregulation, reproduction and development; further phylogenetic consideration. Amphibians: The first terrestrial vertebrates: phylogenetic relationships; Caudata, Gymnophiona, and Anura;Structure and locomotory adaptations, nutrition and the digestive system, circulation, gas exchange, temperature regulation, nervous and sensory functions, excretion and osmoregulation, reproduction, development, and metamorphosis; further phylogenetic considerations. Reptiles: The First Amniotes: cladistic interpretation of the amniotic lineage; Testudines or Chelonia, Rhynchocephalia, Squamata, and Crocodilia; adaptations in external structure and locomotion, nutrition and the digestive system, circulation, gas exchange, and temperature regulation, nervous and sensory functions, excretion and osmoregulation, reproduction and development; further phylogenetic considerations. Birds: Feathers, flight and endothermy: phylogenetic relationships; ancient birds and the evolution of flight; diversity of modern birds; adaptation in external structure and locomotion, nutrition and the digestive system, circulation, gas exchange, and regulation, nervous and sensory systems, excretion and osmoregulation, reproduction and development; migration and navigation. Mammals: Specialized teeth, endothermy, hair and viviparity; diversity of mammals; adaptations in external structure and locomotion, nutrition and the digestive system, circulation, gas exchange, and temperature regulation, nervous and sensory functions, excretion and osmoregulation, behavior, reproduction and development.	

Practicals Museum study of: 1. Protochordates, Pisces, Amphibia, Reptilia, Aves, Mammalia. 2. Field trips to study animal diversity in an ecosystem. Note: Preserved specimen and/or colored projection slide and/or CD ROM projection of computer must be used.	
Reference Materials	Latest editions of following books 1. Hickman, C.P., Roberts, L.S., Larson, A. 2011. Integrated Principles of Zoology, 15 th Ed. (International). Singapore: McGraw Hill. 2. Campbell, N.A. Biology, 9 th Ed. 2011. Menlo Park, California: Benjamin/Cummings Publishing Company, Inc. Miller, S.A. and Harley, J.B. 2010. Zoology, 8 th Edition (International) Singapore: McGraw Hill. 3. Miller, S.A. 2002. General Zoology Laboratory Manual. 5 th Ed. (International), Singapore: McGraw Hill. 4. Kent, G.C., Miller, S. 2001. Comparative Anatomy of Vertebrates. Latest edition New York: McGraw Hill. 5. Hickman, C.P., Kats, H.L. 2000. Laboratory Studies in Integrated Principles of Zoology. Singapore: McGraw Hill. 6. Hickman, C.P., Roberts, L.S., Larson, A. 2011. Integrated Principles of Zoology, 15 th Ed. (International). Singapore: McGraw Hill. 7. Campbell, N.A. Biology, 9 th Ed. 2011. Menlo Park, California: Benjamin/Cummings Publishing Company, Inc. Miller, S.A. and Harley, J.B. 2010. Zoology, 8 th Edition (International) Singapore: McGraw Hill. 8. Miller, S.A. 2002. General Zoology Laboratory Manual. 5 th Ed. (International), Singapore: McGraw Hill. 9. Kent, G.C., Miller, S. 2001. Comparative Anatomy of Vertebrates. Latest edition New York: McGraw Hill. 10. Hickman, C.P., Kats, H.L. 2000. Laboratory Studies in Integrated Principles of Zoology. Singapore: McGraw Hill.

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	Biodiversity and Conservation
Course code	BOT214
Cr. Hrs.	4(3+1)
Specific objectives of the course: To familiarize the students with the diversity of nature. Importance of biodiversity for survival and proper functioning of ecosystems.	
Course outline	
<p>Biodiversity : Definition, types and threats Threats to Biodiversity; deforestation, over grazing, erosion, desertification, ecosystem degradation, bio invasion, pollution and climate change Biodiversity of Pakistan Measuring biodiversity: Alpha, Beta and Gamma diversity; Systematic and functional diversity. Ecological services, indirect value of ecosystem by virtue of their ecological functions, direct value of ecosystem (i.e. Utility of Bio resources) Sustainable and unsustainable use of biological resources Biodiversity Hot spots of Pakistan and the world. International treaties/agreements regarding Biodiversity and conservation; CBD, CITES, Ramsar Conservation strategies; in situ, ex situ, in vitro conservation Conservation vs preservation IUCN categorized protected areas in Pakistan; red listing Environmental Impact Assessment. Use of herbarium and Botanical Garden in biodiversity and conservation. Concept of pastures and wild life management Global Biodiversity Information Facility (GBIF)</p> <p>Lab outline: Inventory of plant biodiversity in various habitats. Field survey for baseline studies and Impact Assessment. Identification of wild plant species used by local communities in different ecosystems.</p>	
Reference Materials	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Abbasi, A. M., Khan, M. A., M. Ahmad and M. Zafar. 2012. Medicinal plant biodiversity of Lesser Himalaya Pakistan. Springer Publishers USA.2. Hussain, F., 1991. Vegetation and ecology of lesser Himalaya. Department of Botany, Peshawar3. Shinwari, M. I. and M. A. Khan. 1998. Ethnobotany of Margalla Hills. Department of Biological Sciences, Quaid-i-Azam University Islamabad Pakistan.4. Shinwari, M. I., M. I. Shinwari and Shah, M. 2007. Medicinal Plants of Margalla Hills National Park Islamabad. Higher Education Commission Islamabad. Pp.218.5. Heywood, V. (ed.). 1995. Global Biodiversity Assessment. Published for the United Nations Environment Programme. Cambridge University Press, Cambridge, UK.6. Falk, D. A. &Holsinger, K. E. 1991. Genetics and Conservation of Rare Plants. Center for Plant Conservation. Oxford University Press, Oxford, UK.7. Frankel, O. H., Brown, A. H. D. & Burdon, J. J. 1995. The Conservation of PlantBiodiversity. Cambridge University Press, Cambridge, UK.8. IUCN. 1994. IUCN Red List Categories. As Approved by the IUCN Council. IUCN.9. Leadlay, E. and Jury, S. 2006 Taxonomy and Plant Conservation. CUP.



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Title	Plant Physiology and Ecology
Course code	BOT213
Cr. Hrs.	4(3+1)
Specific objectives of the course: To provide comprehensive knowledge of functioning of organs, organelles and biomolecules, To enable the students to assess the effects of various environmental factors on plant growth and development.	
Course outline	
<p>Plant Physiology Water relations (water potential, osmotic potential, pressure potential, matric potential). Absorption and translocation of water. Stomatal regulation. Mineral nutrition: Soil as a source of minerals. Passive and active transport of nutrients. Essential mineral elements, role and deficiency symptoms of macronutrients. Photosynthesis: Introduction, Oxygenic and non-oxygenic photosynthesis Mechanism: light reactions (electron transport and photophosphorylation) and dark reactions (Calvin cycle). Differences between C3 and C4 plants. Factors affecting this process, Products of photosynthesis. Respiration: Definition and respiratory substrates. Mechanism-Glycolysis, Krebs cycle. Electron transport and oxidative phosphorylation. Anaerobic respiration. Energy balance in aerobic and anaerobic respiration, Respiratory quotients.</p> <p>Ecology Introduction, aims and applications of ecology. Soil: Physical and Chemical properties of soil (soil formation, texture. pH, EC, organism and organic matter etc) and their relationships to plants. Light and Temperature. Quality of light, diurnal and seasonal variations. Ecophysiological responses. Water: Field capacity and soil water holding capacity. Characteristics of xerophytes and hydrophytes. Effect of precipitation on distribution of plants. Wind: Wind as an ecological factor and its importance. Population Ecology: Introduction. A brief description of seed dispersal and seed bank. 1. Community Ecology i. Ecological characteristics of plant community ii. Methods of sampling vegetation (Quadrat and line intercept) iii. Major vegetation types of the local area.</p> <p>Ecosystem Ecology i. Definition, types and components of ecosystem. ii. Food chain and Food web.</p> <p>Applied Ecology: Causes, effects and control of water logging and salinity with respect to Pakistan</p> <p>Lab Outline: a) Plant Physiology Preparation of solutions of specific normality of acids/bases, salts, sugars, molal and molar solutions and their standardization. Determination of uptake of water by swelling seeds when placed in sodium chloride solution of different concentrations. Measurement of leaf water potential by the dye method. Determination of the temperature at which beet root cells lose their permeability. Determination of the effects of environmental factors on the rate of transpiration of a leafy shoot by means of a porometer/cobalt chloride paper method. Extraction of chlorophyll from the leaves and separation of component pigments on a paper chromatogram. Study of absorption spectra using spectrophotometer. Estimation of oxygen utilized by a respiring plant by Winkler's method.</p> <p>Ecology Determination of physical and chemical characteristics of soil. Measurements of various population variables Measurement of vegetation by Quadrat and line intercept methods. Field trips to ecologically diverse habitats. Measurements of wind velocity. Measurement of light and temperature. Effect of light and temperature on seed germination.</p>	

Reference Materials	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Ihsan, I. 1995. Plant Physiology, Biochemical Processes in Plants, UGC Press.2. Witham and Devlin. 1986 Exercises in Plant Physiology, AWS Publishers, Boston.3. Taiz, L. and Zeiger, E. 2006. Plant Physiology. 4th. Ed. Sinauers Publ. Co. Inc. Calif.4. Salisbury F. B. and Ross C. B. 1992. Plant Physiology. 5th Edition. Wadsworth Publishing Co. Belmont CA.5. Hopkins, W. B. 1999. Introduction to Plant Physiology. 2nd Ed. John Wiley and Sons. New York6. Schultz, J. C. 2005. Plant Ecology. Springer-Verlag, Berlin.7. Ricklefs, R. E. 2000. Ecology. W. H. Freeman and Co., UK.8. Ricklefs, R. E. 2001. The Economy of Nature. W. H. Freeman and Co., UK.9. Barbour, M. G., J. H. Burke and W. D. Pitts. 1999. Terrestrial Plant Ecology, The Benjamin, Cumming Publishing Co. Palo Alto, California, USA.10. Chapman, J. L. and Reiss, M. J. 1995. Ecology: Principles and Applications. Cambridge University Press.11. Hussain F. 1989. Field and Laboratory Manual of Plant Ecology. National Academy of Higher Education, Islamabad. <p>Hussain, S. S. 1989. Pakistan Manual of Plant Ecology; National Book Foundation, Islamabad.</p>
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Khushal Khan Khattak University, Karak

Department of Botany

Title	Basic Organic Chemistry-II
Course code	CHEM214
Cr. Hrs.	3(3+0)
Specific objectives of the course:	
Course outline	
Chemistry of Carbonyl Compounds: Nomenclature, Structure and reactivity of carbonyl group; preparation and reactions of aldehydes and ketones.	
Chemistry of Carboxylic Acids: Nomenclature, Preparation, properties and reactions of carboxylic acids. Effect of substitution and structure on the strengths of acidity of carboxylic acids.	
Chemistry of Amino Group: Nomenclature, Structure of aliphatic and aromatic primary, secondary and tertiary amines; Synthesis reactions and physical properties of amines, basicity and nucleophilicity of amines; Diazonium salts: Preparation and synthetic applications.	
An introduction to Chromatography: Chromatographic Methods: Paper, thin layer & column chromatography.	
Reference Materials	Latest editions of following books <ol style="list-style-type: none"> 1. Kemp, W., Organic Spectroscopy, Macmilan, London, 1987. 2. Younas, M., Text Book of Organic Chemistry, Ilmi Kutab Khana, Lahore, 2nd Ed 2008. 3. March, J., Advanced Organic Chemistry, Wiley, New York, 6th Ed 2007. 4. Pine, S.H., Organic Chemistry, McGraw-Hill, New York 5th Ed 1987 5. Solomon's, T. W. G., Fundamentals of Organic Chemistry, Wiley, New York, 10th Ed 2011. 6. Chughtai, F. A., Organic reaction, Majid book Depot, Lahore/Faisalabad 2nd Ed. 7. Morrison R. T. and R.N. Boyd, Organic Chemistry, Allyn and Bacon, London, 6th Ed 1999. 8. Wade G.L., Text book Organic Chemistry 5th Edition Pearson, 6th ed 2006. 9. Vogel, A. I., A Text Book of Practical Organic Chemistry, Longman, London 5th Ed 1989 10. Clarke, H. T. and D. Haynes., A Hand Book of Organic Analysis, Edward Arnold, London 2009 11. Mann, F. G and B. C. Saunders, Practical Organic Chemistry, Longman, London. 12. Shriner, R. L., D.Y. Curtin, R.C. Fuson, and T.C. Morrill, The Systematic Identification of Organic Compounds, Wiley, New York, 1940. 13. Rehman, A., Experimental Organic Chemistry, The caravan Book House, Lahore, 2008



Khushal Khan Khattak University, Karak

Department of Botany

Title	Bacteriology and Virology
Course code	BOT321
Cr. Hrs.	3(2+1)
Specific objectives of the course:	
To understand the morphology, structure and economic importance of Viruses and Bacteria	
Course outline	
a) Viruses <ol style="list-style-type: none"> 1. General features of viruses, viral architecture, classification, dissemination and replication of single and double – stranded DNA/RNA viruses. 2. Plant viral taxonomy. 3. Virus biology and virus transmission. 4. Molecular biology of plant virus transmission. 5. Symptomatology of virus-infected plants: (External and Internal symptoms). 6. Metabolism of virus-infected plants. 7. Resistance to viral infection. 8. Methods in molecular virology. 	

<p>b) Bacteria</p> <ol style="list-style-type: none">History, characteristics and classification.Evolutionary tendencies in Monera (Bacteria, actinomycetes and cyanobacteria)Morphology, genetic recombination, locomotion and reproduction in bacteriaBacterial metabolism (respiration, fermentation, photosynthesis and nitrogen fixation)Importance of bacteria with special reference to application in various modern sciences specially agriculture, biotechnology and genetic engineering.Symptoms and control of major bacterial diseases in Pakistan <p>Lab outline:</p> <p>a) Viruses</p> <p>Observation of symptoms of some viral infected plant specimens.</p> <p>b) Bacteria, Actinomycetes and Cyanobacteria</p> <ol style="list-style-type: none">Methods of sterilization of glassware and media etc.Preparation of nutrient medium and inoculation.Preparation of slides for the study of various forms, capsule/slime layer, spores, flagella and Gram-staining.Growth of bacteria, subculturing and identification of bacteria on morphological and biochemical basis (using available techniques).Microscopic study of representative genera of Actinomycetes and Cyanobacteria from fresh collections and prepared slides.	
Reference Materials	<p>Latest editions of following books</p> <ol style="list-style-type: none">Black, J. G. 2005 Microbiology - Principles and Exploration, John Wiley and Sons, Inc.Prescott, L. M., Harley, J. P. and Klein, D. A. 2005. Microbiology McGraw-Hill Companies, Inc.Arora, D. R. 2004. Textbook of Microbiology, CBS Publishers and Distributors, New Delhi.Ross F. C. 1995. Fundamentals of Microbiology. John Willey & Sons, New York.Khan, J. A. and Dijkstra J. Plant Viruses as Molecular Pathogens. The Haworth Press, Inc.Hull R. Matthews, 2004, Plant Virology, Academic Press.Tortora, G. J: Funke, B. R. and Case C. L., 2004, Microbiology. Pearson Education.Molecular Plant-Microbe Interactions, Kamal Bouarab, Normand Brisson, Fouad Daayf (eds), 2009 MPG Books Group, Bodmin, UK.Plant-Microbe Interactions Gary Stacey, Noel T. Keen (Eds) 2011, springer London. <p>Journals/Periodicals:</p> <p>World Journal of Microbiology & Biotechnology, Current Microbiology, Journal of Industrial Microbiology and Biotechnology, Journal of General Virology, Journal of Virology</p>



Khushal Khan Khattak University, Karak
Department of Botany


Title		Phycology and Bryology
Course code		BOT322
Cr. Hrs.		3(2+1)
Specific objectives of the course: To understand the classification, morphology and economic importance of Algae and Bryophytes .		
Course outline		
<p>a) Phycology Introduction, general account, evolution, classification, biochemistry, ecology and economic importance of the following divisions of algae:Chlorophyta, Charophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta.</p> <p>b) Bryology: Introduction and general account of bryophytes, classification, theories of origin and evolution. Brief study of the classes: Hepaticopsida, Anthocerosida and Bryopsida.</p> <p>Lab Outline:</p> <p>a) Phycology:</p> <ul style="list-style-type: none">i. Collection of fresh water and marine algae.ii. Identification of benthic and planktonic algaeiii. Section cutting of thalloid algaeiv. Preparation of temporary slidesv. Use of camera lucida/micrographs. <p>b) Bryology Study of the following genera: Pellia, Porella, Anthoceros and Polytrichum.</p>		
Reference Materials	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Bold, H. C. and M. J. Wynne 1985. Introduction to Algae: structure and reproduction. Prentice Hall Inc. Engle Wood Cliffs2. Lee. R. E. 1999. Phycology. Cambridge University Press, U.K.3. Dawson, E. Y., Halt. 1966. Marine Botany. Reinhart and Winstan, New York.4. Chapman, V. J. and D. J. Chapman. 1983. Sea weed and their uses. MacMillan and Co. Ltd. London.5. Vashishta. B. R. 1991. Botany for degree students. Bryophytes 8th ed. S. Chand and Co. Ltd. Delhi.6. Schofield, W. B. 1985. Introduction to Bryology. MacMillan Publishing Co. London.7. Hussain, F. and I. Ilahi. 2012. A text book of Botany. Department of Botany, University of Peshawar.8. Barsanti, L. and P. G. Gualtieri. 2006. Algae, anatomy, biochemistry, biotechnology. Taylor and Francis, New York.9. Vashishta, B. R., A. K. Sinha and A. Kumar. 2010. Algae. S. Chand & Co.10. Bellinger, E. G. and D. C. Sigee. 2010. Fresh water algae (Identification and use as bioindicators). John Wiley & Sons.11. Hussain, F. 2013. Phycology. A text book of Algae. Pak Book Empire Lahore.12. Vashishta, B. R., A. K. Sinha and A. Kumar. 2010. Bryophytes. S. Chand & Co. New Delhi.13. Fida Hussain, Habib Ahmad and Syed Zahir Shah. 2012. The unicellular algae of District Peshawar, Pakistan. Lambert Publication, Germany. <p>Journals / Periodicals: Pakistan Journal of Botany, International Journal of Phycology and Phyco-chemsitry, Bryology, Phycology.</p>	



Khushal Khan Khattak University, Karak
Department of Botany

Title	Mycology and Plant Pathology
Course code	BOT323
Cr. Hrs.	3(2+1)
Specific objectives of the course: To introduce the students to Mycology and Diseases caused by Fungi.	
Course outline	
a) Mycology 1. Introduction: General characters of fungi, Thallus, cell structure and ultrastructure of fungi. 2. Reproduction: Asexual and sexual reproduction and reproduction structures, life cycle, haploid, heterokaryotic and diploid states. 3. Fungal Systematics: Classification of fungi into phyla with suitable examples to illustrate somatic structures, life cycle and reproduction of Myxomycota, Chytridiomycota, Zygomycota (Mucrales) Oomycota (Peronosporales), Ascomycota (Erysiphales, Pezizales), Basidiomycota (Agaricales, Polyporales, Uredinales, Ustilaginales) and Deuteromycetes. 4. Symbiotic relationships of fungi with other organisms (lichens and mycorrhiza) and their significance. 5. Importance of fungi in human affairs with special reference to Industry and Agriculture	
b) Pathology 1. Introduction and classification of plant diseases. 2. Symptoms, causes and development of plant diseases 3. Loss assessment and disease control 4. Epidemiology and disease forecast 5. Important diseases of crop plants and fruit trees in Pakistan caused by fungi, e.g. damping off, mildews, rusts, smuts, dieback, red rot of sugarcane etc. 6. Systemic resistance: Induced systematic resistance (ISR), Acquired Systematic resistance (ASR).	
Lab Outline:	
a) Mycology General characters and morphology of fungi.Study of unicellular and mycelial forms with septate and aseptate hyphae. Distinguishing characters of different phyla: study of suitable examples.Study of asexual and sexual reproductive structures in different groups of fungi.Study of some common examples of saprophytic, parasitic and air-borne fungi belonging to different phyla.	
b) Pathology Identification of major plant pathogens under lab and field conditions, cultural studies of some important plant pathogenic fungi, application of Koch’s postulates for confirmation of pathogenicity. Demonstration of control measures through chemotherapeutants.	

<p>Reference Materials</p>	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Agrios, G. N., 2005. Plant Pathology, Academic Press, London.2. Ahmad, I. and Bhutta, A. R., 2004. Textbook of Introductory Plant Pathology. Book Foundation, Pakistan.3. Alexopoulos, C. J., Mims, C. W. and Blackwell, M., 1996. Introductory Mycology, 4th Ed. John Wiley & Sons.4. Khan, A. G. and Usman, R., 2005. Laboratory Manual in Mycology and Plant Pathology. Botany Department Arid Agriculture University, Rawalpindi.5. Mehrotra, R. S. and Aneja, K. R., 1990. An Introduction to Mycology. Wiley and Eastern Ltd., New Delhi, India.6. Moore-Landecker, E., 1996. Fundamentals of Fungi. 4thEdn. Prentice Hall Inc., New Jersey, USA.7. Trigliano, R. N., Windham, M. T. and Windham, A. S., 2004. Plant Pathology: Concepts and Laboratory Exercises. CRC Press, LLC, N.Y. <p>Journals / Periodicals:</p> <p>Pakistan Journal of Botany, Mycotoxin, Mycopath, Phytopathology, Australasian Journal of Plant pathology , Asian Journal of Plant Pathology, Annual Review of Plant Pathology.</p>
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<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	Diversity of Vascular Plants
Course code	BOT324
Cr. Hrs.	3(2+1)
Specific objectives of the course: To enable the students to understand and appreciate the biology and evolution of plant architecture	
Course outline	
<p>a) Pteridophytes Introduction, origin, history, features and a generalized life cycle. Methods of fossilization, types of fossils, geological time scale and importance of paleobotany. First vascular plant - Rhyniophyta e.g. Cooksonia General characters, classification, affinities and comparative account of evolutionary trends of the following phyla: Psilopsida Psilotum), Lycopsidea (Lycopodium, Selaginella), Sphenopsida (Equisetum), Pteropsida (Ophioglossum, Dryopteris and Azolla/Marsilea).</p> <p>b) Origin and Evolution of seed habit.</p> <p>c) Gymnosperms: Geological history, origin, distribution, morphology, anatomy, classification and affinities of Cycadofillicales, Bennettitales, Ginkgoales, Cycadales and Gnetales. Distribution of gymnosperms in Pakistan. Economic importance of gymnosperms. An introduction to the Gondwana flora of world.</p> <p>d) Angiosperms: Origin, general characteristics, Importance, and life cycle of angiosperms.</p> <p>e) Palynology: 1. An introduction to Neopalynology and Paleopalynology, its applications in botany, geology, archaeology, criminology, medicines, honey and oil and gas exploration. Basic information about the nomenclature, morphology and classification of living and fossil pollen and spores.</p> <p>Lab Outline: 1. To study the morphological and reproductive features of available genera. 2. Study trips to different parts of Pakistan for the collection and identification of important pteridophytes, gymnosperms and angiosperms. 3. Study of pollen morphology</p>	
Reference Materials	Latest editions of following books 1. Beck, C. B. 1992. Origin and Evolution of Gymnosperms. Vol-1&II, Columbia University Press, New York, 2. Foster, A. S. and Gifford, E. M. Jr. 1998. Comparative Morphology of Vascular Plants. W. H. Freeman and Co. 3. Jones, D. 1983. Cycadales of the World, Washington, DC. 4. Mauseth, J. D. 1998. An Introduction to Plant Biology, Multimedia Enhanced, Jones and Bartlett Pub. UK. 5. Moore, R. C., W.d. Clarke and Vodopich, D. S. 1998. Botany McGraw-Hill Company, USA 6. Raven, P. H. Evert, R. E. and Eichhorn, S. E. 1999. Biology of Plants, W. H. Freeman and Company Worth Publishers. 7. Ray, P.M. Steeves, T. A. and Fultz, T. A. 1998. Botany Saunders College Publishing, USA. 8. Taylor, T. N. and Taylor, E. D. 2000. The Biology and Evolution of Fossil Plants, Prentice Hall. 9. Stewart, W. N. and Rothwell, G. W. 1993. Paleobotany and the Evolution of Plants, University Press, Cambridge. 10. Faegri, K., P. E. Kaland& K. Krzywinski 1989. Text Book of Pollen Analysis, John Wiley & Sons. N. Y. 11. Vashishta, B. R., A. K. Sinha and A. Kumar. 2010. Pterodophyta. S. Chand & Co. New Delhi 12. B. P. Panday. 2006. College Botany. Vol 1 & II. S. 7th Edition. Chand & Co. New Delhi 13. Vashishta, B. R., A. K. Sinha and A. Kumar. 2010. Gymnosperms. S. Chand & Co. Journals / Periodicals: Pakistan Journal of Botany, New Phytologist, Review of Palaeobotany& Palynology, Palaeontographica, Palaeobotanist



Khushal Khan Khattak University, Karak

Department of Botany

Title	Plant Systematics
Course code	BOT325
Cr. Hrs.	3(2+1)
Specific objectives of the course: To know floral composition/system of classification focusing on identification, classification, description nomenclature and flora writings monographs.	
Course outline 1. Introduction: Importance and relationship with other sciences, Phases of plant taxonomy. Types of Taxonomic Evidences. 2. Concept of Species: What is a species? Mechanism of Speciation, Taxonomic species, Biological species, Micro and macro species, 3. Variation: Types of variation, Continuous and discontinuous variation, Clinal variation. Biosystematics, Ecophene, Ecotype, Ecospecies, Ceonospecies and Comparium 4. Nomenclature: Important rules of botanical nomenclature including effective and valid publication, typification, principles of priority and its limitations, author citation, rank of main taxonomic categories, What is Herbarium. 5. Classification: Why classification is necessary? Importance of predictive value. Brief history, Different systems of classification with at least one example of each (Linnaeus, Bentham and Hooker, Engler and Prantl, Bessey, Cronquist, Takhtajan, and Dahlgren. 6. General characteristics, distribution, evolutionary trends, phyletic relationships and economic importance of the following families of angiosperm: <ol style="list-style-type: none"> 1. Apiaceae (Umbelliferae) 2. Arecaceae (Palmae) 3. Asclepiadaceae 4. Boraginaceae 5. Capparidaceae 6. Caryophyllaceae 7. Chenopodiaceae 10. Convolvulaceae 11. Cucurbitaceae 12. Cyperaceae 13. Euphorbiaceae 14. Lamiaceae (Labiateae) 15. Liliaceae 16. Magnoliaceae 17. Malvaceae 18. Myrtaceae 19. Orchidaceae 20. Papaveraceae 21. Poaceae (Gramineae) 22. Ranunculaceae 23. Salicaceae 24. Scrophulariaceae 25. Solanaceae 	
Lab Outline: 1. Technical description of plants of the local flora and their identification up to species level with the help of a regional/Flora of Pakistan 2. Preparation of indented and bracketed types of keys 3. Preparation of permanent slides of pollen grains by acetolysis method and study of different pollen characters. 4. Study of variation pattern in different taxa. 5. Submission of properly mounted and fully identified hundred herbarium specimens at the time of examination	

6. Field trips shall be undertaken to study and collect plants from different ecological zones of Pakistan.

Latest editions of following books

1. Ali, S. I. and Nasir, Y. 1990-92. Flora of Pakistan. Karachi Univ. Press, Karachi
2. Ali, S. I. and Qaiser, M. 1992-2007 -todate. Flora of Pakistan. Karachi Univ. Press, Karachi.
3. Greuter, W., McNeill, J., Barrie, F. R., Burdet, H. M., Demoulin, V., Filguerras, T. S., Niclson, D. H. Silva, P. C., Skog, J. E., Trehane, P.,Turland, N. J. &Hawksworth, D.L.,(eds.) 2000. International code of botanical nomenclature (Saint Louis Code) adopted by the Sixteenth International botanical congress St. Louis Missouri, July –August 1999. Koeltz, Konigstein. (Regnum Veg.138.)
4. Davis, P. H. & Heywood, V. H. 1963. Principles of Angiosperm Taxonomy. Oliver & Boyd, London
5. Ingrouille, M. 1992. Diversity and Evolution of Land Plants, Chapman & Hall. London
6. Nasir, E. & Ali, S. I. 1970-89. Flora of Pakistan. Karachi Univ. Press, Karachi.
7. Stace, C. (1992). Plant Taxonomy and Biosystematics, Edward Arnold.
8. Takhtajan, A. (1986). Flowering Plant: Origin and Dispersal, Oliver and Boyd, Edinburgh
9. Jones, S. B. and Luchsinger, A. E. 1987. Plant Systematics. McGraw-Hill, Inc. New York.
10. Naik, V. N. 2005. Taxonomy of Angiosperms. Tata McGraw-Hill Publishing Company, New Delhi.
11. Stussy, T. F. 1990. Plant Taxonomy, Columbia University Press, USA.
12. Jeffrey C. 1980. An Introduction to Plant Taxonomy. Cambridge University Press.UK
13. Levin, D. A. 2000. The Origin, Expansion and Demise of Plant Species. Oxford University Press.
14. Shinwari, M. I. and M. A. Khan. 1998. Ethnobotany of Margalla Hills. Department of Biological Sciences, Quaid-i-Azam University Islamabad Pakistan.
15. Shinwari, M. I., M. I. Shinwari and Shah, M. 2007. Medicinal Plants of Margalla Hills National Park Islamabad. Higher Education Commission Islamabad. Pp.218.
16. Sivarajan V. V and N. K. P Robson 1991 Introduction to the Principles of Plant Taxonomy.
17. Radford, A. E., W. C. Dickison, J. R. Massey, and C. R. Bell. 1998 Vascular Plant Systematic. Harper and Row, New York.
18. Leadlay, E. and Stephen 2006. Taxonomy and Plant Conservation.
19. Rajput, M. T., S. Saliha and K. M. Khan. 1996 Plant Taxonomy. Nasim Book Depot Hyderabad.
20. Heywood V. H. 1978. Flowering Plants of the World. Oxford University Press.
21. Simpson, M. G. 2006. Plant Systematics. Elsevier Academic Press.
22. Soltis, D. E. P. S. Soltis, P. K Endress, and M. W. Chase, 2005. Phylogeny & evolution of angiosperms. Sinauers associates, Inc. Publishers.
23. Pullaiah, T. 2007 Taxonomy of Angiosperms 3rd Ed. Regency Publication, New Delhi.


Reference Materials



Khushal Khan Khattak University, Karak
Department of Botany

Title	Plant Biochemistry-I
Course code	BOT328
Cr. Hrs.	3(2+1)
Specific objectives of the course: To elucidate the structure and role of primary metabolites in plants	
Course outline	
Introduction to carbohydrates: Occurrence and classification, Sugar structures, synthesis of polysaccharides, Carbon metabolism in the chloroplast, Starch synthesis Pentose phosphate pathway Carbon export Sucrose synthesis and transport in vascular plants, Cellulose synthesis and composition of primary cell walls	
Introduction to lipids: Occurrence, classification. Structure and chemical properties of fatty acids, Fatty acid biosynthesis in plants, di and triglycerides, phospholipids, glycolipids, sulpholipids, waxes and sterols.	
Introduction to Proteins: Amino acids and their structure. Electro chemical properties and reactions of amino acids. Classification of proteins. Primary, secondary, tertiary and quaternary structure of proteins . Protein targeting. Protein folding and unfolding. Transport, storage, regulatory and receptor proteins. Protein purification. Protein sequencing. Biological role. Plant defense proteins and peptides, Defensins and related proteins, Synthesis and functions of non-ribosomal peptides	
Introduction to Nucleic Acids: General introduction. Purine and pyrimidine bases, nucleosides, nucleotides. Structure and properties of DNA and RNA Types and functions of RNA. Nucleic Acid Metabolism.	
Introduction to Enzymes: Nature and functions, I.U.E. classification with examples of typical groups. Isozymes, ribozymes, abzymes. Enzyme specificity. Enzyme kinetics. Nature of active site and mode of action. Allosteric enzymes and feedback mechanism. Enzymes with multiple functions - mechanisms and evolution. Isoprenoid metabolism, Biosynthetic pathways, Monoterpenes, sesquiterpenes, phytosterols, diterpenes, Enzymes with multiple functions - mechanisms and evolution	
Lab Outline:	
1. Solutions, acids and bases. Electrolytes, non-electrolytes, buffers, pH. Chemical bonds.	
2. To determine the Rf value of monosaccharides on a paper Chromatogram.	
3. To estimate the amount of reducing and non-reducing sugars in plant material titrimetrically/spectrophotometrically.	
4. To determine the saponification number of fats.	
5. To extract and estimate oil from plant material using soxhlet apparatus.	
6. Analysis of various lipids by TLC methods.	
7. To estimate soluble proteins by Biuret or Lowry or Dye-binding method.	
8. To estimate the amount of total Nitrogen in plant material by Kjeldahl's method.	
9. To determine the Rf value of amino acids on a paper chromatogram.	
10. Extraction of Nucleic acids from plant material and their estimation by UV absorption or colour reactions.	
11. To estimate the catalytic property of enzyme catalase or peroxidase extracted from a plant source.	
12. To determine the PKa and isoelectric point of an amino acid.	

Reference Materials	Latest editions of following books
	1. Conn E E. and Stumpf P. K., 2002. Outlines of Biochemistry, John Wiley and Sons Inc. New York.
	2. Lehninger, A L. 2004. Principles of Biochemistry. Worth Publishers Inc.
	3. Voet, D., Voet J. G. and Pratt, C. W. 1998. Fundamentals of Biochemistry, John Wiley and Sons, New York.
	4. Dey, P. M. and Harborne, J. B. 1997. Plant Biochemistry. Harcourt Asia PTE Ltd. Singapore.
	5. Smith, E. L, Hill, R L, Lehman, R I., Lefkowits, R J. Handler and Abraham. 2003, Principles of Biochemistry, (General Aspects). White. International Student Edition. McGraw Hill International Book Company.
	6. Zubay G.,2003, Biochemistry, MacMillan Publishing Co., New York.
	7. Chesworth,,J. M., Strichbury T. and Scaife., J. R. 1998. An introduction to agricultural biochemistry. Chapman and Hall, London.
	8. Mckee, T. and Mckee, J. R. 1999. Biochemistry – An Introduction. WCB/McGraw-Hill, New York, Boston, USA.
	9. Lea, P. J..andLeegood, R. C. 1993. Plant Biochemistry and Molecular Biology. Wiley and Sons, New York.
	10. Abdes, R. H. Frey, P. A. and Jencks W. P. 2004, Biochemistry, Jones and Bartlet, London.
	11. Goodwin T. W. and Mercer, E. I. 1997. Introduction to Plant Biochemistry. Pergamon Press, Oxford.
	12. Heldt, H. W. 2008. Plant Biochemistry. 3 rd Edition, Academic Press, U. K.
	13. Bowsher, C. 2008. Plant Biochemistry.
	14. Campbell, M. K. and F. Shawn. 2008. Biochemistry 6 th Edition.
Journals / Periodicals:	
Plant Physiology and Biochemistry, Annual Review of Biochemistry, Biochemistry Journal, Critical Review in Biochemistry and Molecular Biology	

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	Plant Ecology-I
Course code	BOT329
Cr. Hrs.	3(2+1)
Specific objectives of the course: To understand the role and interaction of plants with their environment	
Course outline	
1. Introduction: history and recent developments in ecology	
2. Soil: Nature and properties of soil (Physical and Chemical). Water in the soil-plant-atmosphere continuum. The ionic environment and plant ionic relations, Nutrient cycling. Physiology and ecology of N, S, P and K nutrition. Heavy metals (brief description), Salt and drought stress and osmoregulation. Soil erosion	
3. Light and temperature: Nature of light, Factors affecting the variation in light and temperature, Responses of plants to light and temperature, Adaptation to temperature extremes,	
4. Carbon dioxide: Stomatal responses, water loss and CO2-assimilation rates of plants in contrasting environments. Ecophysiological effects of changing atmospheric CO2 concentration. Functional significance of different pathways of CO2 fixation. Productivity: response of photosynthesis to environmental factors, C and N balance	
5. Water: Water as an environmental factor, Role of water in the growth, adaptation and distribution of plants, Water status in soil, Water and stomatal regulation, Transpiration of leaves and canopies.	
6. Oxygen deficiency: Energy metabolism of plants under oxygen deficiency, Morpho-anatomical changes during oxygen deficiency, Post-anoxic stress	
7. Wind as an ecological factor.	

8. Fire as an ecological factor.
- Lab Outline:
1. Determination of physico-chemical properties of soil and water.
 2. Measurements of light and temperature under different ecological conditions.
 3. Measurements of wind velocity.
 4. Measurement of CO₂ and O₂ concentration of air and water.
 5. Effect of light, temperature, moisture, salinity and soil type on germination and growth of plants.
 6. Measurement of ions, stomatal conductance, osmotic potential, water potential, xylem. pressure potential, leaf area and rate of CO₂ exchange in plants in relation to various environmental conditions.

Reference Materials

Latest editions of following books

- 1- M. Ahmad and S. S. Shaukat. 2012. A test book of vegetation ecology. Publisher Abrar Sons New Urdu Bazar Karachi.
2. Schultz, J. C. 2005. Plant Ecology, Springer-Verlag
3. Bazzaz, F. A. 2004. Plants in Changing Environments: Linking Physiological, Population, and Community Ecology, Cambridge University Press
4. Chapin, F. S. et al. 2002. Principle of Terrestrial Plant Ecology, Springer-Verlag
5. Lambers, H. et al. 2002. Plant Physiological Ecology, Springer-Verlag
6. Larcher, W. 2003., Physiological Plant Ecology: Ecophysiology and Stress Physiology of Function Groups - Springer-Verlag
7. Nobel, P. S 1999, Physico-chemical and Environmental Plant Physiology, Academic Press.
8. Lambers, H., T. L. Pons and F. Stuart. 2008. Plant Phyiological Ecology.
9. Smith, R. L. 2004. Ecology and field Biology. Addison Wesley Longman, Inc., New York.
10. Barbour, M. G., Burke, J. H and Pitts, W. D. 2004 Terrestrial Plant Ecology, The Benjamin, Cumming Publishing C. Palo Alto, California, USA.
11. Smith R. L. 1998 Elements of Ecology. Harper & Row Publishing.
12. Townsend. C. R. Begon. M and J. L Harper. 2002 Essentials of ecology. Blackwell Publishing.
13. Gurevitch. J. Scheiner, S. M. and G. A Fox. 2006 The Ecology of Plants\.
14. Hussain. F. 1989 Field and Laboratory Manual of Plant Ecology, National Academy of Higher Education, Islamabad.
15. Hussain. S. S. 1989 Pakistan Manual of Plant Ecology. National Book Foundation Islamabad.
16. More. P. D. and Chapman S. B. 1986 Methods in Plant Ecology, Blackwell Scientific Publication Oxford.
17. Rashid, A. 2005. Soil Science. National Book Foundation, Islamabad.

Journals / Periodicals:

Pakistan Journal of Botany, Journal of Ecology, Journal of Applied Ecology, Ecology, Journal of Arid Environment



Khushal Khan Khattak University, Karak
Department of Botany

Title	Plant Physiology-I
Course code	BOT330
Cr. Hrs.	3(2+1)
Specific objectives of the course: To provide comprehensive knowledge on some vital functions and mechanisms of plants.	
Course outline	
<p>Photosynthesis: History of photosynthesis. Nature and units of light. Determination of oxygenic and anoxygenic photosynthesis. Ultra structure of thylakoid vesicle. Various pigments and photosynthetic activity. Ultra structure and composition of photo system-I and II. Absorption and action spectra of different pigments. Mechanism of photosynthesis - light absorption, charge separation or oxidation of water (water oxidizing clock), electron and proton transport through thylakoid protein-pigment complexes. Photophosphorylation and its mechanism. CO₂ reduction (dark reactions) - C₃ pathway and Photorespiration, Regulation of C₃ pathway, C₄ pathway and its different forms, C₃-C₄ intermediates, CAM pathway. Methods of measurement of photosynthesis.</p> <p>Respiration: Synthesis of hexose sugars from reserve carbohydrates. Mechanism of respiration- Glycolysis, Differences between cytosolic and chloroplastidic glycolysis, Oxidative decarboxylation, Krebs cycle, Regulation of glycolysis and Krebs cycle, Electron transport and oxidative phosphorylation. Aerobic and anaerobic respiration. Energetics of respiration. Pentose phosphate pathway. Glyoxylate cycle. Cyanide resistant respiration.</p> <p>Translocation of Food: Pathway of translocation, source and sink interaction, materials translocated, mechanism of phloem transport, loading and unloading.</p> <p>Leaves and Atmosphere: Gaseous exchange, mechanism of stomatal regulation. Factors affecting stomatal regulation.</p> <p>Assimilation of Nitrogen, Sulphur and Phosphorus: The nitrogen cycle. Nitrogen fixation. Pathways of assimilation of nitrate and ammonium ions. Assimilation of sulphur and phosphorus.</p> <p>Lab Outline:</p> <ol style="list-style-type: none">1. To determine the volume of CO₂ evolved during respiration by plant material.2. To determine the amount of O₂ used by respiring water plant by Winkler Method.3. Separation of chloroplast pigments on column chromatogram and their quantification by spectrophotometer.4. To extract and separate anthocyanins and other phenolic pigments from plant material and study their light absorption properties.5. To categorize C₃ and C₄ plants through their anatomical and physiological characters.6. To regulate stomatal opening by light of different colours and pH.	

Reference Materials	Latest editions of following books
	1. Dennis, D.T., Turpin, D.H., Lefebvre, D.D. and Layzell, D.B. 1997. Plant Metabolism. 2nd Edition. Longman Group, U.K.
	2. Dey, P.M. and Harborne, J.B. 1997. Plant Biochemistry. Harcourt Asia PTE Ltd. Singapore.
	3. Fitter, A. and Hay, R.K.M. 2001. Environmental Physiology of Plants. Academic Press, UK.
	4. Heldt, H-W. 2004. Plant Biochemistry. 3rd Edition, Academic Press, U.K.
	5. IhsanIllahi, 1991. Plant Growth, UGC Press, Islamabad.
	6. IhsanIllahi, 1995. Plant Physiology, Biochemical Processes in Plants, UGC Press.
	7. Nobel, P.S. 1999. Physicochemical and Environmental Plant Physiology. Academic Press, UK.
	8. Press, M.C., Barker, M.G., and Scholes, J.D. 2000. Physiological Plant Ecology, British Ecological Society Symposium, Volume 39, Blackwell Science, UK.
	9. Salisbury F.B. and Ross C.B. 1992. Plant Physiology. 5th Edition. Wadsworth Publishing Co. Belmont CA.
	10. Taiz, L. and Zeiger, E. 2006. Plant Physiology. 4th Edition. Sinnauers Publ. Co. Inc. Calif.
	11. W.B. Hopkins. 1999. Introduction to Plant Physiology. 2nd Ed. John Wiley and Sons. New York.
	12. Epstein, E. and Bloom, A.J. 2004. Mineral Nutrition of Plants: Principles and Perspectives. 2nd Edition. Sinauer Associates, California, USA.
	13. Kirkham, M.B. 2004. Principles of Soil and Plant Water Relations. Elsevier, Amsterdam, Netherlands.
14. Barton, W. 2007. Recent Advances in Plant Physiology.	



Khushal Khan Khattak University, Karak
Department of Botany

Title	ANATOMY OF VASCULAR PLANTS
Course code	BOT326
Cr. Hrs.	3(2+1)
Specific objectives of the course: To provide the students understanding about anatomical features of vascular Plants.	
Course outline	
<ol style="list-style-type: none">1. The plant body and its development: fundamental parts of the plant body, internal organization, different tissue systems of primary and secondary body.2. Meristematic tissues: classification, cytohistological characteristics, initials and their derivatives.3. Apical meristem: Delimitation, different growth zones, evolution of the concept of apical organization. Shoot and root apices.4. Leaf: types, origin, internal organization, development of different tissues with special reference to mesophyll, venation, bundle-sheaths and bundle-sheath extensions. Enlargement of epidermal cells.5. Vascular cambium: Origin, structure, storied and non-storied cell types, types of divisions: additive and multiplicative; cytoplasmic characteristics, seasonal activity and its role in the secondary growth of root and stem. Abnormal secondary growth.6. Origin, structure, development, functional and evolutionary specialization of the following tissues: Epidermis and epidermal emergences, Parenchyma, Collenchyma, Sclerenchyma, Xylem, Phloem with special emphasis on different types of woods, Periderm.7. Secretory tissues: Laticifers (classification, distribution, development, structural characteristics, functions) and Resin Canals.8. Anatomy of reproductive parts: Flower Seed Fruit9. Economic aspects of applied plant anatomy10. Anatomical adaptations11. Molecular markers in tree species used for wood identification.	
Lab outline:	
<ol style="list-style-type: none">1. Study of organization of shoot and root meristem, different primary and secondary tissues from the living and preserved material in macerates and sections, hairs, glands and other secondary structures.2. Study of abnormal/unusual secondary growth.3. Peel and ground sectioning and maceration of fossil material.4. Comparative study of wood structure of Gymnosperms and Angiosperms with the help of prepared slides.	


<div>Reference Materials</div>	<div><div>Latest editions of following books</div><div><div>1. Dickison, W. C. 2000. Integrative plant anatomy. Academic Press, U. K.</div><div>2. Fahn, A. 1990. Plant Anatomy. Pergamum Press, Oxford.</div><div>3. Esau, K. 1960. Anatomy of Seed Plants. John Wiley, New York.</div><div>4. Metcalf, C. R. and Chalk, L. 1950. Anatomy of the Dicotyledons. Clarendon Press. Oxford.</div><div>5. Anon. Manual of Microscopic Analysis of Feeding Stuffs. The American Association of feed Microscopists.</div><div>6. Vaughan, J. G. 1990. The structure and Utilization of Oil Seeds. Chapman and Hall Ltd. London.</div><div>7. Metcalfe, C. R. 1960. Anatomy of the Monocotyledons. Gramineae. Clarendon Press, Oxford.</div><div>8. Metcalfe, C. R. 1971. Anatomy of the Monocotyledons.V. Cyperaceae. Clarendon Press, Oxford.</div><div>9. Cutler, D. F. 1969. Anatomy of the Monocotyledons. IV. Juncaceae. Clarendon Press, Oxford.</div><div>10. Cutler, D. F. 1978. Applied Plant Anatomy. Longman Group Ltd. England</div><div>11. Raymond, E. S. and E. Eichhorn. 2005. Esau's Plant Anatomy; Meristematic cells and tissues of plant body. John Willey Sons.</div><div>12. Eames, A. J. and L. H. Mac Daniels. 2002. An introduction to Plant Anatomy. Tat McGraw-Hill Publishing Company Limited, New Delhi.</div><div>Journals / Periodicals:</div><div>Pakistan Journal of Botany</div></div></div>
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Khushal Khan Khattak University, Karak
Department of Botany

Title	Genetics-I
Course code	BOT327
Cr. Hrs.	3(2+1)
Specific objectives of the course: To understand the nature and function of genetic material	
Course outline	
<p>1. Extensions of Mendelian Analysis: Variations on dominance, multiple alleles, lethal alleles, several genes affecting the same character, penetrance and expressivity.</p> <p>2. Linkage I: Basic Eukaryotic Chromosome Mapping : The discovery of linkage, recombination, linkage symbolism, linkage of genes on the X chromosome, linkage maps, three-point testcross, interference, linkage mapping by recombination in humans.</p> <p>3. Linkage II: Special Eukaryotic Chromosome Mapping Techniques: Accurate calculation of large map distances, analysis of single meioses, mitotic segregation and recombination, mapping human chromosomes.</p> <p>4. Recombination in Bacteria and their Viruses: Bacterial chromosome, bacterial conjugation, bacterial recombination and mapping the E.coli chromosome, bacterial transformation, bacteriophage genetics, transduction, mapping of bacterial chromosomes, bacterial gene transfer.</p> <p>5. The Structure of DNA: DNA: The genetic material, DNA replication in eukaryotes, DNA and the gene.</p> <p>6. The Nature of the Gene: How genes work, gene-protein relationships, genetic observations explained by enzyme structure, genetic fine structure, mutational sites, complementation.</p> <p>8. DNA Function: Transcription, translation, the genetic code, protein synthesis, universality of genetic information transfer, eukaryotic RNA.</p> <p>9. The Extranuclear Genome: Variegation in leaves of higher plants, cytoplasmic inheritance in fungi, extra nuclear genes in chlamydomonas, mitochondrial genes in yeast, extragenomic plasmids in eukaryotes.</p> <p>10. Developmental Genetics: Gene Regulation and Differentiation, Crown gall disease in plants, cancer as a developmental genetic disease.</p> <p>11. Population Genetics: Gene frequencies, conservation of gene frequencies, equilibrium, Hardy-Weinberg law, factors affecting gene equilibrium.</p> <p>Lab Outline:</p> <p>1. Numerical problems</p> <p>a) Arrangement of genetic material:</p> <p>i. Linkage and recombination.</p> <p>ii. Gene mapping in diploid.</p> <p>iii. Recombination in Fungi.</p> <p>iv. Recombination in bacteria.</p> <p>v. Recombination in viruses.</p> <p>b) Population Genetics:</p> <p>i. Gene frequencies and equilibrium.</p> <p>ii. Changes in gene frequencies,</p> <p>2. Blood group and Rh-factor</p> <p>3. Drosophila</p> <p>i. Culture technique</p> <p>ii. Salivary gland chromosome</p> <p>4. Fungal Genetics</p> <p>Sacchromyces culture techniques and study.</p> <p>5. Studies on variation in maize ear size and colour variation</p> <p>6. Bacterial Genetics.</p> <p>i. Bacterial cultural techniques, Gram staining (E. coli, B. subtilis)</p> <p>ii. Transformation.</p> <p>ii. Conjugation.</p>	

Reference Materials	Latest editions of following books
	1. Gelvin, S, B. 2000. Plant Molecular Biology Manual. Kluwer Academic Publishers.
	2. Pierca, B. A. 2005. Genetics. A conceptual approach, W. H. Freeman and Company, New York.
	3. Synder, L, and Champness, W. 2004. Molecular Genetics of Bacteria. ASM Press, Washington D. C.
	4. Klug, W. S. and Cummings, M. R. 1997. Concepts of Genetics, Prentice Hall International Inc.
	5. Roth Well, N. V. 1997. Understanding Genetics, 2nd Edition, Oxford University Press Inc.
	10. Gardner, E. J., 2004. Principles of Genetics, John Willey and Sons, New York.
	6. Ringo J, 2004. Fundamental Genetics, Cambridge University Press.
	7. Griffiths A. J. F; Wessler, S. R; Lewontin, R. C, Gelbart, W. M; Suzuki, D. T. and Miller, J. H., 2005, Introduction to Genetic Analysis, W. H. Freeman and Company.
	8. Snyder, L and Champness W, 2003, Molecular Genetics of Bacteria, ASM Press.
	10 Hartl, D. L. and Jones, E. W. 2005, Genetics - Analysis of Genes and Genomes, Jones and Bartlett Publishers. Sudbry, USA.
	11 Hedrick, P. W. 2005. Genetics of Population. Jones and Bartlett Publisher, Sudbury, USA.
	12 MahmutCaliskan. 2012. The Molecular basis of plant genetic diversity. In Tech Publishers.
	13 Ram J. Singh. 2011. Genetic resources, chromosome engineering and crop improvement. Medicinal plants. Vol. 6. CRC Press.
	14 William S. Klug, Michael R. Cummings, Charlotte A. Spencer, Michael A. Palladino. 2011. Concepts of genetics. Pearson Educations.
	15 Daniel Hartl. 2011. Genetics Johns and Bartlett Publishers.
	16 David Hyde. 2008. Introduction to Genetic principles. McGraw-Hill.
Journals/Periodicals:	
J. Genetics, Theoretical and Applied Genetics, Cytologia, Chromosoma, Genome.	

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	Research Methodology
Course code	BOT331
Cr. Hrs.	2(2+0)
Specific objectives of the course:	
Course outline	
Introduction to research, research methods, planning various methods of research. Major philosophical and theoretical underpinning of research including the idea of validity in research,realibility of measure and ethics. Research problem, purpose of reaserch. Types, analytical, quantitative, qualitative, applied and hypothesis testing research. Research Philosophy, How to develop research philosophy. Research proposal, How to write synopsis. Development of working hypothesis, survey of literature, how to write survey of literature, how to write thesis, abstract, introductions, material and methods, results, discussion, references, and citation. Research design, experimental quasi, experimental and non experimental design, data collection , classification, analysis and interpretation of data, plagiarism and plagiarism report.	

Poulation and sample, application of statistical packages, variance, annova, and LSD and research data. Thesis writing, Title of thsis, abstract, introduction, methodology, results, discussion, statistical analysis, reference.	
Reference Materials	Latest editions of following books 1. Shank, G.D. 2002. Qualitative research: a personal skill approach, upper saddle river, Prentice Hill 2. Brizuela, B.M. 2000. Act of inquiry in qualitative research. Cambridge 3. Paul Leedy, 2004. Practical research Planning and Design 8th edition, Jeanne Ellis ormrod.


<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	Molecular Biology
Course code	BOT431
Cr. Hrs.	3(2+1)
Specific objectives of the course: To disseminate the knowledge of molecular basis of life	
Course outline An introduction to molecular biology ;Definition , history and the birth of Molecular biology , The molecular basis of life , Discovery of DNA as genetic material ? 2.. DNA structure and function , the molecular nature of gene and DNA. The genetic code , DNA replication , semi conservative , lagging and leading strand , origin of replication , enzyme involved in initiation , elongation of DNA replication . The transcription ;the formation of close promoter complex . initiation, elongation and termination . Factor involve in the initiation , elongation and termination . 3...Gene regulation in prokaryotes . The regulation of The regulation of virulence gene ,gene expression . The operon theory . The lac operon model , trp operon model. The regulation of virulace gene . inducible and repressible control mechanism . . 4.. Gene regulation in eukaryotes , Gene regulation at transcriptional , post transcriptional , gene regulation at translational and and post translational level . 5.. recombinant DNA technology ; introduction , basic technique , PCR and RtPCR , Restriction enzyme , plasmid , Bacteriophage as tool , the formation of recombinant DNA , recombinant DNA methology , recombinant DNA and social responsibility , site directed mutagenesis , DNA sequencing 6....Application of recombinant DNA ; application of recombinant DNA technology using prokaryotes , recombinant DNA technology in eukaryotes , an over view , transgenic yeast , transgenic plants , transgenic animals , screening for genetic diseases , identifying diseases genes , DNA typing , gene therapy , gentic modified organism and apprehension . 7.. Bio ethics . moral , religion and ethical concern. Lab Outline: Following techniques will be used for the isolation and analysis of different components: 1. Extraction of RNA, DNA and proteins 2. Electrophoreses: One and two dimensional 3. Purification of proteins, RNA and DNA. 4. Amplification using PCR. 5. Northern, Western and Southern Blotting.	

<p>Reference Materials</p>	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Cullis, C. A. 2004. Plant Genomics and Proteomics. Wiley-Liss, New York.Gibson, G. and S. V. Muse, 2002. A Premier of Genome Science, Sinauer Associates Inc. Massachusetts.3. Gilmartin, P. M. and C. Bowler. 2002. Molecular Plant Biology. Vol. 1 & 2. Oxford University Press, UK.4. Lodish, H. et al., 2004. Molecular Cell Biology. 5th Edition. W. H. Freeman & Co., New York.5. Malacinski, G. M. 2003. Essentials of Molecular Biology, 4th Edition. Jones and Bartlett Publishers, Massachusetts.6. Watson, J. D. et al. 2004. Molecular Biology of the Gene. Peason Education, Singapore.7. Ignacimuthu, S. 2005. Basic bioinformatics. Narosa Publishing House, India.8. Weaver, R. F. 2005. Molecular Biology. McGraw-Hill, St. Louis.9. Lehninger, A L. 2004. Principles of Biochemistry. Worth Publishers Inc.10. David Figurski. 2013. Genetic manipulation of DNA and protein, example from current research. In Tech Publishers.11. Bruce Alberts et al. 2007. Molecular biology of the cell. 5th Edition. Garland and Sons.12. M. Madan Babu. 2013. Bacterial gene regulations and transcription network. Caister Publishers. Academic Publishers.
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Khushal Khan Khattak University, Karak
Department of Botany

Title		Plant Biochemistry-II
Course code		BOT432
Cr. Hrs.		3(2+1)
Specific objectives of the course: To explicit the fundamentals of metabolic energy, Metabolism and Plant constituents.		
Course outline		
<p>1. Bioenergetics: Energy, laws about energy changes. Oxidation and reduction in living systems.</p> <p>2. Metabolism:</p> <p>i. Biosynthesis, degradation and regulation of sucrose and starch. Breakdown of fats with special reference to beta-oxidation and its energy balance. Biosynthesis of fats.</p> <p>ii. Replication of DNA. Reverse transcription. Biosynthesis of DNA and RNA.</p> <p>iii. Components of protein synthesis. Genetic code, protein synthesis: initiation, elongation and termination.</p> <p>3. Alkaloids: Occurrence, physiological effects, chemical nature with special reference to solanine, nicotine, morphine, theine and caffeine. Aflatoxins, their nature and role.</p> <p>4. Terpenoids: Classification: monoterpenes, sesquiterpenes, diterpenes, triterpenes, tetraterpenes, polyterpenes and their chemical constitution and biosynthesis.</p> <p>5. Vitamins: General properties and role in metabolism.</p> <p>Lab Outline:</p> <p>1. Separation of soluble proteins by polyacrylamide gel (PAGE) electrophoresis.</p> <p>2. Separation of nucleic acids by gel electrophoresis.</p> <p>3. To estimate the amount of vitamin C in a plant organ (orange, apple juice).</p> <p>4. To determine potential alkaloids in plants.</p> <p>5. To estimate terpenoids in plants.</p>		
Reference Materials	Latest editions of following books	
	<p>1. Conn E. E. and Stumpf, P. K. 2002. Outlines of Biochemistry, John Wiley and Sons Inc. New York.</p> <p>2. Albert L. Lehninger, 2004. Principles of Biochemistry. Worth Publishers Inc.</p> <p>3. Voet, D. Voet J. G. and Pratt, C. W. 1998. Fundamentals of Biochemistry, John Wiley and Sons, New York.</p> <p>4. Dey, P. M. and Harborne, J. B. 1997. Plant Biochemistry. Harcourt Asia PTE Ltd. Singapore.</p> <p>5. Smith; E L., Hill; R. L., Lehman; R. I., Lefkowitz, R J. and Abraham. H. Principles of Biochemistry, (General Aspects). White. International Student Edition. McGraw Hill International Book Company.</p> <p>6. Zubay. G. 2003, Biochemistry, MacMillan Publishing Co., New York.</p> <p>7. Chesworth., J. M., Strichbury T. and Scaife, J. R. 1998. An introduction to Agricultural Biochemistry. Chapman and Hall, London.</p> <p>8. Mckee, T. and Mckee, J. R. 1999. Biochemistry – An Introduction. WCB / McGraw-Hill, New York, Boston, USA.</p> <p>9. Taiz, L. and Zeiger, E. 2006. Plant Physiology. 4th Edition. Sinnauers Publ. Co. Inc. Calif.</p> <p>10. Lea, P. J. and Leegood, R. C. 1993. Plant Biochemistry and Molecular Biology. Wiley and Sons, New York.</p> <p>11. Abides, R. H., Frey P. A. and Jencks, W. P. 1992. Biochemistry, Jones and Bartlet, London.</p> <p>12. Goodwin T. W. and Mercer, E. I. 1997. Introduction to Plant Biochemistry. Pergamon Press, Oxford.</p> <p>13. Heldt, H. W. 2008. Plant Biochemistry. 3rd Edition, Academic Press, U. K.</p> <p>14. Campbell, M.K. and F. Shawn. 2008. Biochemistry 6th Edition.</p> <p>Journals / Periodicals:</p> <p>Plant Physiology & Biochemistry, Annual Review of Biochemistry, Biochemistry Journal, Critical Review in Biochemistry and Molecular Biology</p>	

<div><div>Khushal Khan Khattak University, Karak Department of Botany</div></div>	
Title	Plant Ecology-II
Course code	BOT433
Cr. Hrs.	3(2+1)
Specific objectives of the course: To provide comprehensive knowledge of population, community, ecosystem ecology and its relevance to mankind.	
Course outline	
A. Population Ecology 1. Population structure and plant demography: Seed dispersal, Dormancy, Seed Bank, Seed dormancy, Recruitment, Demography 2. Life history pattern and resource allocation : Density dependent and density independent factors, Resource allocation, Reproductive effort, Seed size vs seed weight, Population genetics, Evolution. B. Community Ecology: Historical development of community ecology, Community concepts and attributes, Methods of sampling of plant communities, Ecological succession, Community soil-relationship, Local Vegetation, Vegetation of Pakistan, Major formation types of the world. C. Ecosystem Ecology: Ecological concepts of ecosystem, Boundaries of ecosystem. Compartmentalization and system concepts, Energy flow in ecosystem, Biogeochemical cycles: water carbon and nitrogen Case studies: any example Lab Outline: Determination of seed bank in various populations. Seed dispersal pattern of local populations. Demography and life history of local annual population. Study of community attributes. Sampling of vegetation including Quadrat, plotless, transect and Braun-Blanquet. Correlate soil properties with vegetation type. Field trip to study different communities located in different ecological regions of Pakistan. Slide show of the vegetation of Pakistan. Slide show of the major formations of the world. Soil physical and chemical properties	

Reference Materials

Latest editions of following books

1.

Ahmad, M. and S. S. Shaukat. 2012. A test book of vegetation ecology. Publisher Abrar Sons, New Urdu Bazar, Karachi.

2.

Schultz J. C. 2005. Plant Ecology, Springer-Verlag.

3.

Townsend C. R. Begon. M and J. L. Harper 2002. Essentials of Ecology, Blackwell Publishing,

4.

Chapin, F.S. et al. 2002. Principle of Terrestrial Plant Ecology, Springer-Verlag

5.

Gurevitch, et al., 2002.The Ecology of Plants, Sinauer Associates, Inc.

6.

Barbour M. G. et al., 1999, Terrestrial Plant Ecology, The Benjamin-Cumming Publishing Co.

7.

Smith, R. L. 1998. Elements of Ecology by Harper & Row Publishers,

8.

Moore P.D. and Chapman S. B. 1986. Methods in Plant Ecology, Blackwell Scientific Publication, Oxford.

9.

Hussain, S. Pakistan Manual of Plant Ecology,

10.

Hussain, F. 1989. Field and Laboratory Manual of Plant Ecology, National Academy of Higher Education. Islamabad

11.

Lambers, H., T. L. Pons and F. Stuart. 2008. Plant Physiological Ecology.

12.

Larcher. W. 2003 Physiological Plant Ecology. Ecophysiology and Stress Physiology of Function Groups. Springer- Verlag.

Journals/Periodicals:

Ecology, Journal of Ecology, Journal of Applied Ecology



Khushal Khan Khattak University, Karak
Department of Botany

Title	Plant Physiology-II
Course code	BOT434
Cr. Hrs.	3(2+1)
Specific objectives of the course: To give it comprehensive and advanceknowledge of growth regulators, mechanism of water uptake and role of essential nutrients in plant metabolism	
Course outline	
<p>1. Plant Growth Regulators: Major natural hormones and their synthetic analogues. Bioassay, structure, biosynthesis, receptors, signal trasduction and mode of action, transport, physiological effects of Auxins , Gibberellins, Cytokinins, Absciscic acid, Ethylene, Polyamines, Brassinosteriods, Jasmonates, and Salicylic acid.</p> <p>2. Water Relations: The soil -plant -atmosphere continuum - an overview. Structure of water. Physico-chemical properties of water. Water in the soil and its potentials. Water in cell components. Absorption of water in plants (pathways and driving forces, Aquaporins,-their structure and types). Cell water relations terminology. Hofler diagram - analysis of change in turgor, water and osmotic potential with changes in cell volume. Modulus of elasticity coefficient; Hydraulic conductivity. Osmoregulation, Methods for measurement of water , osmotic and turgor potentials- Pressure chamber, psychrometry, pressure probe, pressure volume curve.</p> <p>3. Plant Mineral Nutrition: Inorganic composition of plant and soil. Absorption of mineral nutrients - roots, mycorrhizae. Effect of soil pH on nutrient availability. Ion traffic into root. The nature of membrane carriers, channels and electrogenic pumps. Passive and active (primary and secondary) transports and their energetics. Essential and beneficial elements-their functions and deficiency symptoms in plants. Fertilizers and their significance in Agriculture.</p> <p>4. Phytochromes: Discovery of phytochromes and cryptochromes. Physical and chemical properties of phytochromes. Distribution of phytochromes among species, cells and tissues and their role in biological processes. Phytochromes and gene expression.</p> <p>5. Control of Flowering: Autonomous versus environmental regulation. Circadien rhythms. Classification of plants according to photoperiodic reaction, photoperiodic induction, locus of photoperiodic reaction and dark periods in photoperiodism. Role of photoperiodism in flowering. Biochemical signaling involved in flowering. Vernalization and its effect on flowering. Floral meristem and floral organ development. Floral organ identity genes and the ABC model.</p> <p>6. Signal transduction in prokaryotes and eukaryotes.</p> <p>7. Dormancy; definition and causes of seed dormancy; methods of breaking seed dormancy; types and physiological process of seed germination.</p> <p>8. Plant Movements; Tropic movement-phototropism, gravitropism and their mechanism. Nastic movements.</p>	
Lab Outline:	
<p>1. To investigate the preferential absorption of ions by corn seedlings and potato slices.</p> <p>2. To determine osmotic potential of massive tissue by freezing point depression method or by an osmometer.</p> <p>3. To investigate water potential of a plant tissue by dye method and water potential apparatus.</p> <p>4. Determination of K uptake by excised roots.</p> <p>5. Measurement of stomatal index and conductance.</p> <p>6. Qualitative determination of K content in Guard cells by Sodium cobalt nitrite method.</p>	

<p>Reference Materials</p>	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Dennis, D. T., Turpin, D. H., Lefebvre, D. D. and Layzell, D. B. 1997. Plant Metabolism. 2nd Edition. Longman Group, U. K. Dey, P. M. and Harborne, J. B. 1997. Plant Biochemistry. Harcourt Asia PTE Ltd. Singapore.2. Fitter, A. and Hay, R. K. M. 2001. Environmental Physiology of Plants. Academic Press, UK.3. Heldt, H. W. 2004. Plant Biochemistry. 3rd Edition, Academic Press, U.K.4. IhsanIllahi, 1991. Plant Growth, UGC Press, Islamabad.5. IhsanIllahi, 1995. Plant Physiology, Biochemical Processes in Plants, UGC Press.6. Nobel, P. S. 1999. Physicochemical and Environmental Plant Physiology. Academic Press, UK.7. Press, M. C., Barker, M. G., and Scholes, J. D. 2000. Physiological Plant Ecology, British Ecological Society Symposium, Volume 39, Blackwell Science, UK.8. Salisbury F. B. and Ross C. B. 1992. Plant Physiology. 5th Edition. Wadsworth Publishing Co. Belmont CA.9. W. B. Hopkins. 1999. Introduction to Plant Physiology. 2nd Ed. John Wiley and Sons. New York.10. Epstein, E. and Bloom, A. J. 2004. Mineral Nutrition of Plants: Principles and Perspectives. 2nd Edition. Sinauer Associates, California, USA.11. Kirkham, M. B. 2004. Principles of Soil and Plant Water Relations. Elsevier, Amsterdam, Netherlands.14. Barton, W. 2007. Recent Advances in Plant Physiology.15. Taiz, L. and Zeiger, E. 2006. Plant Physiology. 4th Edition. Sinnauers Publ. Co. Inc. Calif. <p>Journals / Periodicals: Pakistan Journal of Botany, Plant Physiology, PhysiologiaPlantarum, Planta, Annual Review of Plant Biology, Journal of Plant Physiology</p>
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Khushal Khan Khattak University, Karak
Department of Botany

Title	Genetics-II
Course code	BOT435
Cr. Hrs.	3(2+1)
Specific objectives of the course: To introduce students recombination of genetic material at molecular levels with emphasis on introduction to biotechnology and genomics.	
Course outline	
1. Mechanisms of Genetic Change I: Gene Mutation: The molecular basis of gene mutations, spontaneous mutations, induced mutations, reversion analysis mutagens and carcinogens, biological repair mechanisms. 2. Mechanisms of Genetic Change II: Recombination: General homologous recombination, the holiday model, enzymatic mechanism of recombination, site-specific recombination, recombination and chromosomal rearrangements. 3.Mechanisms of Genetic Change III: Transposable Genetic Elements: Insertion sequences, transposons, rearrangements mediated by transposable elements, review of transposable elements in prokaryotes, controlling elements in maize. 4.Human Genome Project: Strategies and application, achievement and future prospects. 5.Plant Genome Projects: Arabidopsis, achievement and future prospects. Other plant genome projects 6.Bioinformatics: Application of computational tests to the analysis of genome and their gene products	
Lab Outline: Problems relating to the theory 1 Isolation and separation of DNA and protein on Gel electrophoresis. i. Bacterial chromosome ii. Plasmid DNA (minipreps) iii. Plant DNA iv. Protein 2. DNA Amplification by PCR	


<p>Reference Materials</p>	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Trun, N and Trempy J. 2004, Fundamental Bacterial Genetics, Blackwell Publishing House.2. Winnacker, E. L.2003, From Gene to Clones Introduction to Gene Technology, Panima Publishing Corporation, New Delhi.3. Beaycgamp T. L. and Walters L., Contemporary Issues in Bioethics, Wadsworth Publishing Company.4. Brown, T. A. 2002 Genomes, Bios Scientific Publishers Ltd.5. The Genome of Homo Sapiens, 2003, Cold Spring Harbor Laboratory Press.6. Ignacimuthu, S. 2005, Basic Bioinformatics, Narosa Publishing House, India,7. Lwein, B. 2004, Gene VIII, Pearson Education Int.8. Miglani, 2003, Advanced Genetics, Narosa Publishing House, India,.9. Hartt, D. L, and Jones, E. W. 2005. Genetics, Analysis of Gene and Genomes. Jones and Bartlett Publishers, Sudbury, USA10. Gelvin, S. B. 2000. Plant Molecular Biology Manual. Kluwer Academic Publishers.11. Primrose, S. B., Twyman, R. M. and Old R. W. 2004. Principles of Gene Manipulation, an Introduction to Genetic Engineering (6th Edition), Blackwell Scientific Publications.12. Snyder, L and Champness W, 2003, Molecular Genetics of Bacteria, ASM Press.13. Wilson, J. and Hunt, T. 2004. Molecular Biology of the cell – the problems book, Garland publishing Inc.14. Anthony J. F Griffiths, Jeffrey H Miller, David T Suzuki, Richard C Lewontin, and William M Gelbart. W. H. 2009. An Introduction to Genetic Analysis, 7th Edition. Freeman and Company.
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Khushal Khan Khattak University, Karak
Department of Botany

Title	Environmental Biology
Course code	BOT436
Cr. Hrs.	3(2+1)
Specific objectives of the course: To provide updated knowledge of environmental problems and sustainable environmental management.	
Course outline	
<div>1. Environment: Introduction, scope, pressure</div> <div>2. Pollution: definition, classification and impact on habitats</div> <div>i. Air pollution: Sources and effect of various pollutants (inorganic, organic) on plants, prevention, control, remediation. Photochemical smog. Smog. Acid rain: 1. Theory of acid rain, 2. Adverse effects of acid rains. Chlorofluorocarbons and its effects.</div> <div>ii. Water pollution: Major sources of water pollution and its impact on vegetation, prevention, control remediation, eutrophication, thermal pollution.</div> <div>iii. Sediments pollution: fungicide, pesticides, herbicide, major sources of soil pollution and its impact. Prevention, control remediation. Heavy metal pollution. Tanneries. Hospital waste. Treatments of sewage, sludge, and polluted waters.</div> <div>iv. Noise pollution.</div> <div>v. Radiation pollution (including nuclear): Measurement, classification and effects, Principle of radiation protection, waste disposal</div> <div>3. Forest: importance, deforestation, desertification and conservation</div> <div>4. Ozone layer:</div> <div>i. Formation</div> <div>ii. Mechanism of depletion</div> <div>iii. Effects of ozone depletion</div> <div>5. Greenhouse effect and global warming: causes, impacts.</div> <div>6. Human population explosion: impact on environment.</div> <div>7. Impact assessment: Industrial urban, civil developments.</div> <div>8. National conservation strategy: Brief review of major problems of Pakistan and their solutions.</div> <div>9. Sustainable Environmental management.</div> <div>10. Wetlands and sanctuaries protection: The pressures, problems and solutions.</div> <div>11. Range management: Types of rangelands, potential threats, sustainable management.</div> <div>12. Aerobiology (Pollen allergy & dust allergy).</div> <div>Lab Outline:</div> <div>1. Examination of industrial waste water and Municipal sewage and sludge for</div> <div>i. Total dissolved solids.</div> <div>pH and EC.</div> <div>iii. BOD/COD.</div> <div>iv. Chlorides, carbonate, and Nitrates.</div> <div>2. Examination of water samples forms different sites for the presence and diversity of organisms.</div> <div>3. Effect of air pollutants on plants.</div> <div>4. Visits to environmentally compromised sites and evolution of remediation methods.</div>	

Reference Materials	Latest editions of following books
	1. Newman, E. I. 2001. Applied Ecology. Blackwell Science. UK
	2. Mooney, H. A. and Saugier, B. 2000. Terrestrial Global Productivity. Academic Press, UK.
	3. Eugene, E. D. and Smith, B. F. 2000. Environmental Science: A study of interrelationships. McGraw-Hill. USA.
	4. French, H. 2000. Vanishing Borders: Protecting the Planet in the Age of Globalization. W. W. Norton and Company, NY.
	5. Hall, C. A. S. and Perez, C. L. 2000. Quantifying Sustainable Development. Academic Press, UK.
	6. Bazzaz, F. A. 2004. Plants in changing environments: Linking physiological, population, and community ecology. Cambridge Univ. Press.
	7. Bush, M.B. 1997. Ecology of a changing planet. Prentice Hall, UK.
	8. Marsh, M.W. and Grossa Jr., J.M. 1996 Environmental geography: Science, land use, and earth systems. John Wiley and Sons.
	9. Lambers, H., T. L. Pons and F. Stuart. 2008. Plant Physiological Ecology.
	10. MohamamdAshfaq and Mushtaq A. Saleem. Environmental Pollution and Agriculture.
	11. Shah Faisal Muhamamd and Sultan Mehmood. 2012. Lambert Publishers Germany.
	12. Advanced Air and Noise Pollution Control, L. K. Wang, N. C. Pereira and Y. T. Hung, Humana Press, 2005.
	13. Air Pollution Control Technology Handbook, K. B. Schnelle and C. A. Brown, CRC Press, 2002. Handbook of Solid Waste Management and Waste Minimization Technologies, N. P. Cheremisinoff, Butterworth-Heinemann, 2003.
	14. Pollution Control In Process Industries, S. P. Mahajan, Tata McGraw-Hill, 1985.
	15. Industrial Pollution control: issues and techniques, N. J. Sell, Van Nostrand Reinhold, 1992.
	16. Environmental Biotechnology: Basic Concepts and Applications, I. S. Thakur, I.K. International Publishing House Pvt. Limited, 2006.
	17. Vandermeer, John H. 2011. The ecology of agro-ecosystems - Jones and Bartlett Publishers; Sudbury, Mass; 2011 - xv, 387 p.
	18. Greipsson, Sigurdur. 2011. Restoration ecology - Jones and Bartlett Publishers ; Sudbury, MA ; 2011 - xvi, 408 p
	19. Santra, S. C. 2010. Fundamentals of ecology and environmental biology - New Central Book Agency; London; 2010 - 353p.
	20. Singh, M.P. 2007 Forest environment and biodiversityDaya; New Delhi; 2007 - 556p.
Journals/Periodicals: Environmental Biology, Environment, Bioremediation	

<div></div> <div>Khushal Khan Khattak University, Karak Department of Botany</div>	
Title	Biostatistics
Course code	BOT212
Cr. Hrs.	3(2+1)
Specific objectives of the course:	
Course outline	
1. Introduction objectives and scope: i. Definition ii. Characteristics iii. Importance and limitations iv. Population and samples 2. Frequency distribution: i. Variable types ii. Formation of frequency table from raw data iii. Summation, notation and statistical inference iv. Data transformation. 3. Measures of central tendencies and dispersion: i. Arithmetic mean ii. Median iii. Mode iv. Range	

- v. Variance
 - vi. Standard deviation
 - vii. Standard error of the mean
 - viii. Mean deviation.
 - 4. Organizing and describing data (Standard distributions):
 - i. Random sampling and the binomial distribution
 - ii. Probability, Types of Probabilities, Random variables, Combining probabilities, Probability distributions, Binomial distributions.
 - ii. Poisson and normal distributions, properties and applications.
 - 5. Basic experimental design:
 - I. Concept and design
 - II. Principles of experiments
 - III. Observational studies
 - IV. Planning of experiments
 - V. Replication and randomization
 - VI. Field plot technique
 - VII. Layout and analysis of completely randomized design
 - VIII. Randomized complete block design
 - IX. Latin square
 - X. Factorial design
 - XI. Treatment comparison
 - 6. Tests of significance:
 - a. T-test: (Basic idea, confidence limits of means, significant difference of means.
 - b. Chi square test: Basic idea, testing goodness of fit to a ratio, testing association (contingency table).
 - c. F-test: Introduction and application in analysis of variance.
 - d. LSD test, Duncan's New Multiple Range test (for comparison of individual means). Bonferroni test.
 - 7. Introduction to comparing of means:
- Unit organization, Basic one way ANOVA, Types of sums of squares, How ANOVA works, The ANOVA Table. Two-way ANOVA-Factorial designs: (two-way factorial analysis, calculating and analyzing the two-way ANOVA, Linear combination, multiple comparisons.
- 8. Correlation and Regression.

Lab outline:

- 1. Data collection, arrangement of data in frequency table, calculating frequency, cumulative frequency and preparation of Ogive.
- 2. Calculating different measure of central tendency such as arithmetic means, harmonic mean, geometric mean, median and mode.
- 3. Calculation of mean from grouped and ungrouped data.
- 4. Calculation of variance and standard deviation from grouped and ungrouped data.
- 5. Calculating dispersion, relative dispersion, standard deviation, standard error, standard score and coefficient variation by hand and machine method.
- 6. Problems concerning probability, binomial distribution, T-test
- 7. Chi square test.
- 8. Analysis of variance - one factor design.
- 9. Multiple Analyses of Variance.
- 10. Determination of correlation by constructing different types of graphs such as scatter diagram, linear positive correlation, linear perfect negative correlation, no correlation and curvilinear correlation (second degree polynomial, third degree polynomial).
- 11. Linear Regression and multiple regression models.
- 12. MS Excel, MSTAT or relevant statistical software packages.

<p>Reference Materials</p>	<p>Latest editions of following books</p> <ol style="list-style-type: none">1. Harvey, M. 1995. Intuitive Bioostatistics. Oxford University Press. NY. Kuzma J. W. and Bohnenblust, S. E. 2001, Basis Statistics for the Health Sciences, McGraw-Hill International Education.2. Onton, P., Adams, S. and Voelkar, D. H. 2001. Cliffnotes for statistics. Blackwell Scientific Publishers.3. Pacano, M. and Gauvreau, K. 2000. Principles of Biostatistics.4. Quinn, G. 2002. Experimental Design and Data Analysis for Biologists. Cambridge University Press.5. Rosner, B. 2005. Fundamentals of Biostatistics. John Wiley & Sons.6. Samuels, M. L. and Witmar, J. A. 2003. Statistics for life sciences. 3rd Edition. Cambridge University Press.7. Triola, M. F. and Triola, M. M. 2005. Biostatistics for Biological and Health Sciences. Pearson Addison Wesley.8. Zar, J. H., 1999. Biostatistical Analysis, Pearson Education.
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ANNEXURE: D: SAMPLE TIME TABLE OF BS BOTANY

TIME TABLE BS BOTANY SPRING 2023 , GGDC KDA KARAK

MONDAY	9.00/1st	10.00/2nd	11.00 - 11.30 BREAK	11.30-12.30/3rd	12.30-1.30/4 th
1ST	SOCIOLOGY	Zoology I AI		BOT.101 SN	BOT 101 LAB SN
4TH	English IV ZA	Bot.213 KG		LIBRARY	BOT 213 LAB
6TH	BOT 327 MJ	BOT 328 ZA		BOT 326 KG	BOT 328 LAB ZA
8TH	BO 434 FB	BOT 434 LAB FB		BOT 436 FB	BOT 440 MJ/RESEARCH SN
THURSDAY					
1ST	ENGLISH I AK	CHEM I WN		PAK STUDIES NY	As per Bot 1 st semester time table
4TH	CHEM IV AP	Zoology IV AI		BOT 214 SN	BOT 214 LAB
6TH	BOT 330 Z A	BOT 330 ZA		BOT 329 KG	BOT 329 LAB
8TH	BOT 435 FB	BOT 435 LAB FB		BOT 440 LAB/RESEARCH SN	BOT 442 MJ

FB = MS. FATIMA BIBI, KG= MS. KIRAN GUL, ZA= MS. ZEENAT AYESHA, MJ= MS.MARIA JAVED,

AK= MS.ANUM KHATTAK ,SN=Ms. SHAHIDA NAVEED, AP=ABIDA PERVEEN,WN=WAJEEHA NAIMAT ,AYESHA IRUM,NY=NIGHAT YASMIN

ANNEXURE: E: SAMPLE OF BS BOTANY DATE SHEET

<div style="display: flex; justify-content: space-between;"> BS Botany DATE SHEET MID TERM (2 Semester) DATE SHEET FINAL TERM(4,6,8 </div>									
Semesters)									
<div style="text-align: center;"> SPRING 2023 (15 MAY 2023-20 MAY 2023 TIMING: 9 AM -12 PM </div>									
S.NO	DAY	DATE	Semester 2/46	SEMESTER 4/ Exam Room = Bot 8	INSTRUCTOR/31	SEMESTER 6 Exam Room = Bot 6 Classroom	INSTRUCTOR/35	SEMESTER 8/32	INSTRUCTOR Exam Room = Bot Lab
1	Monday	15/5/2023		Bot.213 Plant Physiology/Eco	Kiran Gul/Wajeeha	Bot.328 Biochemistry	Anum Khattak /Abida	Bot 434 Plant Genetics -II	Fatima/Ferzana
	Tuesday	16/5/23	English 2/Anum						
2	Wednesday	17 /5/23		Eng.212 English -IV	Zeenat Ayesha/Lubna	Bot.326 Plant Anatomy	Kiran Gul/Wajeeha	Bot.440 Stress Physiology	Maria Javid /Abida
	Thursday	18 /5/23	RS 101: Islamiyat /Hamida						
3	Friday	19 /5/23		Bot.214 Biodiversity	Anum Khattak/Fouzia	Bot.330 Plant Physiology - I	Zeenat Ayesha/Hussan	Bot.435 Plant Physiology -II	Anum Khattak/Saba
	Saturday	20/5/2023	Zoo. 102.Principals of Animal Life /Saima Irum						

ANNEXURE:F :SAMPLE MID TERM PAPER

GOVERNMENT GIRLS DEGREE COLLEGE KARAK

MID TERM EXAM, SPRING 2022

Department: Botany Programme: BS Botany Semester: 6 Batch: _02 (Fall 2019 -Spring 20223)

Course Title: Genetics -I

Course Code: Bot: 3 Marks: 30 Time Allowed: 01 hourn 30 minutes .

SECTION - A Marks :20 Name:

Q.1. Choose the correct option:

1. The tendency of an offspring to resemble its parent is known as? A. Variation b. Heredity c. Resemblance,,d, Inheritance
2. Who is known as the “Father of Genetics”? a. Morga b. Mendel c. Watson d. Bateson
3. Mendel’s findings/works were published in the year? A. 1863 B. 1864 C. 1865 D. 1866
4. The alternate form of a gene is called? A. Alternate type B. Recessive character C. Dominant character D. Allele
5. The genotypic ratio of a monohybrid cross is? A. 1:2:1 B. 3:1 C. 2:1:1 D. 9:3:3:1
6. The crossing of F1 to either of the parents is known as? A. Test cross B. Back cross C. F1 cross D. All of the above
7. An exception to Mendel’s law is? A. Independent assortment B. Linkage C. Dominance D. Purity of gametes
8. When the activity of one gene is suppressed by the activity of a non-allelic gene, it is known as
A. Pseudo-dominance B. Hypostasis C. Epistasis D. Incomplete dominance
9. Cell was discovered by Robert Hooke in A. 1665 B. 1765 C. 1865 D. 1965
10. How many phenotypes can occur in the human blood group ABO with alleles “A” “B?” A. 2 B. 3 . C. 4 D. 5
11. In floral formula “G” represents ----- A. Calyx B. Corolla C. Gynoecium D. Androecium
12. The geometrical device that helps to find out all the possible combinations of male and female gametes is known as
A. Bateson Square B. Mendel Square C. Punnett Square D. Mendel’s Cube
13. When an organism has a life cycle with alternation of generations, the haploid generation is the
A.ZygoteB. Gametophyte C. Gamete D. Sporophyte
14. The stage of meiosis in which chromosomes pair and cross over is: A. prophase I B. metaphase I
C. prophase II D. metaphase II
15. Pea plants were used in Mendel’s experiments because(a) They were cheap (b) They had contrasting characters (c) They were available easily (d) All of the above
16. Ratio 12: 3: 1 is : example of ----- epistasis.
17. Ratio 9: 3: 4 is : example of ----- epistasis.
18. Ratio 9 : 6: 1 is : example of ----- epistasis.
19. Ratio 9 : 7 is : example of ----- epistasis.
20. Ratio 15 : 1 is : example of ----- epistasis.

21. Part -B : Marks :10 (2*5 = 10) Answer any 4 questions.

Q.2. Write briefly the preformation theory. Q.3. Write briefly the particulate theory .

Q.4. Write briefly the law of independent assortment of inheritance. Q.5. Write briefly the law of segregation of inheritance. Q.6. Write briefly the application of Genetic

ANNEXURE: G

Faculty Resume

SHAHIDA NAVEED

PhD

Assistant Professor of Botany

Address: Department of Botany Government Girls Degree College KDA Karak (Affiliated with Khushal Khan Khattak University Karak Khyber Pakhtunkhwa Pakistan)

CONTACT NUMBERS: +923459359865

Email Address: shahidanaveed@live.com

Professional Overview

I am working as a Assistant professor of Botany at the Higher Education Department Government of Khyber Pukhtunkhwa Pakistan, since, November, 2008, and teaching Botany and Biology at B.Sc and BS level. I got my PhD Degree from the department of Botany, University of Peshawar. My PhD mainly focuses on Phytosociological distribution of Plants, Ethnobotanical/Ethnomedicinal uses of Plants and standardization of medicinal plants through various techniques of Pharmacognosy. I have published 3 Research papers from my Ph.D research in Pakistan Journal of Botany, having 0.8 impact factor, and two papers in a Y category Journal. I have worked in a Women University Swabi in 2016, on Deputation basis, and supervised 4 students of M.Sc Botany and published the research work in Pakistan Journal of Weed Science and Research (Y category Journal). I am also working as Focal person of Quality Enhancement Cell and Controller of Examination at BS level at G.G.D.College Karak. I have adopted excellent organizational skills in a variety of deadline-oriented situation. Get on well with people at all levels, easily making good working relationships have become my habit. I am always seeking out new responsibilities irrespective of reward and recognition and strive for quality in everything I do. My total teaching experience is more than 15 years and my post PhD teaching experience is 6 and half years. I have published 28 research papers in national and international journals and still more research articles are under review. Currently I am supervising 4 BS research students at GGDC KDA Karak.

Education

PhD 2014 Botany (Pharmacognosy) University of Peshawar Pakistan

M.Ed 2002 Education - Al-Khair University AJK Pakistan

B.ED 2001 EDUCATION - UNIVERSITY OF PESHAWAR, PAKISTAN

M.Sc1999 Botany - University of Peshawar, Pakistan

B.Sc.1996 Biological Sciences - University of Peshawar. KP, Pakistan

Ph D RESEARCH AREA

Pharmacognosy , Phytosociology and Ethnobotany of medicinal plants in order to provide less expensive treatment with no side effects.

Research Publications

Research Publications

1. Allelopathy of *Tamarix aphylla* .Naila Khalid, Shahida Naveed.PAB. DECEMBER,2022
2. Matigation of Salt stress in Wheat by plant derived smoke. Farhana Hussain, Shahida Naveed. Weed Science Journal, November,2022.
3. Imran, Amanullah, **S Naveed**, I Khan, M Sajid, T Mahmood, I Hussain, M Ilyas, I Ali, S Ullah, A Kamal, A R Altawaha, A R Al-Tawaha, D Thangadurai , J_Sangeetha, A Rauf, P Saranraj, W Al-Sultan, D K A ALTaey, Refat , A Youssef , S N Sirajuddin and Hastang. Relationship of soil physico chemical properties with elevation and geographical directions. The 3rd International Conference of Animal Science and Technology IOP Conf. Series: Earth and Environmental Science 788 (2021) 012172 IOP Publishing doi:10.1088/1755-1315/788/1/012172
4. **Shahida Naveed**, M.Ibrar and Inayat Khattak.2019. Phytosociological and heavy metal profile of *Iphiona grantioides* and *Pluchea argutasub.sp.glabra*.Pak.J.Bot.51(6):DOI:http://dx.doi.org./10.30848/PJB2019-6(33). **Impact factor.8**
5. **Shahida Naveed**, Salma , Inayat Khattak and K.B. Marwat. 2019. Ethnomedicinal study of weeds in maize, rice and tobacco fields of tehsil Razzar, Dist. Swabi Khyber Pakhtunkhwa Pakistan. Pak. J. Weed Sci. Res., 25(2): 91-109. **Y Category Journal**
1. Imran, Amanullah, Asad Ali, **Shahida Naveed** and Inayat Khattak.2019. Production statistics and modern technology of maize cultivation in Khyber Pakhtunkhwa, Pakistan. Plant Science Archive.2(2),1-12,2019.
2. **Shahida Naveed**, ., Madeeha, I. Khattak and K.B. Marwat. 2018. Ethnobotanical study of important wild plants of District Swabi Khyber Pakhtunkhwa Pakistan. Pak. J. Weed Sci. Res., 24(3): 279-293. **Y Category Journal**

3. **Shahida Naveed**, Muhammad Ibrar , Inayatullah Khattak and Muhammad Qasim Kakar. Anatomical and Pharmacognostic study of *Iphiona grantioides* (boiss.) Aanderb and *Pluchea arguta* Boiss. subsp. glabra Qaiser. Pak. J. Bot., 49(5): 1769-1777, 2017. **Impact factor.8**
4. **Shahida Naveed**, Muhammad Ibrar and Inayatullah Khattak. In vitro evaluation of medicinal, antioxidant activities and phytochemical screening of *Iphiona grantioides* and *Pluchea arguta* subsp. glabra qaiser. Pakistan Journal of Botany.2017. Pak. J. Bot., 48(6): 2505-2511. **Impact factor.8**
5. **Shahida Naveed**, Muhammad Ibrar and Inayatullah Khattak. Anthelmintic, Antilice, Insecticidal, cytotoxic and phytotoxic activity of *Iphiona grantioides* (BOISS.)ANDERB. and *Pluchea arguta* subsp. glabra QAISER (Asteraceae) for phytotoxic, cytotoxic. Wulfenia Journal.2016.
6. Imran, Abdul Bari, Inayatullah Khan and **Shahida Naveed**. Traditional Rice Farming Accelerate CH₄ & N₂O Emissions Functioning as a Stronger Contributors of Climate Change. Agri Res & Tech: Open Access J. 2017; 9(3): 555765.
7. Ulfat Samreen, **Shahida Naveed**, Imran and Inayat Khattak. Ethnobotanical study of Sub-Tropical hills of Darazinda, Takht-e Suleman Range F.R D.I. Khan, Pakistan. Pure and Applied Biology. Pure Appl. Biol., 5(1): 149-164, March- 2016
8. Imran, Inayat Khattak and **Shahida Naveed**. Growth and yield of maize hybrid as influenced by different sowing dates in Swat Pakistan. Pure and Applied Biology. Pure Appl. Biol., 5(1): 114-120, March- 2016
9. Imran, Inayat Khattak and **Shahida Naveed**. Weeds density in late sown maize: Productivity influence by compost application and seed rate under temperate environment. Pak. J. Weed Sci. Res., 22(1): 169-181, 2016. **Y Category Journal**
10. Imran, Inayat Khattak and **Shahida Naveed**. Variable Rates of Phosphorous Application Influenced Phenological Traits of Green Gram (*Vignaradiata* L). Vol. 1.Issue 3. Open Access Journal of Agricultural Research.2016.
11. Imran, Izaz Hussain, Inayatkhattak, Aziz Ur rehman, FayazAhamd, Hayat Zada and **Shahida Naveed**.Roots nodulation, yield and yield contributing parameters of Mungbean cultivars as influenced by different Phosphorous level in Swat- Pakistan.Pure Appl. Biol., 4(4): 557-567, December- 2015.
12. Imran, Inayat Khattak and **Shahida Naveed**. Impact of Phosphorus levels and seed rates on late sown maize on high elevation in Swat, Pakistan. Pakistan J. Agric. Res. Vol. 28 No. 4, 2015

13. **Shahida Naveed**, Muhammad Ibrar and Barkatullah. Invitro hepatoprotective potential of *Iphiona grantioides* and *Pluchea arguta* subsp. *glabra* in Acetaminophen induced hepatotoxicity in rabbits. Pak. J. Weed Sci. Res., 20(3): 305-322, 2014. **Y Category Journal**
14. **Shahida Naveed**, Furrukh Hussain, Inayatullah Khattak and Niaz Ali. Fresh Water Algae from Chontra District Karak. Global Journal of Science Frontier Research(C) Vol. XII (V1).2011.
15. **Shahida Naveed**, Furrukh Hussain, Inayatullah Khattak and Lal Badsha. Florestic Composition and ecological characteristics of Olea Acacia Forest Of Shamshukki District Karak. Global Journal of Science Frontier Research.(C) Vol.12(8), pp. 31- 36.2012.
16. **Shahida Naveed**, Muhammad Ibrar and Inayatullah Khattak. First Ever Report On Olive Leaf Nut Galls Caused By an Unidentified *Cecidomyiidaen* sp. In District Karak, KP, Pakistan Greener Journal of Biological Sciences October.
17. Muhammad Ibrar, **Shahida Naveed**, Inayatkhattak and Imtiaz Ahmad. Phytochemical investigation of wild olive leaf nut galls from District Karak, KPK, Pakistan. Top class Journal of herbal medicine vol. 2(1), 7-12, 26 January, 2013.
18. **Shahida Naveed**, Farrukh Hussain, Inayatullah, Khattak, Ijaz Ahmad Khan and Barkatullah. Allelopathic potential of *Forsskeoleatenecissema*. International journal of Medical and Applied Sciences. Vol.1 (1), pp.5-14. Oct-Dec.2012.
19. Zille Huma, **Shahida Naveed**, Abdur Rashid, AsadUllah, Inayatkhattak. Effects of domestic and industrial waste water on germination and seedling growth of some plants. Current Opinion in Agriculture. January 2013.
20. Inayat Khattak, **Shahida Naveed**, Muhammad Sajid Khattak and Tahir Farid. Role of Agricultural Inputs through NRM interventions for the Socio Economic Development of the Poor Rural Communities of District Karak under SRSP-Batcha Khan Poverty Alleviation Programme. Greener journal of Agricultural Sciences. Vol. 2. pp.303-310, Nov. 2012.
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Courses & Workshop attended:

1. One day training for KP Colleges faculty capacity building ,arranged by QAC HED KP Peshawar April 2022 .
2. Two Weeks training for KP Colleges faculty capacity building ,arranged by HEC Islamabad from 7June 2021-17 June 2021.
3. One Month Mandatory professional skill enhancement training arranged by HEART Academy-HED KP Peshawar from 15 February2021-16 March 2021.
4. Three Days workshop for Controller of Examination at BS Level, Organized by Higher EducationDepartment,Khyber Pakhtunkhwa,Peshwar.
5. Three Days Training for Focal Persons of Quality Enhancement Cells at BS Level in Colleges. Organized by Higher Education Department,Khyber Pakhtunkhwa,Peshwar.
6. One-month training on Professional Competency Enhancement Programme” arrange by Khushal Khan Khattak University, Finance by Higher Education Commission. June, 2014.

References:

1. Professor Dr. Muhammad Ibrar
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2. Professor Dr. Farrukh Hussain
Department of Botany, University of Peshawar
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0332-1949579

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OBJECTIVES:

A creative and enthusiastic person with a diverse range of field, outgoing with strange and effective organization and communication skills. Good team player and able to use own initiative to achieve institutional objectives, excellence in computer skills, versatile and learns new skills quickly. To develop new area of knowledge, professional practical education in healthy environment and to keep the institute of great thoughts and inspirations of syndrome ideas for challenged ambition.

PERSONAL INFORMATION:

FATHER'S NAME : Javed Anwar
DATE OF BIRTH : 01/01/1994
N.I.C NO : 14202-1865945-8
DOMICILE : Karak(kpk)
RELIGION : ISLAM
NATIONALITY : PAKISTANI

QUALIFICATIONS:

Qualification	Subjects	Year	Div. Grade	Marks/Cgpa	Board/University
B.S (Hons)Botany	Botany	2016	1st	3.6/4.0	KUST Kohat
F.Sc	Science	2012	1st	767/1100	B.I.S.E kohat
Matriculation (SSC)	Science	2010	1st	705/1050	B.I.S.E kohat

OTHER QUALIFICATION;

Qualification	Year	Marks/Cgpa	Div. Grade	Board/University
PTC	2013	619/900	1st	AIOU islamabad
CT	2016	pending	pending	AIOU islamabad
B.ED	progress	-	-	AIOU islamabad

ANNEXURE: H: QEC PROFORMA

Table A.1 Minimum Requirements for Each Program
(Program Semester Credit hours)

Program	Math & Basic Science	Engineering Topics	General Education	Others

- A. HEC/University requirements
- B. Program Requirements
- C. Deviations
- D. Justifications for Deviat

PROFORMA-1 COURSE EVALUATION FORM BY STUDENT

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

College Name: _____ Department: _____ Program: _____

Semester/ Term: _____ Batch _____ Year: _____

Note: Please give us your views and use the below scale to answer the following questions, so that Course quality can be improved.

5: Strongly Agree 4: Agree 3: Neutral/Uncertain 2: Disagree 1: Strongly Disagree

		Course: _____ Course Code: _____	Course: _____ Course Code: _____	Course: _____ Course Code: _____	Course: _____ Course Code: _____	Course: _____ Course Code: _____	Course: _____ Course Code: _____
	Items to be evaluated	Score out of 5	Score out of 5	Score out of 5	Score out of 5	Score out of 5	Score out of 5
	Course Content and Organization						
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.)						

Student Contribution							
4.	Approximate level of your own attendance during the whole Course.						
5.	I participated actively in the Course.						
6.	I think I have made progress in this Course.						
Learning Environment and Teaching Methods							
7.	I think the course was well structured to achieve the learning outcomes, that is, there was a good balance of lectures, tutorials, practical etc.						
8.	The learning and teaching methods encouraged participation.						
9.	The overall environment in the class was conducive to learning.						
10.	Classrooms were satisfactory.						
Learning Materials and Resources							
11.	Learning materials such as lesson plans, course notes etc. were relevant and useful.						
12.	Recommended reading Books etc. were relevant and appropriate.						
13.	The provision of learning resources in the Library was adequate and appropriate.						
14.	The provision of learning resources on the Web was adequate and appropriate (If relevant).						
Quality of Lecture Delivery							
15.	The Course stimulated my interest and thought on the subject area.						
16.	The pace of the Course was appropriate.						
17.	Ideas and concepts were presented clearly.						
Assessment and Feedback							
18.	The method of assessment was reasonable.						
19.	Feedback on assessment was timely.						
20.	Feedback on assessment was helpful for improvement.						
Tutorial							
21.	The material in the tutorials/ lectures was useful.						
22.	I was happy with the amount of work needed for tutorials/ lectures.						
23.	The tutor dealt effectively with my problems in this course.						
Practical / Practice							
24.	The material in the practical's / practice such as assignments, labs, etc. was useful.						

Suggestions for improvement:

PROFORMA-2: FACULTY COURSE REVIEW REPORT

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

For completion by the faculty member and submission to Head of Department or his/her nominee (Dept. Program Team/Focal Person) together with copies of the Course Syllabus outline

Department:		Faculty:	
-------------	--	----------	--

Course Code:		Title:			
Session:		Semester:	Autumn <input type="checkbox"/>	Spring <input type="checkbox"/>	Summer <input type="checkbox"/>
Credit Value:		Level:		Prerequisites:	
Name of Course Instructor:		No. of Students Contact Hours	Lectures	Other (Please State)	
			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						No Grade	Withdrawal	Total
		A	B	C	D	E	F			
No. of Students										
Post-Graduate	Originally Registered	% Grade					No Grade	Withdrawal	Total	
		A	B	C	D	E				
No. of Students										

Overview/Evaluation (Teacher's Comments)

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

1) Please comment on Student Course Evaluation process for your course
2) External Examiners or Moderators (if any)
3) if there is any Student /staff Consultative Committee (SSCC) or equivalent in your deptt, please comment

--

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 in respective degrees/program)

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

8) Please comment any other change you want or academic improvement in your course or teaching methods.

Name: _____ (Course Instructor)	Date: _____
Name: _____ (Head of Department)	Date: _____

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.

7. A B C D E
Administrative support from the department.
8. A B C D E
Providing clarity about the faculty promotion process.
9. A B C D E
Your prospects for advancement and progress through ranks.
10. A B C D E
Salary and compensation package.
11. A B C D E
Job security and stability at the department.
12. A B C D E
Amount of time you have for yourself and family.
13. A B C D E
The overall climate at the department.
14. A B C D E
Whether the department is utilizing your experience and knowledge
15. A B C D E
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: _____

Name of the College: _____

PROFORMA-10:TEACHER

EVALUATION

FORM

(To be filled by the student for each subject in each semester)

Name of Department: _____

Name of Program: _____

Semester: _____ Year: _____

Use the below scale to answer the following questions for each teacher;

5: Strongly Agree

4: Agree

3: Neutral/Uncertain

2: Disagree

1: Strongly Disagree

		Teacher: _____ Subject: _____	Teacher: _____ Subject: _____	Teacher: _____ Subject: _____	Teacher: _____ Subject: _____	Teacher: _____ Subject: _____	Teacher: _____ Subject: _____
	Items to be evaluated	Score out of 5	Score out of 5	Score out of 5	Score out of 5	Score out of 5	Score out of 5
25.	The instructor is prepared for each class.						
26.	The instructor demonstrates knowledge of the subject.						
27.	The instructor has completed the whole course.						
28.	The instructor provides additional material apart from the textbook.						
29.	The instructor gives citations regarding current situations with reference to Pakistani context.						
30.	The instructor communicates the subject matter effectively.						
31.	The instructor shows respect towards students and encourages class participation.						
32.	The instructor maintains an environment that is conducive to learning.						
33.	The instructor arrives in the class on time.						
34.	The instructor leaves the class on time.						
35.	The instructor is fair in examination.						
36.	The instructor returns the graded scripts of midterm exam and final exam etc. in a reasonable amount of time.						
37.	The instructor was available during the specified office hours and for after class consultation.						

Any remarks for Improvement:

PROGRAMME EVALUATION SURVEY FORM BY GRADUATING STUDENTS

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

Name of the College _____ Name of Department _____
 Name of Program _____ Semester / Term _____
 Graduating Year _____ Batch _____

Purpose:

The survey seeks graduating students' input on the quality of education they received in their program and the level of preparation they had at college. The purpose of this survey is to assess the quality of the academic programs. We seek your help in completing this survey. Please tick mark anyone in the following questions;

Items to be evaluated	Strongly Agree	Agree	Neutral/ Uncertain	Disagree	Strongly Disagree
38. The work in the program is too heavy and induces a lot of pressure.	5 <input checked="" type="checkbox"/>	4	3	2	1
39. The program is effective in enhancing team-working abilities.	5	4	3	2	1
40. The program administration is effective in supporting learning.	5	4	3	2	1
41. The program is effective in developing analytical and problem-solving skills.	5	4	3	2	1
42. The program is effective in developing independent thinking.	5	4	3	2	1
43. The program is effective in developing written communication skills.	5	4	3	2	1
44. The program is effective in developing planning abilities.	5	4	3	2	1
45. The objectives of the program have been fully achieved.	5	4	3	2	1
46. The contents of curriculum are advanced and meet program objectives.	5	4	3	2	1
47. Faculty members were able to meet the program objectives.	5	4	3	2	1
48. Environment was conducive for learning.	5	4	3	2	1
49. The infrastructure of the department was good.	5	4	3	2	1
50. The program was comprised of Co-curricular and extra-curricular activities.	5	4	3	2	1
51. Scholarships / grants were available to students in case of hardship.	5	4	3	2	1
Note: If you didn't attend/ undergo internship, skip questions 15 to 22.					
52. The internship experience is effective in enhancing ability to work in teams.	5	4	3	2	1
53. The internship experience is effective in enhancing independent thinking.	5	4	3	2	1
54. The internship experience is effective in enhancing appreciation of ethical values.	5	4	3	2	1
55. The internship experience is effective for professional and career development.	5	4	3	2	1
56. The internship experience is effective in enhancing time management skills.	5	4	3	2	1
57. The internship experience is effective in enhancing Judgment skill.	5	4	3	2	1
58. The internship experience is effective in enhancing discipline skills.	5	4	3	2	1
59. The internship experience is effective in enhancing the link between theory and practice.	5	4	3	2	1
60. There are many best aspects of this program.	5	4	3	2	1
61. Many aspects of this program need to be improved.	5	4	3	2	1

Suggestions for improvement:

PROFORMA-9: FACULTY RESUME

Name	
Personal	May include address(s) and phone number(s) and other personal information that the candidate feels is pertinent.
Experience	List current appointment first, each entry as follows: Date, Title, Institution.
Honor and Awards	List honors or awards for scholarship or professional activity.
Memberships	List memberships in professional and learned Societies, indicating offices held, committees, or other specific assignments.
Graduate Students Postdocs Undergraduate Students Honour Students	List supervision of graduate students, postdocs and undergraduate honors theses showing: Years Degree Name Show other information as appropriate and list membership on graduate degree committees.
Service Activity	List University and public service activities.
Brief Statement of Research Interest	May be as brief as a sentence or contain additional details up to one page in length.
Publications	List publications in standard bibliographic format with earliest date first. 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).

Research Grants and Contracts.	Entries should include: Date Title Agency / Organization Total Award Amount Segment the list under following headings: Completed Funded and in progress In review
Other Research or Creative Accomplishments	List patents, software, new products developed, etc.
Selected Professional Presentations	

CHECK LIST FOR B.S STUDENT FILE

CHECK LIST FOR B.S STUDENT FILE				
	Name of the Student:			
	Degree Name:			
	Registration No:			
S No	Name of Document	Yes	No	N/A
1	Secondary School Certificate or Equivalent			
2	Mark Sheet of Secondary School Certificate or Equivalent			
3	Higher Secondary School Certificate or Equivalent			
4	Mark Sheet of Higher Secondary School Certificate or Equivalent			
5	Bachelors or Equivalent Degree (14 year qualification)			
6	Transcript of Bachelors or Equivalent (14 years qualification)			
7	Master / BS (4 year) (16 Year education) Degree & Transcript			
8	Admission Form at the time of Admission by student			
9	CNIC			
10	Copy of the Merit List at the time of Admission including student name			
11	Admission Confirmation Letter			
12	Course Registration in Ist Semester			
13	Transcript of 1st Semester duly verified by Exam			
14	Course Registration in 2 nd Semester			
15	Transcript of 2nd Semester duly verified by Exam			
16	Course Registration in 3 rd Semester			
17	Transcript of 3rd Semester duly verified by Exam			
18	Course Registration in 4th Semester			
19	Transcript of 4th Semester duly verified by Exam			
20	Course Registration in 5th Semester			
21	Transcript of 5 th Semester duly verified by Exam			
22	Course Registration in 6 th Semester			
23	Transcript of 6 th Semester duly verified by Exam			
24	Course Registration in 7 th Semester			
25	Transcript of 7 th Semester duly verified by Exam			
26	Course Registration in 8 th Semester			
27	Transcript of 8 th Semester duly verified by Exam			
28	Completing Degree through Thesis/ Course Work/Project			
29	Copy of Degree Awarded			
30	Copy of Transcript Awarded			

CHECK LIST FOR MASTER/MS/M.PHIL. FACULTY FILE

Teacher Name:			
Designation:			
Department:			
Name of Document	Evidence Attached		
	Yes	No	N/A
Offer/Appointment/Transfer Letter			
Joining Report			
Detailed CV			
Degree of MS/M.Phil. Or Equivalent			
Transcript of MS/M.Phil. Or Equivalent			
Equivalence of MS/M.Phil. from HEC			
Degree of Bachelors/Master or Equivalent			
Transcript of Bachelors/Master of Equivalent			
Semester work load			
Details of courses being taught in current semester			

CHECKLIST FOR PH.D. FACULTY FILE

Checklist for Ph.D. Faculty File			
Teacher Name:			
Designation:			
Department:			
Name of Document	Evidence Attached		
	Yes	No	N/A
Offer/Appointment/Transfer Letter			
Joining Report			
Detailed CV			
Degree of Ph.D. or Equivalent			
Transcript of Ph.D. or Equivalent			
Equivalence of Ph.D. from HEC if required			
Degree of MS/M.Phil. Or Equivalent			
Transcript of MS/M.Phil. Or Equivalent			
Equivalence of MS/M.Phil. from HEC if required			
Semester work load			
Details of courses being taught in current semester			