Pir Mehr Ali Shah

Arid Agriculture University, Rawalpindi

Self-Assessment Report for Department of Food and Nutritional Sciences

And Department of Biochemistry & Biotechnology

Barani Institute of Sciences Burewala

Session: 2020-2022

Coordinator: Mr. Suhail Akraam

Convener: Ms. Farah Tawakkal

Members: Ms. Shakila Anwar

Table of Contents

LIST OF TABLES

INTRODUCTION

Barani Institute of Sciences (BIS) is an affiliate of Pir Mehr Ali Shah, Arid Agriculture University Rawalpindi. It was established in 2014 with the aim of providing a high-quality education to our youth in the fields of Life Sciences, Computer Sciences, Food Sciences, Management Sciences and Social/Natural Sciences etc. As a nascent institution, BIS is in the process of establishing itself as one of the leading institutions in the country. Therefore, the institution is ought to become operationally efficient and more effective in achieving its objectives through excellent education, increased productivity and more knowledge driven work processes and practices. Today, we can rightly claim with immense satisfaction and gratitude before Almighty Allah that we have managed to conform to our standards and policies. We have successfully laid out inordinate amplitude of requisite facilities which are available on the campus to meet the multifarious requirements of our students. However, like any dynamic organization, our quest for excellence continues unabated and we are continually on the look-out for measures to improve our existing standards. In line with our basic policy of 'Quality Education for All', our doors are open to all individuals regardless of their religion, race or class and we remain committed to extend our facilities to any Pakistani youth desirous of attaining quality education. BIS provides a very conducive teaching environment (through the air-conditioned classrooms, elaborate workshops and laboratories, and a reasonably diverse and rich library). BIS strongly feels that while theoretical education is the scarlet thread which builds the base for higher learning, Creativity and Imagination are equally important for further academic advancement. Surely, it is the “wanting to know” which eventually results in “getting to know”. Hence, our foremost endeavor is to agitate theyoung minds in a manner that the spark of inquisitiveness is kindled and the ability to question and seek answers is generated. In addition to imparting high-quality education “character building” and “personality development” figure out very high on our priority list. Grooming the youth to become responsible citizens and inculcating a spirit of mental as well as physical self-discipline is vital for the uplift of any society. It is, therefore, our utmost effort to mold our students into disciplined, motivated, and polished members of the community.

CRITERION-1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES

The self-assessment is based on several criteria. To meet each criterion several standards must be satisfied. This section describes how the standards of the Criterion 1 are met

Mission statement (Biochemistry)

To provide necessary skills and knowledge in applying Biochemistry and related subject's approaches for the solution of problems related to Health, Agriculture, Industry, forensic and modern technologies.

Documented measurable objectives of the program are as under:

- To excel in innovative scientific education and research
- To produce intellectual, highly committed, and diverse scientific manpower
- To engage in translational scientific research focused towards the benefit of humanity

Main elements of strategic plan to achieve mission and objectives

- We follow Differentiation Strategy by nurturing distinctive competence of quality education.
- We achieve differentiation by hiring visiting faculty from industry having strong theoretical background, practical expertise, and repute and also by development ofpermanent faculty.
- We differentiate ourselves by introducing modern disciplines (subjects).
- We conduct Study tours and Clinical Rotations at small scale to develop deep theoretical understanding.
- We orientate all the employees that how his or her job can affect the learning process of students and quality of education.

Table 2: Program Objective Assessment (BS Biochemistry)

Objectives	**How Measured**	**When Measured**	**Improvement Needs Identified**	**Improvement Made**
1- To excel in 2- innovative scientific education and research	Through exams, quizzes, presentations,practical and assignments	During and at the end of each semester	faculty in writing skills.	Emphasis on reading, Writing, learning and earning.
2- To produce intellectual, highly committed, and diverse scientific manpower	By assessing knowledge through presentations, practical performance and case studies.	During the semester	Informative camps in areas susceptible to Biochemistry related disorders.	Introduction of different dimensions of Biochemistry and Real Case studies.

3- To engage in translational scientific research focused towards the benefit of humanity	Through Final report after internship and clinical rotations in form of groups.	During the semester	Lack of confidence, task division and problems related to group conflicts	Practicing group leadership and resolving conflicts and focus on group project report

Program Learning Outcomes

All the students in BS Biochemistry program should be able to:

- Communicate well through presentations, oral discussions, review articles etc.
- Use enhanced knowledge and vision
- Apply basic knowledge of respective course subjects
- Use analytical skills for understanding broader issues
- Develop innovative mindset
- Pursue higher studies

Standard 1-2:

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

As the department of Biochemistrycommenced in FALL 2021, so none of the batches have graduated yet. This specific objective is not applicable to the department for now.

Standard-1-3:

The results of the program's assessment and the extent to which they are used to improve the program must be documented

The Results of program's assessment

Teacher Evaluation

Barani Institute of Sciences (BIS) offers Bachelor of Biochemistry in Life Sciences Department. The departments consist of 04 full time and 01 visiting faculty members along with 01 lab Lab-In charges. All of the faculty holds relevant academic degrees and are qualified in teaching at this level. The courses are carefully formulated, and appropriate teaching methodology is adopted. Full time faculty holds higher degrees. BIS has also hired Visiting Faculty Members to manage the workload and improve the quality of

education. Furthermore, the process of improving the level of education for full time faculty is being emphasized and the faculty is encouraged to acquire higher qualifications.

6 courses are taught in first and 6 courses in second semester of BS Biochemistry during the Fall-2021 to Spring- 2022 session by permanent and visiting faculty members. All these teachers were evaluated by the students at the end of the semesters in accordance with Teachers' Evaluation Proforma. The results are graphically presented on the following pages. Detail of individual performance of each teacher is illustrated with the help of a bar chart. Following is the list of questions asked in teacher's evaluation Performa. The bar chart describes the teacher'sevaluation for each question.

S No.	Questions
Q1	Instructor's preparedness for each class?
Q2	Instructor demonstrates knowledge of subject?
Q3	Whole course is completed?
Q4	Provision of additional material apart from text?
Q5	Citations are given according to current situations in Pakistan?
Q6	Subject matter is communicated effectively?
Q7	Students are shown respect and encouraged for class participation?
Q8	Conducive environment is maintained?
Q9	Timely arrival for class?
Q10	Class is left on time?
Q11	Fair examination?
Q12	Graded scripts are returned in a reasonable time?
Q13	Instructor was available for after class consultation?
Q14	Subject matter has increased students' knowledge of the subject?
Q15	Course objective requirements, procedures and grading criteria are clearly stated?
Q16	Integration of theoretical concepts with real world applications?
Q17	Assignments and exams cover the material presented in the course?
Q18	Course material is modern and updated?

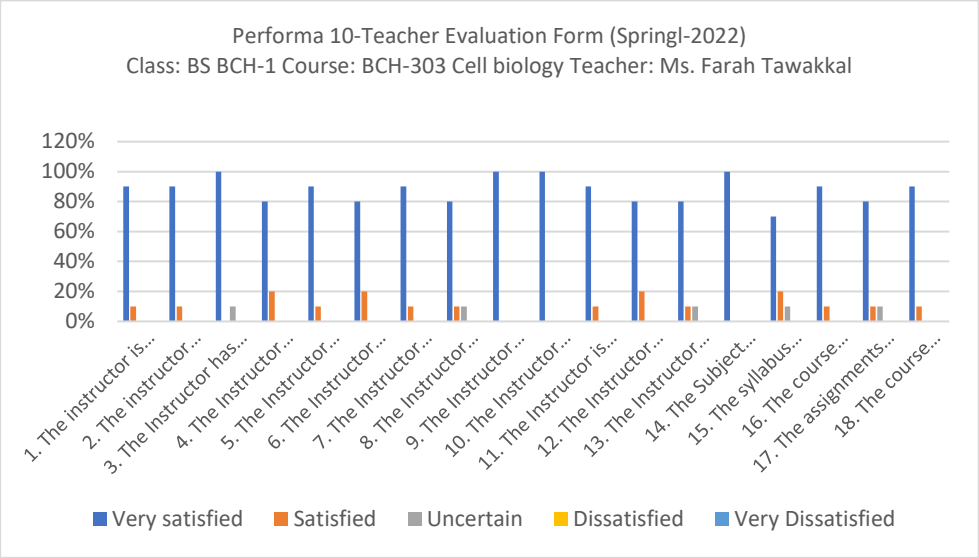
Program Assessment Results

This section contains the Teacher Assessment and Student Course Evaluation in summarizing form as well as in detail form.

Teacher Evaluation

Ms. Farah Tawakkal (BS Biochemistry 1st semester, Cell Biology, BCH-303)

Performa 10-Teacher Evaluation Form (Fall-2021) Class: BS BCH-1 Course: BCH-303 Cell biology Teacher: Ms. Farah Tawakkal					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	100%	0%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	90%	10%	0%	0%	0%
3. The Instructor has completed the whole course.	100%	0%	10%	0%	0%
4. The Instructor provides additional material apart from the text book.	80%	20%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	90%	10%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	100%	0%	0%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	90%	10%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%
9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	100%	0%	0%	0%	0%
11. The Instructor is fair in examination.	90%	10%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	80%	20%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	80%	10%	10%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	70%	20%	10%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	90%	10%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	80%	10%	10%	0%	0%
18. The course material is modern and updated.	90%	10%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Well-rehearsed
- Provides Relevant Material
- Updated with recent happenings and events

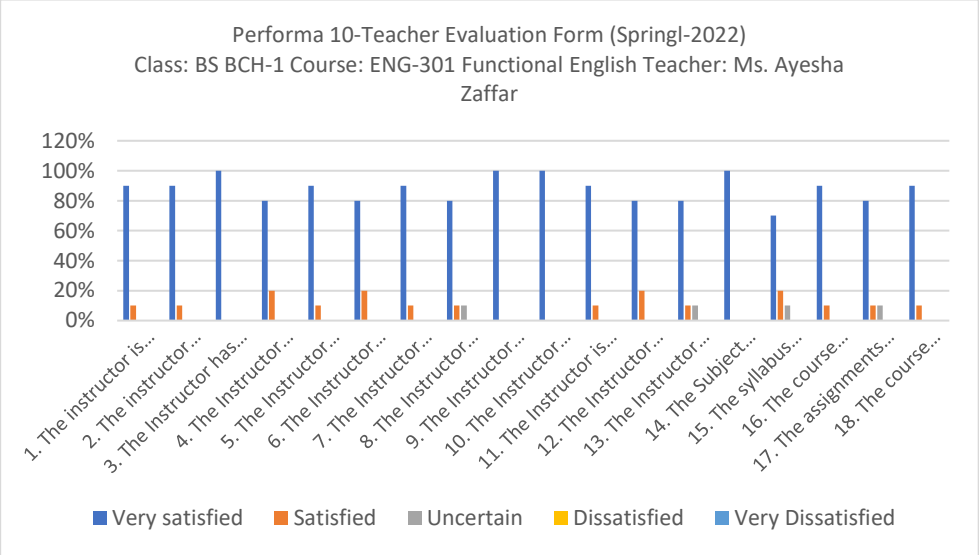
Weakness:

- No significant weakness was found

Ms. Ayesha Asghar (BS Biochemistry 1st semester, Functional English, ENG-301)

Performa 10-Teacher Evaluation Form (Fall-2021) Class: BS BCH-1 Course: ENG-301 Functional English Teacher: Ms. Ayesha Zaffar					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	90%	10%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	90%	10%	0%	0%	0%
3. The Instructor has completed the whole course.	100%	0%	0%	0%	0%
4. The Instructor provides additional material apart from the text book .	80%	20%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	90%	10%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	80%	20%	0%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	90%	10%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%
9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	100%	0%	0%	0%	0%
11. The Instructor is fair in examination.	90%	10%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	80%	20%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	80%	10%	10%	0%	0%

14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	70%	20%	10%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	90%	10%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	80%	10%	10%	0%	0%
18. The course material is modern and updated.	90%	10%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Communicates effectively
- Punctual
- Fair in examination

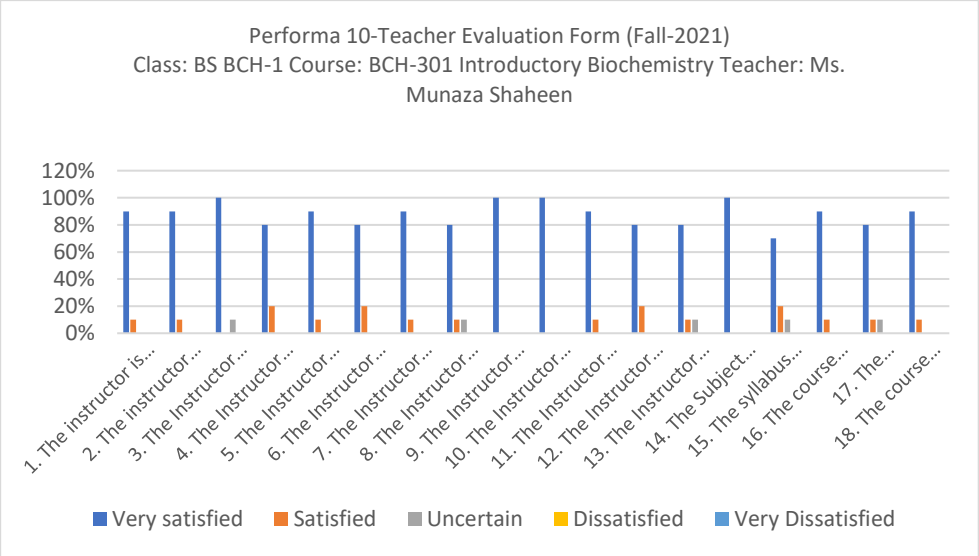
Weakness:

- No significant weakness was found

Ms. Munaza Shaheen (BS Biochemistry 1st semester, Introductory Biochemistry, BCH-301)

Performa 10-Teacher Evaluation Form (Fall-2021) Class: BS BCH-1 Course: BCH-301 Introductory Biochemistry Teacher: Ms. Munaza Shaheen					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	80%	20%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	75%	25%	0%	0%	0%
3. The Instructor has completed the whole course.	90%	10%	0%	0%	0%
4. The Instructor provides additional material apart from the text book.	75%	25%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	100%	0%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	80%	10%	10%	0%	0%

7. The Instructor shows respect towards students and encourages class participation	80%	10%	10%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	75%	25%	0%	0%	0%
9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	90%	10%	0%	0%	0%
11. The Instructor is fair in examination.	75%	25%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	100%	0%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	75%	25%	0%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	75%	25%	0%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	75%	25%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	100%	0%	0%	0%	0%
18. The course material is modern and updated.	75%	25%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Maintains conducive environment
- Respects students
- Well-rehearsed

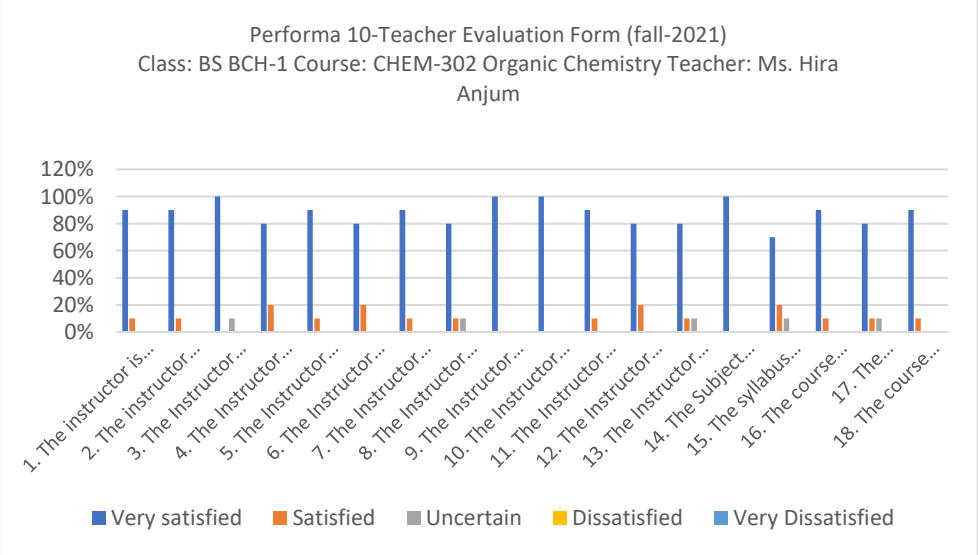
Weakness:

- No significant weakness was found

Ms. Hira Anjum (BS Biochemistry 1st semester, Introductory Biochemistry, CHEM-302)

Performa 10-Teacher Evaluation Form (Fall-2021) Class: BS BCH-1 Course: CHEM-302 Organic Chemistry Teacher: Ms. Hira Anjum

Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	90%	10%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	90%	10%	0%	0%	0%
3. The Instructor has completed the whole course.	90%	0%	10%	0%	0%
4. The Instructor provides additional material apart from the text book.	80%	20%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	90%	10%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	80%	20%	0%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	90%	10%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%
9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	100%	0%	0%	0%	0%
11. The Instructor is fair in examination.	90%	10%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	80%	20%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	80%	10%	10%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	70%	20%	10%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	90%	10%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	80%	10%	10%	0%	0%
18. The course material is modern and updated.	90%	10%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

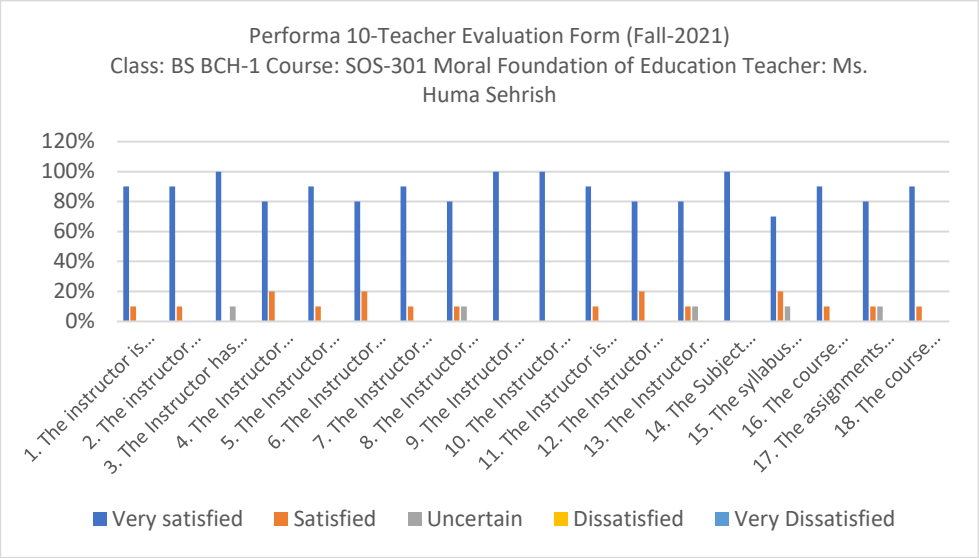
- Good pace
- Encourages class participation
- Respects Students

Weakness:

- No significant weakness was found

Ms. Huma Sehrish (BS Biochemistry 1st semester, Moral Foundations of Education, SOS-301

Performa 10-Teacher Evaluation Form (Fall-2021) Class: BS BCH-1 Course: SOS-301 Moral Foundations of Education Teacher: Ms. Huma Sehrish					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	90%	10%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	80%	10%	10%	0%	0%
3. The Instructor has completed the whole course.	70%	20%	10%	0%	0%
4. The Instructor provides additional material apart from the text book.	75%	25%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	100%	0%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	80%	10%	10%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	80%	10%	10%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%
9. The Instructor arrives on time.	90%	10%	0%	0%	0%
10. The Instructor leaves on time.	90%	10%	0%	0%	0%
11. The Instructor is fair in examination.	70%	20%	10%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	90%	10%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	95%	5%	0%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	80%	10%	10%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	80%	20%	0%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	90%	10%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	80%	20%	0%	0%	0%
18. The course material is modern and updated.	75%	25%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Good pace
- Provides Relevant Material
- Respects Students

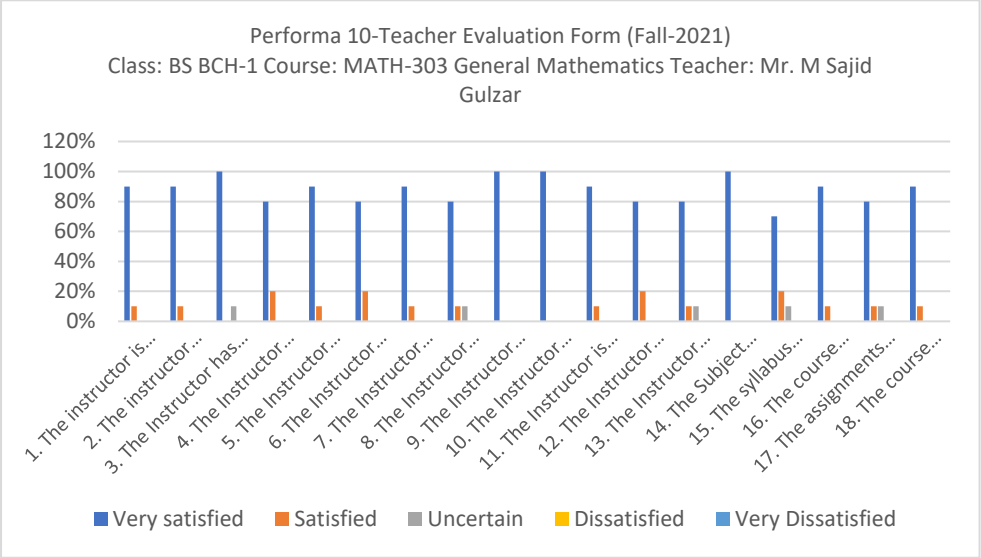
Weakness:

- No significant weakness was found

Mr. M Sajid Gulzar (BS Biochemistry 1st semester, General Mathematics, MATH-303)

Performa 10-Teacher Evaluation Form (Fall-2021) Class: BS BCH-1 Course: MATH-303 General Mathematics Teacher: Mr. M Sajid Gulzar					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	100%	0%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	80%	10%	10%	0%	0%
3. The Instructor has completed the whole course.	80%	10%	10%	0%	0%
4. The Instructor provides additional material apart from the text book.	90%	10%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	100%	0%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	80%	10%	10%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	80%	10%	10%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%
9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	90%	10%	0%	0%	0%
11. The Instructor is fair in examination.	80%	20%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	100%	0%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	100%	0%	0%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%

15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	80%	20%	0%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	90%	10%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	80%	20%	0%	0%	0%
18. The course material is modern and updated.	90%	10%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Good pace
- Provides Relevant Material
- Respects Students

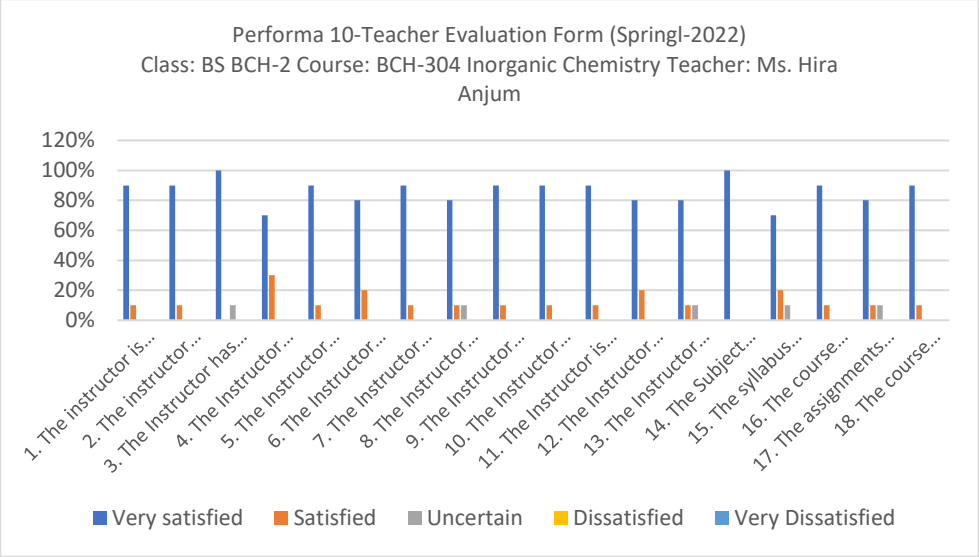
Weakness:

- No significant weakness was found

Hira Anjum (BS Biochemistry 2nd semester, Inorganic Chemistry, BCH-304)

Performa 10-Teacher Evaluation Form (Spring-2022) Class: BS BCH-2 Course: BCH-304 Inorganic Chemistry Teacher: Ms. Hira Anjum					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	90%	10%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	90%	10%	0%	0%	0%
3. The Instructor has completed the whole course.	100%	0%	0%	0%	0%
4. The Instructor provides additional material apart from the text book.	80%	20%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	80%	10%	10%	0%	0%
6. The Instructor communicates the subject matter effectively	90%	10%	0%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	90%	10%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%

9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	80%	10%	10%	0%	0%
11. The Instructor is fair in examination.	90%	10%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	100%	0%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	80%	10%	10%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	90%	10%	0%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	80%	20%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	70%	30%	0%	0%	0%
18. The course material is modern and updated.	80%	10%	10%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Fair in examination
- Punctual
- Respects Students

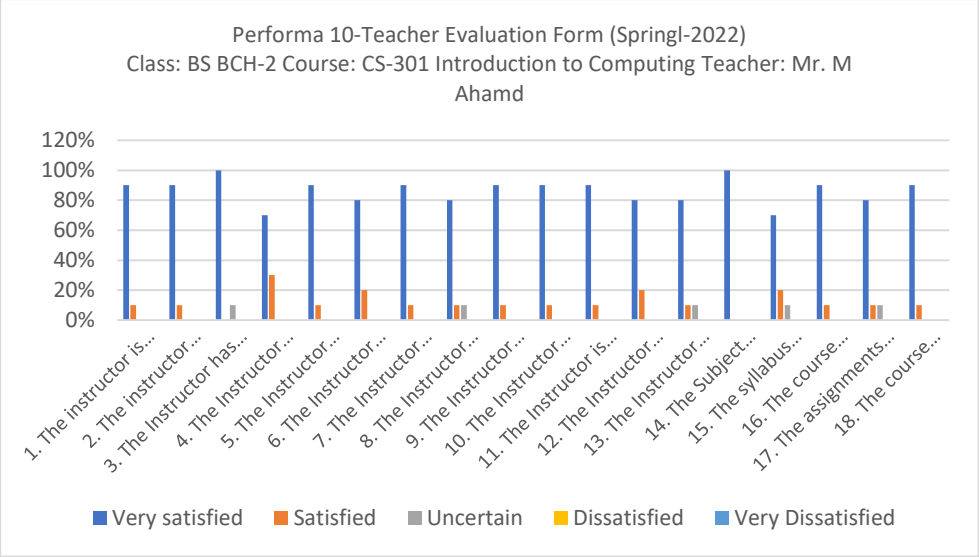
Weakness:

- Material part from textbook is not provided

Mr. Muhammad Ahmad (BS Biochemistry, 2nd sem, Introduction to Computing, CS-301)

Performa 10-Teacher Evaluation Form (Spring-2022) Class: BS BCH-2 Course: CS-301 Introduction to Computing Teacher: Mr. M Ahamd					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	90%	10%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	90%	10%	0%	0%	0%
3. The Instructor has completed the whole course.	80%	10%	10%	0%	0%

4. The Instructor provides additional material apart from the text book.	80%	20%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	70%	30%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	80%	20%	0%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	90%	10%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%
9. The Instructor arrives on time.	90%	10%	0%	0%	0%
10. The Instructor leaves on time.	90%	10%	0%	0%	0%
11. The Instructor is fair in examination.	90%	10%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	80%	20%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	80%	10%	10%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	70%	20%	10%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	80%	20%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	80%	20%	0%	0%	0%
18. The course material is modern and updated.	80%	10%	10%	0%	0%



General Comments of the Students about the Teacher Strengths:

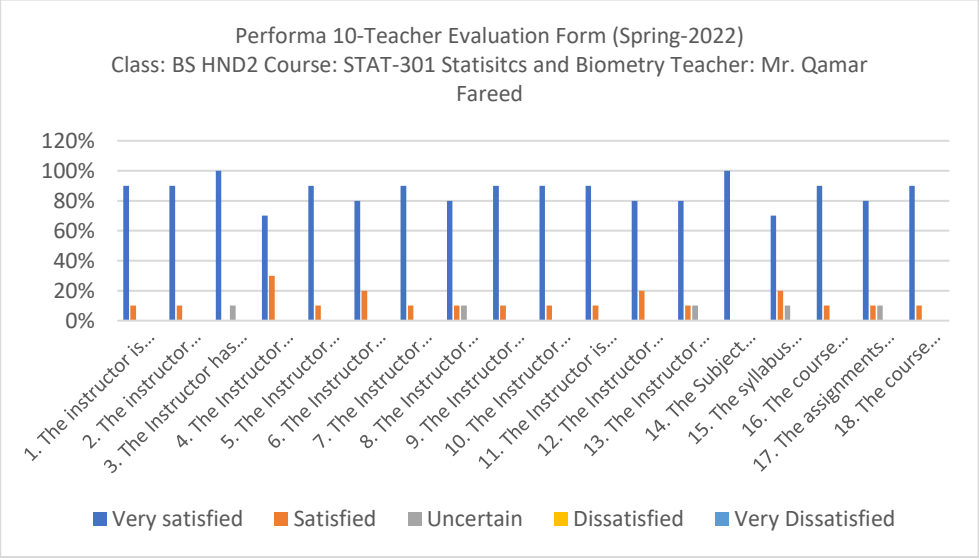
- Fair in examination
- Punctual
- Respects Students

Weakness:

- Not available after class

Muhammad Qamar Fareed (BS Biochemistry 2nd sem, Statistics and Biometry, STAT-301)

Performa 10-Teacher Evaluation Form (Spring-2022) Class: BS HND-2 Course: STAT-301 Statistics and Biometry Teacher: Mr. Qamar Fareed					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	80%	10%	10%	0%	0%
2. The instructor demonstrates knowledge of the subject.	75%	25%	0%	0%	0%
3. The Instructor has completed the whole course.	100%	0%	0%	0%	0%
4. The Instructor provides additional material apart from the text book.	75%	25%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	100%	0%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	75%	25%	0%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	100%	0%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	75%	25%	0%	0%	0%
9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	75%	25%	0%	0%	0%
11. The Instructor is fair in examination.	75%	25%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	100%	0%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	75%	25%	0%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	75%	25%	0%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	75%	25%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	100%	0%	0%	0%	0%
18. The course material is modern and updated.	75%	25%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

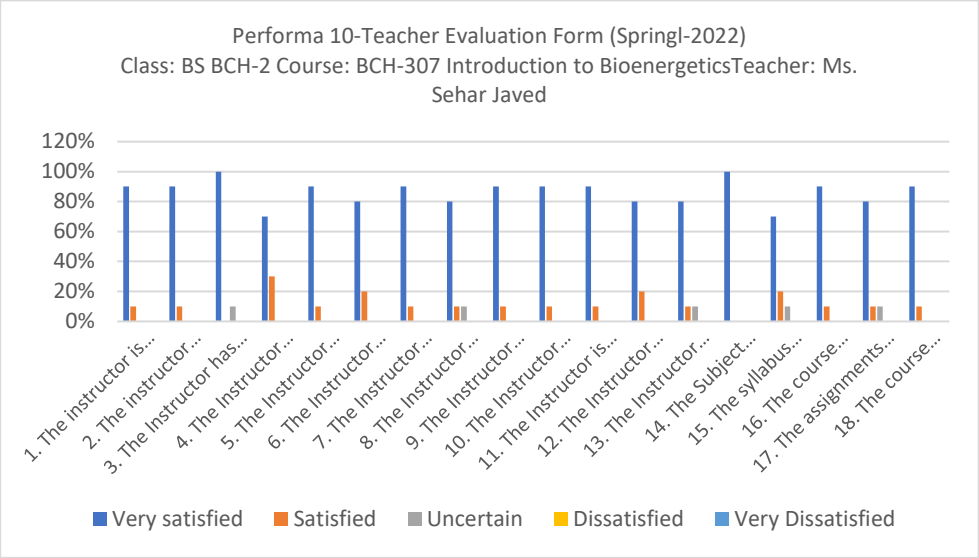
- Fair in examination
- Provides extra material than textbook
- Punctual

Weakness:

Nothing

Sehar Javed (BS Biochemistry 2nd semester, Introduction to bioenergetics, BCH-307)

Performa 10-Teacher Evaluation Form (Spring-2022) Class: BS BCH-2 Course: BCH-307 Introduction to Bioenergetics Teacher: Ms. Sehar Javed					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	90%	10%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	80%	10%	10%	0%	0%
3. The Instructor has completed the whole course.	100%	0%	0%	0%	0%
4. The Instructor provides additional material apart from the text book.	80%	20%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	80%	10%	10%	0%	0%
6. The Instructor communicates the subject matter effectively	80%	20%	0%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	90%	10%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%
9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	80%	10%	10%	0%	0%
11. The Instructor is fair in examination.	90%	10%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	100%	0%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	80%	10%	10%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	70%	20%	10%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	80%	20%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	80%	20%	0%	0%	0%
18. The course material is modern and updated.	80%	10%	10%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Fair in examination
- Maintains conducive environment
- Well-rehearsed

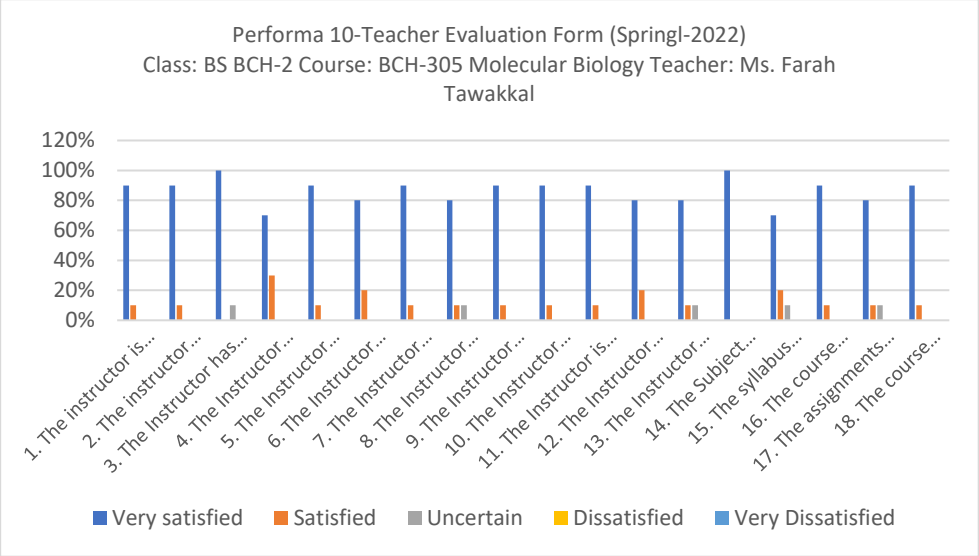
Weakness:

- Whole course is not completed

Farah Tawakkal (BS Biochemistry 2nd semester, Molecular Biology, BCH-305)

Performa 10-Teacher Evaluation Form (Spring-2022) Class: BS BCH-2 Course: BCH-305 Molecular Biology Teacher: Ms. Farah Tawakkal					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	100%	0%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	90%	10%	0%	0%	0%
3. The Instructor has completed the whole course.	100%	0%	0%	0%	0%
4. The Instructor provides additional material apart from the text book.	80%	20%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	100%	0%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	90%	5%	5%	0%	0%
7. The Instructor shows respect towards students and encourages class participation	100%	0%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	90%	10%	0%	0%	0%
9. The Instructor arrives on time.	100%	0%	0%	0%	0%
10. The Instructor leaves on time.	80%	10%	10%	0%	0%
11. The Instructor is fair in examination.	90%	10%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	100%	0%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	80%	10%	10%	0%	0%

14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	90%	10%	0%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	80%	20%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	100%	0%	0%	0%	0%
18. The course material is modern and updated.	90%	10%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Fair in examination
- Provides extra material than textbook
- Respects students
- Punctual

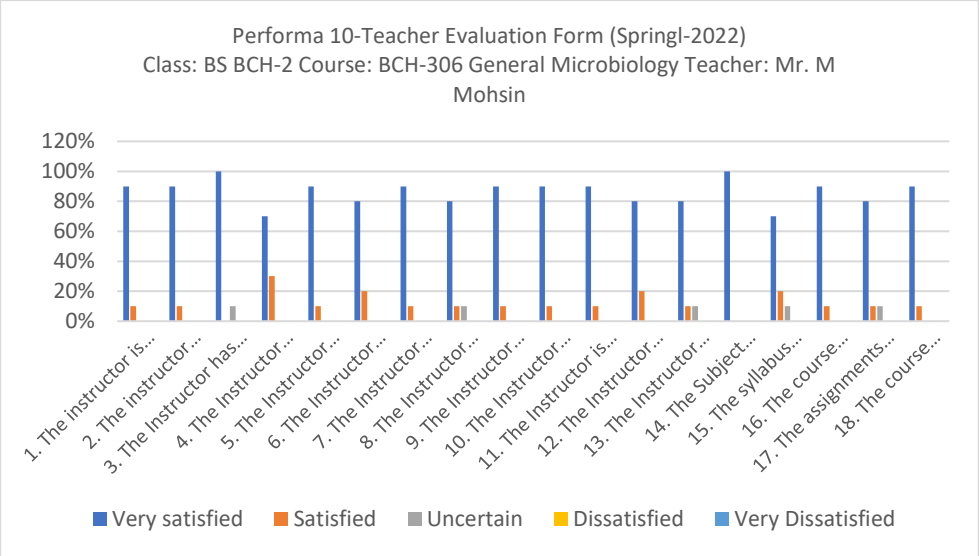
Weakness:

- No general Weakness found

Mohsin Abbas (BS Biochemistry 2nd semester, General Microbiology, BCH-306)

Performa 10-Teacher Evaluation Form (Spring-2022) Class: BS BCH-2 Course: BCH-306 General Microbiology Teacher: Mr. M Mohsin					
Question	Very satisfied	Satisfied	Uncertain	Dissatisfied	Very Dissatisfied
1. The instructor is prepared for each class.	90%	10%	0%	0%	0%
2. The instructor demonstrates knowledge of the subject.	90%	10%	0%	0%	0%
3. The Instructor has completed the whole course.	100%	0%	10%	0%	0%
4. The Instructor provides additional material apart from the text book.	70%	30%	0%	0%	0%
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	90%	10%	0%	0%	0%
6. The Instructor communicates the subject matter effectively	80%	20%	0%	0%	0%

7. The Instructor shows respect towards students and encourages class participation	90%	10%	0%	0%	0%
8. The Instructor maintains an environment that is conducive to learning.	80%	10%	10%	0%	0%
9. The Instructor arrives on time.	90%	10%	0%	0%	0%
10. The Instructor leaves on time.	90%	10%	0%	0%	0%
11. The Instructor is fair in examination.	90%	10%	0%	0%	0%
12. The Instructor returns the graded scripts etc. in a reasonable amount of time.	80%	20%	0%	0%	0%
13. The Instructor was available during the specified office hours and for after class consultations.	80%	10%	10%	0%	0%
14. The Subject matter presented in the course has increased your knowledge of the subject.	100%	0%	0%	0%	0%
15. The syllabus clearly states course objectives requirements, procedures and grading criteria.	70%	20%	10%	0%	0%
16. The course integrates theoretical course concepts with real-world applications.	90%	10%	0%	0%	0%
17. The assignments and exams covered the materials presented in the course.	80%	10%	10%	0%	0%
18. The course material is modern and updated.	90%	10%	0%	0%	0%



General Comments of the Students about the Teacher Strengths:

- Fair in examination
- Provides extra material than textbook
- Well-rehearsed

Weakness:

- Additional material is not provided

Standard-1-4:

<u>The department must assess its overall performance periodically using quantifiable measures.</u>

Intellectual skills of faculty members are manifested by 3 camps and 2 seminars in semester

Fall-21 to Spring-22.

Table 3: Present performance measures for activities

Faculty	Camp	Seminar	Publication
Farah Tawakkal	1	-	1
Munaza Shaheen		-	1
Sehar Javed	-		-
Total	1	0	2

Major Future Improvement Plans

- To impart quality education using audio visual aids along with provision of latest literature Cases, journals, books, reviews and access to digital library.
- To develop Human nutritionists and Microbiologists who meet future challenges.
- To emphasize research on various clinical and practical issues of national as well as international importance.
- Overall enhancement of knowledge and skills of faculty members in relation to the latest global advancements in this discipline through exchange programs, short training and collaborative research projects within and outside Pakistan.

Strengths of Program/Institute

The course curriculum is well designed and updated. The institute has hired new faculty members to meet the needs of the students. The curriculum is up to date.

Weakness of Program/Institute

There should be more sitting place on the campus in extreme summer weather for the visiting faculty.

Survey of Graduating Students

As the Department of Biochemistry were initiated recently in year 2021, so no students have graduated yet thus no survey of graduating students is available.

Alumni Survey

As the Department of Biochemistry were initiated recently in year 2021, so no students have graduated yet thus no Alumni survey is available.

Employer Survey

As the Department of Biochemistry were recently in year 2021, thus Employer Survey is not applicable in this case.

CRITERION-2: CURRICULUM DESIGN AND ORGANIZATION

Degree Title: BS Biochemistry

Purpose:

BIS being an affiliate of PMAS-AAUR follows the curriculum of University Institute of Biochemistry and Biotechnology (UIBB). This body is authorized to formulate syllabus and course content. The director of the UIBB chairs the meetings of this body. The curriculum is then submitted to the University Academic Council for approval. All the changes, modifications, additions, and deletions with respect of the curriculum must be approved by the academic council before they are adopted for implementation.

Credit Hour Requirements:

Minimum course requirement is 130 credit hours.

Degree Plan:

Students are admitted on open merit based on their previous academic record and an entry test. The minimum duration of studies is 8 semesters (4 academic years) and maximum12 semesters (6 academic years).

Pre-requisites: minimum academic requirements

- A Person (Male/Female) holding Intermediate Certificate, (Pre-Medical) or any equivalent certificate from any recognized Institute / College with at least 50% marks

shall be eligible for admissions.

- Admission will be on open merit basis based on marks obtained in last degree.
- Age: a candidate must not be more than 23 years of age on its October of the year of admission provided that the vice chancellor may relax age limit is very exceptional case.

Academic Standing:

- Maximum grade point average 4.00
- Minimum grade point average for obtaining the degree 2.50
- To remain on the role of university a student shall be required to maintain thefollowing minimum CGPA otherwise he/she shall be ceased on the university role.
- A student who maintains the minimum GPA/CGPA for promotion and merits the requirements will be promoted to the next semester.
- A student who does not meet the requirements made repeat the whole semester once only. The course creates that student earns in the repeated semester shall replace the previously earned course grades.
- During the specified minimum duration for completing the degree, a student may repeat that course of the previous semester in which he/she secured the grade "F" provided the course load does not exceed the maximum limit of credit hours in a semester. Repetition of lowest grades will be allowed after completing last semesterif, the CGPA is less than the degree requirements.
- In the 8th semester if, a student fails to achieve the 2.5 CGPA, he/she must repeat the course / courses with F & D Grades, so as to make CGPA of 2.5 within the maximum time period allowed for the degree.

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

a) Theory

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

Mid Examination	30%
Assignments/Quizzes	10%
Final Examination	60%

b) Practical

For practical examination (if applicable) 100% weightage (for the practical part) is given to the practical examination in the final.

Eligibility for Examination:

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

Scheme of studies and course contents of BS Biochemistry

Scheme of studies for BS Biochemistry is given in the table below. Detailed course contents of under-graduate scheme of studies is given in Annexure 1.

Table 5: Scheme of studies for BS Biochemistry

Semester I

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-301	Introductory Biochemistry	3(2-2)
2	BCH-302	Organic Chemistry	3(2-2)
3	BCH-303	Cell Biology	3(2-2)
4	ENG-301	Functional English	3(3-0)
5	SOS-301	Moral Foundations of Education	2(2-0)
6	MATH-303	General Mathematics	3(3-0)

Semester II

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-304	Inorganic Chemistry	3(2-2)

2	BCH-305	Molecular Biology	3(2-2)
3	BCH-306	General Microbiology	3(2-2)
4	BCH-307	Introduction to bioenergetics	2(2-0)
5	CS-301	Introduction to Computing	3(2-2)
6	STAT-301	Statistics and Biometry	3(3-0)

Semester III

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-401	Nucleic Acid	2(2-0)
2	BCH-402	Amino Acids and Proteins	3(2-2)
3	BCH-403	Carbohydrates	3(2-2)
4	BCH-404	Lipids	3(3-0)
5	ENG-302	Communication Skills	3(3-0)
6	IS/ET-401	Islamic Studies/Ethics	2(2-0)

Semester IV

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-405	Principles of Genetics	3(2-2)
2	BCH-406	Fundamentals of Enzymology	3(2-2)
3	BCH-407	Physical Chemistry	3(2-2)
4	BCH-408	Integrated Metabolism	2(2-0)
5	SSH-301	Pakistan Studies	2(2-0)
6	SOC-301	Introduction to Sociology	3(3-0)

Semester V

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-501	Genetic Engineering	3(2-2)
2	BCH-502	Protein Chemistry	2(2-0)
3	BOT-501	Plant Physiology	3(2-2)
4	BCH-503	Biochemical Techniques	3(1-4)
5	BCH-504	Biosafety and Ethics	2(2-0)
6	BCH-505	Bioinformatics	3(2-2)

Semester VI

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-506	Tissue and Cell Culture	3(2-2)
2	BCH-507	Biotechnology	3(2-2)
3	ZOOL-402	Human Physiology	3(3-0)
4	BCH-508	Cellular Signaling	3(3-0)
5	BCH-509	Biomembranes	2(2-0)
6	BCH-510	Plant Biochemistry	3(2-2)

Semester VII

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-601	Industrial Biochemistry	3(2-2)
2	BCH-602	Good Laboratory Practices & Quality Control	2(2-0)
3	BCH-604	Research Planning & Report Writing	3(1-4)
4	BCH-605	Nutritional Biochemistry	3(2-2)
5		Optional-I	3 (*-*)
6		Optional-II	3 (*-*)

Semester VIII

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-606	Immunology & Immunochemistry	3(3-0)
2	BCH-607	Current Trends in Biochemistry	3(3-0)
		Optional-III	3 (*-*)
		Optional-IV	3 (*-*)
3	BCH-620	Seminar	1(1-0)
4	BCH-621	Research Project/Internship	3(0-6)

Standard-2-1:

The curriculum must be consistent and support the program's documented objectives. The curriculum of Biochemistry (BS Biochemistry) is consistent with the objectives.

Standard-2-2:

Theoretical backgrounds, problem analysis and solution design must be stressed withinthe program's core material.

Programs' core material stresses the theoretical background, problem analysis and solution

design.

Standard-2-3:

The curriculum must satisfy the core requirements for the program, as specified by the respective accreditation body.

The curriculum satisfies the core requirements for the program, as specified by the respective accreditation body.

Standard-2-4:

The curriculum must satisfy the major requirements for the program as specified by HEC, the respective accreditation body/councils.

The curriculum satisfies the basic requirements of HEC by following the structure andoutlines of courses provided by HEC and with the academic council. However, efforts are being made to add value from time to time.

Standard-2-5:

The curriculum must satisfy general education, arts, and professional and other discipline requirements for the program, as specified by the respective accreditation body/ council.

Our curriculum satisfies professional requirements needed for professionals as per the HEC criteria.

Standard-2-6:

An Information Technology Component of the Curriculum Must Be Integrated Throughout the Program

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

- 1 IT course (03 credit hours) is included in the curriculum to fulfill the I.T. requirements for the students of BS Biochemistry.

- However, efforts are undertaken to add value from time to time.

Standard-2-7:

Enhancing Oral and Written Communication Skills of the students

The 2 courses aimed at enhancing communication skills have been integrated in the curriculum of BS Biochemistry.

- Assignments are given to students on specific titles (part of the course) which are presented orally and are submitted as written report, to increase their oral and written communication skills.
- As it is important to note that in all course students have to present at least one topic of their interest or on current topic in the form of presentation with the help of multimedia and or audio-visual aids.

CRITERION-3: LABORATORIES AND COMPUTING FACILITIES

The table contains the details of Biochemistry lab at Barani Institute of Sciences.

Biochemistry and Biotechnology Lab 1: Biochemistry lab

Lab Title:	Biochemistry Lab
Location and area:	Barani Institute of Sciences
Objectives:	For BS Biochemistry Students the objective of the lab is to develop the skills required for microbial Isolation, culturing, growth, media preparation, Identification and control, and to implement these skills clinically and professionally.
Courses Taught:	Microbiology, Biochemistry, Molecular Biology
Major Apparatus/Equipment:	Autoclave, Centrifuge, Micropipettes, Distilled water unit
Safety regulations:	Fire extinguisher has been Installed in the Labs.

Standards-3-1:

Laboratory manuals/documentation/instructions for experiments

The lab manuals are present for the students. However, some of the instructions are also hung on the lab's walls. The environment of the labs is good.

Standard-3-2:

There must be support personnel for instruction and maintaining the Facility

Three lab Instructors are available for instructing the students, issuing the glass wares, maintenance of equipment used in Laboratories and assisting the teachers for demonstrations and practical.

Standard-3-3:

The University computing infrastructure and facilities must be

Computing Facility Support: All the facilities related to computing are available to all faculty members and students for pursuingBS Biochemistry programs.

Computing Infrastructure: Five computing labs are there in the campus. There are total 250 computers in the labs and also available for the faculty and some of the management staff.

CRITERION 4: STUDENT SUPPORT AND ADVISING

The support programs and facilities are organized by the Students' Facilitation Centre and other management staff from time to time. The information about the admissions, schemes about different scholarships and about different conferences and seminars are given by the Students' Facilitation Centre and other management staff. The other activities like cultural, sports and other activities are done by different societies headed by the faculty members and manager student affairs. Moreover, other than Students' Facilitation Centre, faculty members are also involved in solving students' problems. Faculty members also provide guidelines and support services to the students for the completion of the degree and move to the suitable pathtowards a successful career.

Standard-4-1:

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

The courses are according to the approved curriculum as followed by the Arid Agriculture University Food and Nutritional Sciences Department, Biochemistry and Biotechnology Department and HEC criteria are followed strictly. The institution has intake twice a year and the courses are offered twice a year. Therefore, if a student fails in certain courses, he/she can take it in the next semester.

Standard-4-2:

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

Students are prepared for the upcoming challenges by focusing on both theoretical and practical facets of different courses. Projects and assignments are given based on theoretical problems and what they practically face those problems in their daily life as well as they will during their career. The courses are structured and decided in the faculty meetings.

- Faculty members interact with the students frequently to enhance the culture of asking questions in the class and after class.

Standard-4-3:

Guidance on how to complete the program must be available to all students and access to qualified advising must be available to make course decisions and career choices.

Proper guidelines are provided to the students by the Students' Facilitation Centre andFaculty members. Different steps have been taken to provide the proper guidelines to the students:

- The details of the admission and courses are provided to the students in the printed form, for example Prospectus and pamphlets.
- The program and fee structure are also provided on the website www.baraniinstitute.edu.pk
- The Students' Facilitation Centre, Food and Nutritional Sciences Department and Biochemistry and Biotechnology Department help the students and inform the students on the regular basis about the program requirements.
- Students and teachers communicate and interact frequently with each other.
- Students can also contact the teachers and relevant supervisors where they face any problem.
- The job placements are also done by the institution for their students. Moreover, jobs advertisements are shared on the social media and different groups which can be helpful for the students.

Table 7: Student to Teacher Ratio at BIS

Fall 2021- Spring 2022
1.7

CRITERION 5: PROCESS CONTROL

This chapter deals with the admission, faculty recruitment, registration processes and other such activities.

Standard-5-1:

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

The admission process is according to the rules and criteria established by the University following the rules and regulations of HEC. For this purpose, the advertisement is published in the national newspapers and social media by the Social Media Team

- Admissions are done twice a year in sessions Spring and Fall.
- The criteria for BS Biochemistry are Intermediate with second division (50% marks), however, the admissions are awarded on first come first serve basis.
- The criteria for admissions are reviewed every year in academic council before the announcement and if any changes and modifications are required, it needs to be approved first. The priority is also given to the students with good percentage in their Intermediate exams.

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

The students' name, after completion of the admission process, is forwarded to the Registrar's office of PMAS-AAUR for proper registration in the specific program and the registration number is issued to the student.

Registration is done one time for each degree, but evaluation is done through the result of each semester. Only those students, who fulfil the criteria of the University, are promoted to the next semester.

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 the institution's mission statement. These processes must be periodically evaluated to ensure that it is meeting with its objectives.

- The recruitment policy for the faculty followed by the BIS is the same as recommended by the PMAS-AAUR. Induction of all posts is done as per rules.
- Vacancies and newly created positions are advertised in the national newspapers, applications are received by the Department of Human Resource, scrutinized by the scrutiny committee, and call letters are issued to the shortlisted candidates on the basis of experience, qualification, publications and other qualities/activities as determined by the University.
- The candidates are interviewed by the Institute Selection Board, and CEO and alternate candidates are selected.
- Selection of candidates is approved by the Selection Committee for issuing orders to join within a specified period.
- Induction of new candidates depends upon the number of approved vacancies. The standard set by HEC/PMAS-AAUR is followed

Standard 5-4:

The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives.

The institute changed the curriculum on periodical basis to maintain and enhance the quality of teaching and other administrative processes for the provision of high-quality teaching and other services to the students. These changes are done according to the change in innovation and technology.

- The new courses are included and introduced in the curriculum on the basis of the demands and the emergence of new fields.
- The library of the BIS makes sure the availability of the books by International and expert authors on subjects related to the Food and Nutritional Sciences and Biochemistry and Biotechnology Courses. Documentations and internet facilities are also provided by the library.
- The handouts and other study materials are also provided to the students as supplements for almost all lectures.
- The efforts and aim are according to the vision and mission of the institute followed by the rules and regulations of HEC/PMAS-AAUR. Outcomes are regularly measured and evaluated in the staff meetings.

Standard 5-5:

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

The date of examinations is announced by the examination department. The results are notified and announced by the controller examination at the end of each semester. The evaluation of students is done with Finals, Mid-term, Quizzes and Assignments. Some teachers also evaluate students based on projects and presentations. The minimum passing marks for each course is 40 %. The breakup and marks distribution are given below:

Mid Examination 30%

Assignments 10%

Final Examination 60%

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

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 interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline.

Currently, there are 06 faculty members. BIS hired Visiting Faculty to meet the academic load and enhance the quality of education.

Table 8: Full Time and Visiting Faculty members in both departments

S. No.	Name	Position	Qualification	Specialization
1	Farah Tawakkal	Permanent Lecturer	M.Phil	Molecular Biology
2	Munaza Shaeen	permanent Lecturer	M.Phil	Biochemistry
3	Sehar Javed	Permanent Lecturer	M.Phil	Botany

4	Mohsin Abbas	Permanent Lecturer	M.Phil	Microbiology
5	Ayesha Asghar	Permanent Lecturer	M.Phil	English
6	Mr. Qamar	Permanent Lecturer	M.Phil	Statistics
7	Mr. Ahmad	Permanent Lecturer	M.Phil	Computer science
8	Mr. Sajid Gulzar	Permanent Lecturer	M.Phil	Mathematics
9	Hira Anjum	Visiting Lecturer	M.Phil	Organic Chemistry
10	Huma Sehrish	Visiting Lecturer	M.Phil	Sociology
11	Muhammad Yaqoob	Lab Incharge	Bioinformatics	Biochemistry

Standard 6-2:

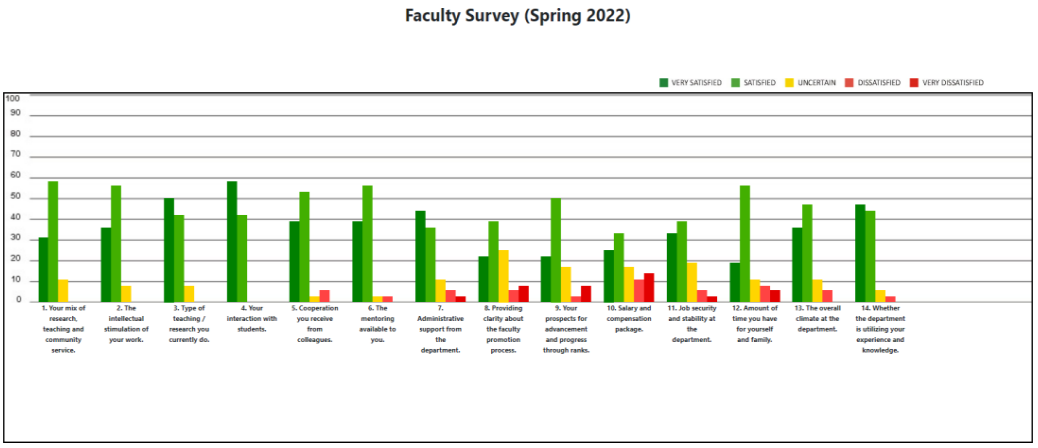
<u>All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place. Effective Programs for Faculty Development</u>

- Professional training and availability of adequate research and academic facilities are provided to the faculty members according to the available resources.
- Existing facilities include mainly internet access, which is available through local area network. In addition, library facility with latest books is also available.
- Financial support is provided by the institute for research activities like paper publications and conferences.

Standard 6-3:

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

Almost all the faculty members are fully satisfied with the workload and the amount they get in the form of salary. Most of the faculty members are satisfied with the mix of research and teaching method. The faculty members are satisfied with the support they are getting from the administration regarding the research and teaching. The faculty members are satisfied with overall climate of the institute. Most of the faculty members are satisfied that the institution is utilizing their capabilities in the maximum capacity.



CRITERION 7: INSTITUTIONAL FACILITIES

Standard- 7-1:

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

The faculty has access to internet and HEC digital library which is very helpful for the high-quality education and producing research of international standard. The institute has also developed its own digital library that provides online books of all courses.

Standard- 7-2:

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

The Institutes possesses well equipped library. Library has more than 5000 books relevant to Food and Nutritional Sciences and Biochemistry and Biotechnology. There are several local journals subscribed to help researchers in the department.

Standard- 7-3:

Class-rooms must be adequately equipped and offices must be adequate to enablefaculty to carry out their responsibilities.

- The office environment is comfortable to work during the summer as well as during winter.
- Classrooms have adequate size white boards that provide enough space to write.
- Multimedia projectors are available in every classroom.

CRITERION 8: INSTITUTIONAL SUPPORT

The BIS administration is continuously struggling to improve the quality education in every department.

Standard-8-1:

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

The institute currently has limited resources for the research. However, the following funds are provided as financial resources to attract and retain high qualified faculty.

Endowment Fund	48 Million
Tangible Assets	54 Million
Working Capital	61 Million
Total Assets	163 Million

Standard-8-2:

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

Below is the list of students in the BS Biochemistry program over Spring 2022. BIS is not accredited for a MS or PhD Degree.

Table 10: Number of students enrolled in BS Biochemistry till Spring 2022

Fall 2021
17

Standard-8-3:

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

Following is the detail of the institution's budget for maintenance, library holdings, laboratories, computing facilities and faculty development.

Table 11: Financial Information about the institution and the Program

LIB Holdings	Laboratories + Computer H/W	Computing (Software)	Total Assets
4.1M	10.2M	5.4M	19.7M

SUMMARY AND CONCLUSION

Barani Institute of Sciences (BIS) is an affiliate institute of the Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi (PMAS – AAUR). BIS was established in 2014 while BS Biochemistry was commenced in 2021. The institute has policies for intake in the program as per the rules prescribed by arid university.

a) Faculty: The institute has 04 full-time faculty members working as Assistant Professor and lecturers in Department of Food and Nutritional Sciences and Department of Biochemistry and Biotechnology.
b) Infrastructure: BIS has enough infrastructural facilities and are approved by the parent university.
c) Equipment: BIS is well equipped with the latest technology and is clear from university affiliation committee in terms of equipment required for BS Biochemistry.

The faculty members and students are encouraged to arrange workshops and seminars as a part of their academic and practical work to further enhance their professional abilities. BIS supports the new trends towards education such as e-learning including digital publications, journals, etc. The faculty and students have been provided with a full-time access to the e-library and internet through local area network, so that they have a ready access to many well-known journals relevant to their respective research areas. The overall student feedback about the department of Food and Nutritional Sciences is good. The facilities being providedfor learning are overwhelmed by our graduates. Student is also satisfied and often appraises the faculty teaching at BIS.

ANNEXURES

ANNEXURE 1: SCHEME OF STUDIES AND DETAILED COURSE CONTENTS

Detailed course contents of BS Biochemistry

Semester I

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-301	Introductory Biochemistry	3(2-2)
2	BCH-302	Organic Chemistry	3(2-2)
3	BCH-303	Cell Biology	3(2-2)
4	ENG-301	Functional English	3(3-0)
5	SOS-301	Moral Foundations of Education	2(2-0)
6	MATH-303	General Mathematics	3(3-0)

ENG-301 Functional English 3(3-0)

Objectives:

Enhance language skills and develop critical thinking.

Course Contents:

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

Note: Extensive reading is required for vocabulary building

Recommended Books:

Functional English

a). Grammar

3. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492
4. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506

b). Writing

3. 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

4. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary

Skills. Third Impression 1992. ISBN 0 19 453402 2.

d). Speaking

BCH-301 INTRODUCTORY BIOCHEMISTRY 3(2-2)

Course Outline:

- A general introduction to the science of biochemistry;
- Importance and the scope of biochemistry
- Prebiotic molecular evolution and rise of living systems;
- Review of the variety and ecology of the living world;
- Forms, functions and brief classification of prokaryotes;
- Cellular architecture and diversity of eukaryotes;
- Structure, physical properties and importance of water; pH and buffer
- Unique properties of carbon and other elements found in biological molecules;
- General reactions of different functional groups;
- Biologically important organic compounds
- Composition, properties and functions of proteins, carbohydrates, lipids and nucleic acids
- Brief introduction of vitamins, hormones and enzymes

Practical:

- Safety measures in laboratory
- Preparation of solutions routinely used in biochemical experiments (e.g., percent, normal and molar solutions)
- pH determination using various methods
- Preparation of buffers Recommended

Books:

- Fundamentals of Biochemistry. (2008) 3rd Ed. by D. J. Voet, G.J. Voet and C. W. Pratt. J. Wiley & Sons Inc.
- Text Book of Biochemistry (1970) by E. West & W. Todd Macmillan.
- Biochemistry. (1999) 3rd Ed. by C. K. Mathews, K. E. Van Holde, & K.G. Ahern. Prentice Hall.
- Harper's Illustrated Biochemistry, 27th Ed. by R.K. Murray, D.K. Grannar, V.W. Rodwell. McGraw-Hill.

- Lehninger Principles of Biochemistry (2008) 5th Ed. by D. L. Nelson, M. M. Cox. W. H. Freeman Publishers

BCH-302 Organic Chemistry 3(2-2)

Course Objective:

- To offer basic concepts of organic chemistry
- To develop understanding of hydrocarbons, reactivity of functional groups and stereochemistry
- To impart practical skills

Course Outline:

- Bonding and hybridization, localized and delocalized bonding, aromaticity, inductive effect, dipole moment, resonance and its rules, hyper-conjugation, classification and nomenclature of organic compounds.
- Different types of organic reactions and mechanism.
- Saturated, unsaturated and aromatic hydrocarbons with emphasis on synthesis and free radical, electrophilic addition and substitution reactions.
- Hydroxyl, ether and amino groups, preparation and properties of alcohols, phenols, ethers, and amines.
- Reaction mechanism and applications.
- Carbonyl compounds, preparations and reaction mechanism of aldehydes and ketones and their applications.
- Carboxylic acids and their derivatives, acidity of carboxylic acids and effect of substituents on their acidity, preparation and reactions of carboxylic acids and their derivatives including; esters, amides, acid halides and acid.
- Types of stereoisomers, RS and EZ notation, optical activity, stereoselectivity and stereo specificity, conformational analysis.

Practical:

- Qualitative analysis of compounds with different functional groups.
- Synthesis of organic compounds using as a tool for understanding techniques like reflux, distillation, filtration, recrystallization and yield calculation.
- Preparation of benzanilide from benzoyl chloride, succinic anhydride from succinic acid, phthalimide from phthalic anhydride, oximes and hydrazones from carbonyl compounds, and an ester from a carboxylic acid and alcohol, etc.

Recommended Books:

- ClaydenJ., Greeves N., and WarrenS., Organic Chemistry, Paperback Edition, Oxford University Press, 2012.
- Brown W., and Poon, T., Introduction to Organic Chemistry, 3rd ed., JohnWiley & Sons, Inc., (2005).
- John, E. M. Organic Chemistry, 8th ed., Brooks/Cole Publishing Co, USA, (2012).
- Younus M., A Textbook of Organic Chemistry, IlmiKitabKhana, Urdu Bazar, Lahore, Pakistan, (2006).
- Solomons T. W. G. and Fryhle C. B., Organic Chemistry, 10th ed., John-Wiley & Sons, Inc., (2011).
- Mayo D. W., Pike, R. M. and Forbes, D. C., Microscale Organic to Laboratory with Multistep and Multisacle Syntheses, 5th ed., John-Wiley & Sons, Inc., (2011).

BCH-303 Cell Biology 3(2-2)

Course Objective:

Gain knowledge of cell as a fundamental unit of life emphasizing the chemical basis of life.

Course Outline:

- Introduction to prokaryotic and eukaryotic cell differences including cell wall, membrane structure and chemical constituents of the cell.
- Composition and functions of lipid bilayer, transport across cell membrane and role of glycolipids and glycoproteins as receptors in cellular signaling.

The functions, isolation and molecular organization of cellular organelles specifically the endoplasmic reticulum, golgi bodies, ribosomes, lysosome, micro-bodies, mitochondria.

- The structure and function of chromosomes and role of nucleus in regulation of metabolism.
- The concept of cell cycle, mitosis and meiosis and cell death.
- Structure and function of cytoskeleton, centriole and function of cilia and flagella in cell movement
- Social organization, Social organization-Definition, meaning and forms, Social groups -Types and functions of groups, Social Institutions: forms, nature and inter-relationship.

Community: definition and forms (Urban and rural).

- Social change, Processes of social change, Social change and conflict, Social change and social problems, Resistance to social change.

- Human ecology, Ecological processes, Ecological problems of Pakistan.

Practical:

Microscopy and staining techniques;

- Study of prokaryotic, eukaryotic cells; cellular reproduction;
- Mitosis: smear/squash preparation of onion roots

Recommended Books:

- Katherine J Denniston, Joseph J Topping , Dr Danae Quirk Dorr, "General, Organic, and Biochemistry" 7th Edition, 2013,publisherBrooks Cole.
- Thomas M. Devlin. Wiley-Liss,"Textbook of Biochemistry with clinical correlation", 4th edition.
- Kim E. Barrett; Susan M. Barman; Scott Boitano&Heddwen L. Brooks, "Ganong's Review of Medical Physiology",25th edition 2015 lang (Mc Graw Hill)
- James R.Mckee and Trudy Mekee "Biochemistry an Introduction", 1966
- James R.Mckee and Trudy Mekee " Biochemistry the molecular basis of life" 6th edition 2012 Oxford University Press.

James W. Baynes and MH Dominiczak, "Medical Biochemistry 3rd Edition 2012.

- Micheal L. Lieberman, Allan-D .Marks, Colleen M Smith 2007 Ëssential Medical Biochemistry (A clinical Approach)" Lippincott William & Wilkins. 8. Clinical Biochemistry E-Book: An Illustrated Colour Text,by Allan Gaw 3rd edit 2014 Churchill livinstone

SOS-301 Moral Foundations of Education 2(2-0)

Objectives

- The course is designed to introduce the basic concepts of sociology with particularreference to environment and social relationships.
- It provides understanding of the role of human being in creating and recreating theenvironment.
- It evaluates the development and environment relationships, environmental policiesand environmental movements with referenceto environmental issues.

Course Detail

Introduction: Sociology, the Science of Society, Scope and significance, Fields ofSociology, Sociology and other Social Sciences.

Social interaction and social structure, Social Interaction, the Nature and Basis ofSocial Interaction.

- Social Processes, Social Structure, Status, Roles, Power and Authority and RoleAllocation.
- Culture, Meaning and nature of culture, Elements of culture, Norms, values, beliefs,sanctions, and customs.

Culture and Socialization Formal and non-formal socialization, and Transmission ofCulture.

Cultural Lag. Cultural Variation, Cultural Integration, Cultural Evolution, CulturalPluralism Culture

and personality.

Deviance and social control, Deviance and conformity, Mechanism and techniques ofsocial control, Agencies of social control.

- Social organization, Social organization-Definition, meaning and forms, Social groups -Types and functions of groups, Social Institutions: forms, nature and internship.

MATH-303 Mathematics-I 3 (3-0)

Course Outline:

Preliminaries: Real-number system, complex numbers, introduction to sets, set operations, functions, types of functions. Matrices: Introduction to matrices, types, matrix inverse, determinants, system of linear equations, Cramer's rule.

Quadratic Equations: Solution of quadratic equations, qualitative analysis of roots of a quadratic equations, equations reducible to quadratic equations, cube roots of unity, relation between roots and coefficients of quadratic equations.

Sequences and Series: Arithmetic progression, geometric progression, harmonic progression. Binomial Theorem: Introduction to mathematical induction, binomial theorem with rational and irrational indices. Trigonometry: Fundamentals of trigonometry, trigonometric identities.

Recommended Books:

1. Dolciani MP, Wooton W, Beckenback EF, Sharron S, *Algebra 2 and Trigonometry*, 1978, Houghton & Mifflin, Boston (suggested text)
2. Kaufmann JE, College *Algebra and Trigonometry*, 1987, PWS-Kent Company, Boston
3. Swokowski EW, *Fundamentals of Algebra and Trigonometry* (6^{th} edition), 1986

Semester -II

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-304	Inorganic Chemistry	3(2-2)
2	BCH-305	Molecular Biology	3(2-2)
3	BCH-306	General Microbiology	3(2-2)
4	BCH-307	Introduction to bioenergetics	2(2-0)
5	CS-301	Introduction to Computing	3(2-2)
6	STAT-301	Statistics and Biometry	3(3-0)

BCH-304 Inorganic Chemistry 3(2-2)

Objectives

1. To provide an overview of fundamental topics in inorganic chemistry
2. To give understanding of underlying concepts of chemical bonding, acid base equilibria, p-block elements and stoichiometry
3. To galvanize the practical approach against the prescribed content.

Course Detail

Chemical Bonding:

- Types of chemical bonding, ionic and covalent bonding, localized bond approach.
- Theories of chemical bonding, valence bond theory (VBT), hybridization and resonance, prediction of molecular shapes using Valence Shell Electron Pair Repulsion (VSEPR) model, molecular orbital theory (MOT) application on diatomic molecules, delocalized approach to bonding, bonding in electron deficient compounds, hydrogen bonding.

Acids and Bases:

- Brief concepts of chemical equilibrium, acids and bases including soft and hard acids and bases (SHAB).
- Concept of relative strength of acids and bases, significance of pH, pKa, pKb and buffer solutions.
- Theory of indicators, solubility, solubility product, common ion effect and their industrial applications. P-Block Elements:
- Physical and chemical properties of p-block elements
- Representative compounds, inter-halogens, pseudo-halogens and polyhalides.

Stoichiometry:

- Atomic masses, mole, molar mass, percentage composition, balancing equations.
- Determining the formula of a compound, stoichiometric calculations; reactants and products, calculation involving rate limiting reactant. characterization.
- Control of microorganisms by physical and chemical methods.
- Chemotherapeutic agents and antibiotics. Modes of action of antibiotics on microorganisms.
- Basic properties of fungi, protozoa and algae
- A brief introduction to structure and propagation of viruses andbacteriophages.

Practical

- Lab safety and good laboratory practices, material safety data sheets (MSDS).

- Disposal of chemical waste and first-aid practices.
- Qualitative analysis of salt mixtures.
- Quantitative analysis through acid-base titrations.
- Preparation and standardization of acid and alkali solutions.
- Redox titrations; preparation and standardization of potassium permanganate solution and its use for the determination of purity of commercial potassium oxalate or oxalic acid, preparation and standardization of sodium thiosulfate solution and its use in determination of copper in a given sample.
- Gravimetric analysis; determination of barium in a given sample, determination of chloride in a given solution.

Recommended Books:

- Cotton, F. A. and Wilkinson, G., Advanced Inorganic Chemistry, 6th ed., John-Wiley & Sons, New York, (2007).
- Huheey, J. E., Inorganic Chemistry: Principles of Structure and Reactivity, 3rd ed., Harper International SI Edition, (2006).
- House, J. E., Inorganic Chemistry, Academic Press. USA, (2008).
- Lee, J. D., Concise Inorganic Chemistry, 5th ed., Chapman and Hall, (1996).
- Miessler, G. L., Tarr, D. A., Inorganic Chemistry, 3rd ed., Pearson Education, India, (2008).
- Huheey, J. E., Kieter E. A., Keiter L. R., Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed., Benjamin-Cummings Pub Co., (1993).
- Sharpe, A. G., Inorganic chemistry, 3rd ed., Pearson Education India, (1981).
- Chaudhary S. U., Ilmi Textbook of Inorganic Chemistry, Ilmi Kitab Khana, Lahore, (2013

BCH-305 Molecular Biology 3(2-2)

Course contents:

Introduction to molecular biology and history; Chemical and physical properties of nucleic acids, The structure and function of DNA, RNA and Proteins; prokaryotic and Eukaryotic genes and genome, DNA packaging in chromatin and regulation of chromatin structure; Structure of chromosomes; Evolution of genomes (nuclear and organelle genome); Central dogma of molecular biology; DNA replication; Transcription; Translation; DNA repair including description of types of DNA damage, various DNA polymerases anddifferent types of repair; DNA recombination; Transposable DNA elements.

Practicals:

1. Extraction and purification of nucleic acids from different sources(bacteria, blood, plants, animal tissues) etc.
2. Qualitative and quantitative analysis of nucleic acids.

Books:

1. Allison, L.A., 2011. Fundamental Molecular Biology. 2nd Edition. WileySons.
2. Gerald Karp, G., Janet Iwasa, J., Wallace Marshall, W., 2016. Karp's Celland Molecular Biology, 8th Edition .John Willey and Sons, Inc.
3. Kormann, M.S.D., 2016. Modern Tools for Genetic Engineering. Publisher: **InTech** Janeza Trdine 951000 Rijeka, Croatia - EuropeanUnion.
4. Kormann, M.S.D., 2016. Modern Tools for Genetic Engineering. Publisher: In Tech Janeza Trdine 951000 Rijeka, Croatia - EuropeanUnion.
5. Larramendy, M.L., and Soloneski, S., 2016. Nucleic Acids From Basic Aspects to Laboratory Tools Publisher: In Tech, Janeza Trdine 951000Rijeka, Croatia - European Union.
6. Lodish., H., Berk, A., Kaiser, C.A. M. Krieger, M., Bretscher, A., Ploegh,H., Martin, K., 2016. Molecular Cell Biology. 8th Edition. W.H. Freeman.
7. Old R. W. and Primrose, S.B.,1994. An Introduction to GeneticEngineering, Blackwell Scientific Publications.
8. Watson, J.D., Gann, A., Levine, M., Losicks, R., 2013. Molecular Biologyof the Gene. The Benjumen Cummings Publishing Company, California

Wilson, J. and Hunt, T., 2015. Molecular Biology of the Cell. 6th EditionGarlandSciences, Taylor and Francis.

BCH-306 General Microbiology-3(2-2)

Objectives

1. To know about the applications of the science of microbiology in the different fields of life.
2. The course may initiate students' interest in agricultural, industrial and/or environmental microbiology.

Course Detail

- Structure and chemical composition of nucleic acid. Role of RNA, DNA in protein synthesis
- Mode of reproduction: Cell division (prokaryote), mitosis and meiosis (eukaryote), bacterial mutation and variation. Introduction to the genetical intermixing of bacteria including transformation, transduction and conjugation.
- Introduction to metabolism and role of phosphorus in energy transfer.Glycolysis and T.C.A. cycle.

- Microbiology of water and wastewaters. Water as a source of infection and methods of water purification. Methods of sewage treatment anddisposal.
- Introduction to food and dairy microbiology. Methods of food preservation.
- Differentiation between food intoxication and food-infection.
- Microbiology of soil with particular reference to nitrogen cycle.
- Microbiology of air.

Practical

1. Isolation of Chromosomal DNA from E.coli.
2. Electophoresis of Microbial DNA.
3. Effect of UV light on phenotype and genotype of bacteria.
4. Enumeration of bacteria in drinking water, milk, soil and air.
5. Pure culture study of (on the basis of morphological, cultural and biochemical characteristics): *E. coli, Salmonella sp, Shigella sp, Staphyloccus aureus, S. epidermidis and S. fecalis, Corynebacterium.*
6. Microscopic study of *Leishmania, Entamoeba, Plasmodium and Giardia.*
7. MPN technique.

Recommended Books

1. Black, J. G. 2005. Microbiology: Principles & Explorations, 6th edition,John Wiley and Sons, N.Y.
2. Talaro,K. P. 2008. Foundations in Microbiology: Basic Principles,McGraw-Hill Companies, N.Y.
3. Tortora, G. J., Funke , B. R. and Case, C. L. 2008. Microbiology: an introduction 9th Edition, Pearson Education.
4. Tortora, G. J., Funke, B. R. and Case, C. L. 2012. Study Guide for Microbiology: An Introduction. 11th edition. Benjamin-Cummings Publishing Company, U.S.A.
5. Tortora, G. J., Funke, B. R. and Case, C. L. 2012. Microbiology: An Introduction, Benjamin-Cummings Publishing Company, U.S.A.

STAT-301 Statistics & Biometry 3(3-0)

Objectives

1. It will help the students to analyze data pertaining to their research work
2. To assess the significance of their experimental designs. Without statistical analysis research articles are not accepted for publication by the scientific journals.
3. Students must have sound knowledge of the statistical programs.

Course Detail

- Introduction to Biostatistics and its scope in Microbiology.
- Collection of Primary and Secondary data.
- Editing of data.
- Presentation of data: Tabulation, Classification, Visual Presentation (Diagrams and Graphs).
- Measures of Central Tendency: Arithmetic Mean by direct and short- cut method, Geometric Mean, Harmonic Mean, Mode, Median, ED50 (LD50 in detail), Quantile.
- Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation by direct and short-cut method, Variance, and their Coefficient.
- Correlation: Simple Correlation Table, Rank Correlation, Partial and Multiple Correlation.
- Regression and method of least square.
- Probability: Concept of Probability, Laws of Probability.
- Permutation and Combination.
- Probability distributions: Binomial distribution, Poisson distribution and their fitting to observed data, Normal distribution.
- Sampling and Basic Design
- Hypothesis Testing.
- Chi-square test, Student's t-test, Analysis of variance.
- Laboratory Experiments pertaining to the course.

Recommended Books

1. Stanton, A.G., 2001. Primer of Biostatistics. McGraw-Hill.
2. Jekel, J., Elmore, J.G., Katz, D.L., 2001. Epidimiology, biostatisticsand preventive medicine. W. B. Saunders.
3. Quinn, G., 2002. Experimental Design and Data Analysis forBiologists. Cambridge University Press.
4. Fernholz L.T, Morgenlhaler, S., Stahel, W., 2000. Statistics inGenetics and in Environmental Sciences, Birkhauser Verlag.
5. Kuzma J. W. and Bohnenblust, S. E. 2001, Basis Statistics for theHealth Sciences, McGraw-Hill International Education.

CS-301 Introduction to Computing 3(2-2)

Course Detail

- Introduction to Computer and Window 98/2000.
- Word processing (Microsoft Word).
- Spread Sheets (Microsoft Excel) and other related software packages(at least two).
- Internet access and different data bases available on the internet.

Semester III

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-401	Nucleic Acid	2(2-0)
2	BCH-402	Amino Acids and Proteins	3(2-2)
3	BCH-403	Carbohydrates	3(2-2)
4	BCH-404	Lipids	3(3-0)
5	ENG-302	Communication Skills	3(3-0)
6	IS/ET-401	Islamic Studies/Ethics	2(2-0)

BCH-401 Nucleic Acids 2(2-0)

Course Objective:

- To understand the basic concepts related to structure and functions of amino-acids and proteins
- To acquire the knowledge of chemistry of nucleic acids
- To understand the differences between RNA & DNA

Course Outline:

Nucleic acids:

- Brief introduction of nucleic acids
- Composition and structure of DNA & RNA
- Types of DNA and RNA
- Function of the DNA & RNA
- Compaction of DNA in nucleus
- Extra nuclear DNA

Practical:

- Isolation of DNA and RNA from plants and blood sample
- Quantification of DNA and RNA

Recommended Books:

- Lehninger Principles of Biochemistry. (2012) 6th Ed. By David L. Nelson, Michael M. Cox W.H. Freeman; 6th Edition (November 21, 2012).
- Principles of Biochemistry. (2011) 5th Ed. by Laurence A. Moran, Robert A Horton, Gray Scrimgeour and Marc Perry
- Fundamentals of Biochemistry (2010) 4th Ed. by D. J. Voet, G.J. Voet and C. W. Pratt. J. Wiley & Sons Inc.

BCH-402 Amino Acids and Proteins 3(2-2)

Course Objective:

- To understand the basic concepts related to structure and functions of amino-acids and proteins
- To acquire the knowledge of chemistry of nucleic acids
- To understand the differences between RNA & DNA

Course Outline:

Proteins:

- Introduction to amino acids and classification
- Introduction to proteins and its types
- Acid- base properties of amino acids
- pH dependent ionization of amino-acids
- Identification of amino acids by different methods
- Chemical and enzymatic reactions of amino acids
- Structural organization of proteins
- Protein denaturation and renaturation

Nucleic acids:

- Brief introduction of nucleic acids
- Composition and structure of DNA & RNA
- Types of DNA and RNA
- Function of the DNA & RNA
- Compaction of DNA in nucleus
- Extra nuclear DNA

Practical:

- . Qualitative tests of proteins & amino acids: Biuret Test; Ninhydrin Test; Xanthoproteic Test;

Pauly's Test; Hoplein's Test; Ehrich's Test; Sakaguchi Test; Sodium nitroprusside Test; Sullivan Test; sulphate Test Phosphate Test; Aldehyde Test

- Extraction of proteins from plant sources and their confirmative tests
- Separation of Amino Acids using Paper and Thin Layer Chromatography
- Isolation of DNA and RNA from plants and blood sample
- . Determination of total proteins by using different methods (Bradford, lowery and biuret methods); Protein estimation by using UV/Visible spectrophotometer
- Quantification of DNA and RNA

Recommended Books:

- Lehninger Principles of Biochemistry. (2012) 6th Ed. By David L. Nelson, Michael M. Cox W.H. Freeman; 6th Edition (November 21, 2012).
- Principles of Biochemistry. (2011) 5th Ed. by Laurence A. Moran, Robert A Horton, Gray Scrimgeour and Marc Perry
- Fundamentals of Biochemistry (2010) 4th Ed. by D. J. Voet, G.J. Voet and C. W. Pratt. J. Wiley & Sons Inc.

BCH-403 Carbohydrates 3(2-2)

Course Objective:

- To demonstrate the in-depth knowledge on occurrence, classification, chemical structure, physical properties and biological importance of different types of carbohydrates
- To impart practical knowledge of different methods for qualitative and quantitative analysis of carbohydrates

Course Outline:

- Introduction, historical background, occurrence and biological significance of carbohydrates
- Nomenclature and classification of carbohydrates
- Structures, chemical and physical properties of monosaccharides, oligosaccharides and polysaccharides
- Blood group Oligo and polysaccharides and their importance in blood transfusion, and tissue/organ transplants

Practical:

- Qualitative analysis of glucose, galactose and fructose, maltose, lactose, sucrose, starch glycogen and cellulose.

- Quantitative analysis of carbohydrates in unknown samples
- Extraction of starch from plant sources and its confirmative tests

Recommended Books:

- Harpers Illustrated Biochemistry. (2012). 29th Ed. By Robert Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Victor Rodwell, P. Anthony Weil. McGraw-Hill Medical.
- Biochemistry. 7th Ed. By Jeremy M. Berg, John L. Tymoczko and Lubert Stryer. Publisher: Palgrave MacMillan; 7th revised international ed edition (April 1, 2011).
- Fundamentals of Biochemistry (2008) 3rd Ed. by D. J. Voet, G.J. Voet and C. W. Pratt. J. Wiley & Sons Inc.

  Lehninger Principles of Biochemistry. (2012) 6th Ed. By David L. Nelson , Michael M. Cox . W.H. Freeman; 6th Edition (November 21, 2012

ENG-302 Communication Skills 3(2-2)

Objectives:

Enable the students to meet their real-life communication needs.

Course Contents:

Paragraph writing

Practice in writing a good, unified and coherent paragraph

Essay writing

Introduction

CV and job application

Translation skills

Urdu to English

Study skills

Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

Academic skills

Letter/memo writing, minutes of meetings, use of library and internet

Presentation skills

Personality development (emphasis on content, style and pronunciation)*Note: documentaries to be shown for discussion and review* **Recommended Books:**

Communication Skills:

b) Grammar

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.

c) Writing

1. Writing. Intermediate by Marie-Chrisitine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 019 435405 7 Pages 45-53 (note taking).
2. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).

d) Reading

1. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
2. Reading and Study Skills by John Langan

e) Study Skills by Riachard Yorky.

IS/ET-401 Islamic Studies/Ethics 2(2-0)

Objectives:

This course is aimed at:

1. To provide Basic information about Islamic Studies
2. To enhance understanding of the students regarding Islamic Civilization
3. To improve Students skill to perform prayers and other worships
4. To enhance the skill of the students for understanding of issues related to faith and religious life.

Contents:

Introduction to Quranic Studies

1) Basic Concepts of Quran
2) History of Quran
3) Uloom-ul -Quran

Study of Selected Text of Holly Quran

6) Verses of Surah Al-Baqra Related to Faith(Verse No-284-286)
7) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)

8) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
9) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
10) Verses of Surah Al-Inam Related to Ihkam(Verse No-152-154)

Study of Selected Text of Holly Quran

4) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.)
5) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
6) Verses of Surah Al-Saf Related to Tafakar,Tadabar (Verse No-1,14)

Seerat of Holy Prophet (S.A.W) I

4) Life of Muhammad Bin Abdullah (Before Prophet Hood)
5) Life of Holy Prophet (S.A.W) in Makkah
6) Important Lessons Derived from the life of Holy Prophet in Makkah

Seerat of Holy Prophet (S.A.W) II

4) Life of Holy Prophet (S.A.W) in Madina
5) Important Events of Life Holy Prophet in Madina
6) Important Lessons Derived from the life of Holy Prophet in Madina

Introduction to Sunnah

3) Basic Concepts of Hadith
4) History of Hadith
3) Kinds of Hadith
4)Uloom –ul-Hadith
5) Sunnah & Hadith
6) Legal Position of Sunnah

Selected Study from Text of Hadith Introduction to

Islamic Law & Jurisprudence

6) Basic Concepts of Islamic Law & Jurisprudence
7) History & Importance of Islamic Law & Jurisprudence
8) Sources of Islamic Law & Jurisprudence
9) Nature of Differences in Islamic Law
10) Islam and Sectarianism

Islamic Culture & Civilization

5) Basic Concepts of Islamic Culture & Civilization
6) Historical Development of Islamic Culture & Civilization
7) Characteristics of Islamic Culture & Civilization
8) Islamic Culture & Civilization and Contemporary Issues

Islam & Science

4) Basic Concepts of Islam & Science
5) Contributions of Muslims in the Development of Science
6) Quran & Science

Islamic Economic System

5) Basic Concepts of Islamic Economic System
6) Means of Distribution of wealth in Islamic economics
7) Islamic Concept of Riba
8) Islamic Ways of Trade & Commerce

Political System of Islam

4) Basic Concepts of Islamic Political System
5) Islamic Concept of Sovereignty
6) Basic Institutions of Govt. in Islam

Islamic History

4) Period of Khlaft-E-Rashida
5) Period of Ummayyads
6) Period of Abbasids

Social System of Islam

4) Basic Concepts of Social System of Islam
5) Elements of Family
6) Ethical Values of Islam

Reference Books:

1. Hameed ullah Muhammad, "Emergence of Islam" , IRI, Islamabad
2. Hameed ullah Muhammad, "Muslim Conduct of State"
3. Hameed ullah Muhammad, 'Introduction to Islam
4. Mulana Muhammad Yousaf Islahi,"
5. Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law" leaf Publication Islamabad, Pakistan.
6. Ahmad Hasan, "Principles of Islamic Jurisprudence" Islamic Research Institute, International Islamic University, Islamabad (1993)
7. Mir Waliullah, "Muslim Jurisprudence and the Quranic Law of Crimes"
8. Islamic Book Service (1982)
9. H.S. Bhatia, "Studies in Islamic Law, Religion and Society" Deep & Deep Publications New Delhi (1989)
10. Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia" Allama Iqbal Open University, Islamabad (2001)

BCH-404 Lipids 3(3-0)

Course Objective:

- To demonstrate the in-depth knowledge on occurrence, classification, chemical structure, physical properties and biological importance of different types of lipids
- To impart practical knowledge of different methods for qualitative and quantitative analysis of lipids

Course Outline:

- Introduction, classification and biological functions of lipids
- Classification, nomenclature, structures and properties of fatty acids
- Structure and properties of simple and mixed triglycerides and waxes
- Structure, properties and functions of phospholipids, sphingolipids and glycolipids

- Lipoprotein system: Chylomicrons, HDL, LDL, IDL and VLDL and their role in distribution of lipids
- Chemical structures and functions of Prostaglandins, thromboxanes and leukotrienes
- Structure and biological significance of cholesterol, bile salts, bile acids and other steroids

Recommended Books:

- Harpers Illustrated Biochemistry. (2012). 29th Ed. By Robert Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Victor Rodwell, P. Anthony Weil. McGraw-Hill Medical.
- Biochemistry. 7th Ed. By Jeremy M. Berg, John L. Tymoczko and Lubert Stryer. Publisher: Palgrave MacMillan; 7th revised international ed edition (April 1, 2011).
- Fundamentals of Biochemistry (2008) 3rd Ed. by D. J. Voet, G.J. Voet and C. W. Pratt. J. Wiley & Sons Inc.
- Lehninger Principles of Biochemistry. (2012) 6th Ed. By David L. Nelson , Michael M. Cox . W.H. Freeman; 6th Edition (November 21, 2012)

Semester IV

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-405	Principles of Genetics	3(2-2)
2	BCH-406	Fundamentals of Enzymology	3(2-2)
3	BCH-407	Physical Chemistry	3(2-2)
4	BCH-408	Integrated Metabolism	2(2-0)
5	SSH-301	Pakistan Studies	2(2-0)
6	SOC-301	Introduction to Sociology	3(3-0)

BCH-405 Principles of Genetics 3(2-2)

Course Objective:

- The basic concepts of genetics
- The molecular basis of heredity
- Principles of inheritance

Course Outline:

- Introduction; classification, the Nature of Genetic Material, scope and brief history of genetics
- Mendelian inheritance; Laws of dominance, segregation, independent assortment, Punnett square, concept of monohybrid, dihybrid, back cross and test cross, complete,
- Non-Mendelian inheritance; The Cytoplasm in Hereditary, The Maternal Effect, Extra

Nuclear Inheritance, incomplete and codominance

- Gene interaction, epistasis and multiple alleles; ABO blood type alleles and Rh factor alleles in human
- Structure of Chromosomes, organization of gene and genome.
- Sex Linked Inheritance, Sex Determination in Drosophila & Man
- Significant Features of Sex-Linked Inheritance
- Linkage and crossing over: Definition, linkage groups, construction of linkage maps, detection of linkage
- Pedigree analysis
- Mutations
- Chromosomal aberrations: Changes in the number of chromosomes. Aneuploidy and euploidy. Changes in the structure of chromosomes, deficiency, duplication, inversion and translocation
- Population genetics; Hardy Weinberg equilibrium

Recommended Books:

- Genetics by Strickberger, M.W. Latest edition, The Macmillan. Co.Ny
- Modern Genetics by Ayala & Kiger. The Benjamin Cummings, Co. Inc. California, USA
- Genetics: From Genes to Genomes by Leland Hartwell, Leroy Hood, Michael Goldberg, and Ann Reynolds Genetics by Levine.
- Genetics by Klug and Cummings; 8th edition.
- Genomes 3 by T. S. Brown: Garland Science; New York
- Human Molecular Genetics 3 by Tom Strachan and Addrew P. Read: Garland Science; New York

BCH-406 Principles of Genetics 3(2-2)

Course Objective:

- To impart knowledge about the nature of enzymes
- To provide an overview of reactions and impact of different factors on their rate
- To introduce the concept of catalysis and catalytic mechanisms

Course Outline:

- Introduction to enzymes, nomenclature and classification
- Isoenzymes, coenzymes and role of cofactors
- Structure of enzyme; active site and regulatory sites
- Enzyme specificity and different types
- Kinetics of chemical reactions

- Michaelis-Menten equation and other models used to understand kinetics
- Multienzyme system and two substrate reactions
- Enzyme Inhibition and types of inhibition
- Ribozyme
- Enzyme catalysis; catalytic strategies and mechanisms of different enzymes
- Regulation of enzyme activity
- Effect of various factors on rate of reactions
- Enzyme assays
- Immobilized enzyme
- Applications of enzyme

Practical:

- Extraction and estimation of enzymes from plant and animal sources.
- Acid and enzymatic hydrolysis of glycogen and starch
- Biosynthesis of enzymes by fungi and bacteria.
- Effect of Temperature on enzymes activity.
- Effect of Substrate concentration on enzyme activity.
- Effect of Enzyme concentration on enzyme activity.
- Effect of heat on stability of enzyme

Recommended Books:

- Fundamentals of Biochemistry. (2008) 3rd Ed. by D. J. Voet, G.J. Voet and C. W. Pratt. J. Wiley & Sons Inc.
- Text Book of Biochemistry (1970) by E. West & W. Todd Macmillan
- Biochemistry. (1999) 3rd Ed. by C. K. Mathews, K. E. Van Holde, & K.G. Ahern. Prentice Hall.
- Harper's Illustrated Biochemistry, 27th Ed. by R.K. Murray, D.K. Grannar, V.W. Rodwell. McGraw-Hill.
- Lehninger Principles of Biochemistry (2008) 5th Ed. by D. L. Nelson, M. M. Cox. W. H. Freeman Publishers

BCH-407 Physical Chemistry 3(2-2)

Course Objective:

- To understand the basic concepts of physical chemistry
- To strengthen the understanding of principles of kinetics and thermodynamics
- To attire graduates with elementary practical skills

Course Outline:

Chemical Thermodynamics:

- Equation of states, ideal and real gases, the real gas equation.

- Van der Waals equation for real gases, critical phenomena and critical constants.
- Laws of thermodynamics and their applications, thermochemistry, calorimetry, heat capacities and their dependence on temperature, pressure and volume, reversible and non-reversible processes.
- Spontaneous and non-spontaneous processes, relations of entropy and Gibbs free energy with equilibrium constant.
- Gibbs Helmholtz equation, fugacity and activity. Chemical Equilibrium:
- General equilibrium expressions, reaction quotients, examples of equilibrium reactions in solid, liquid and gas phases, extent of reactions and equilibrium constants.
- Gibbs energies of formation and calculations of equilibrium constants, effect of temperature and pressure on the equilibrium constants/compositions, van't Hoff equation, Le-Chatelier's principle.

Solution Chemistry:

- Physical properties of liquids, surface tension, viscosity, refractive index, dipole moment and their applications.
- Interactions among the moleculesin liquids, ideal and non-ideal solutions.
- Raoult'slaw and its applications, lowering of vapor pressure, elevation of boiling point, depression of freezing point, osmotic pressure, vapor pressure of nonideal solutions.
- Henry's law, abnormal colligative properties, degrees of association and dissociation of solutes, osmotic pressure and its measurement, fractional distillation and concept of azeotropic mixtures.

Chemical Kinetics:

- The rates of reactions.
- Order of Reactions; zero, first, second and third order reactions with same and different initial concentrations, half-lives of reactions.
- Experimental techniques for rate determination and methods for determination of order of reaction (integration, half-life, initial rate, and graphical methods), Arrhenius equation.

Practicals:

- Determination of viscosity and refractive index of liquids.
- Determination of percent composition of liquid solutions viscometrically.
- Determination of refractive index and molar refractivity.
- Determination of percent composition of liquid solutions by refractive index measurements.
- Determination of molecular weight of a compound by elevation of boiling point

ebullioscopic method).

- Determination of molecular weight of a compound by lowering of freezing point (cryoscopic method).
- Determination of heat of solution by solubility method.
- Determination of heat of neutralization of an acid with a base. Kinetic study of acid catalyzed hydrolysis of ethyl acetate.
- Determination of partition coefficient of a substance between two immiscible liquids

Recommended Books:

- McQuarrie, D. A. and Simon, J. D., Physical Chemistry – A Molecular Approach, 1sted., University Science Books, (1997).
- AtkinsP. and PaulaJ.D., Atkin's Physical Chemistry, 9th ed., Oxford University Press, (2010).
- Shoemaker, D., Experiments in Physical Chemistry, 8th ed., McGraw Hill Publishing Company Limited, (2003).
- Silbey R., Alberty R. and Bawendi M., Physical Chemistry, 4th ed., (2005).
- Glasstone S., Textbook of Physical Chemistry, Macmillan London (1960).
- Chaudhary S. U., Ilmi Textbook of Physical Chemistry, 2nd ed., IlmiKitabKhana Lahore, (2013).
- Linder, B., Elementary Physical Chemistry, World Scientific Publishing Co. Ptv. Ltd., (2011).
- Davis, W. M., Dykstra, C. E., Physical Chemistry: A Modern Introduction, 2nd ed., CRC Press, (2011).

BCH-408 Integrated Metabolism 2(2-0)

Course Objective:

- To provide concept of metabolism and regulation of carbohydrates and lipids
- To understand glycolytic and energy generating pathways and other intermediary pathways for carbohydrates.
- To enhance knowledge about biosynthesis and degradative pathways of fatty acids and lipid

Course Outline:

Carbohydrate metabolism:

- Digestion and absorption of carbohydrates
- Role of glucose in metabolism of plants, animals and microorganisms
- Glycolysis: reactions of glycolysis and energy calculation, anaerobic fate of pyruvate, fermentation, control of metabolic flux. Regulation of glycolytic pathway. Metabolism of other monosaccharides (Feeder pathways).

- Conversion of Pyruvate to acetyl CoA 48
- TCA cycle: Overview of TCA, Metabolic sources of Acetyl Coenzyme A, Regulation of TCA Cycle, Reactions of Electron Transport chain, Energetics, Shuttle systems.
- Other pathways of carbohydrate metabolism: Gluconeogenesis, cori cycle, glycogenesis, glycogenolysis, Glyoxalate Cycle reactions, Pentose phosphate Pathway.
- Carbohydrate synthesis: Synthesis of starch, cellulose and peptidoglycan, glycoproteins.
- Glycogen metabolism: Synthesis and breakdown, glycogen synthetase and phosphorylase and their regulation, Glycogen storage diseases**.**

Lipid metabolism:

- Introduction to lipid digestion, absorption and transport
- Lipolysis and utilization of glycerol
- β-oxidation of fatty acids and various modes of oxidations
- Ketogenesis, ketolysis and regulation
- Biosynthesis of fatty acids, Elongase and Desaturase systems
- Biosynthesis of triacylglycerols, Phospholipids, Cardiolipins, Glycolipids and sphingolipids
- Prostaglandins: Prostacyclins, Thrombaxanes and leukotrienes
- Lipoproteins: metabolism of plasma lipoproteins.
- Metabolism of cholesterol, steroid hormones and bile acids.

Recommended Books:

- Lehningher Principles of Biochemistry" by Nelson & Cox, (2017) 7th edition ISBN 10: 1-4641-2611-9; ISBN-13: 978-1-4641-2611-6.
- Fundamentals of Biochemistry (2014) 5th edition By DJ Voet , GJ Voet and CW Pratt. J Wiley & Sons Inc. ISBN: 9781118918401 49
- Biochemistry (2007) 6th edition by JM Berg, JL Tymoczko & L Stryer WH Freeman &Co
- Biochemistry 6th Edition (Lippincott's Illustrated Reviews Series) by Richard A. Harvey (2014).
- Harpers Illustrated Biochemistry 30th Edition (LANGE Basic Science) by Robert Murray, D. Bender, Kathleen M. Botham and P.J. Kennelly (2015**)**

SSH-301 Pakistan Studies 2 (2-0)

Course Outline:

1. Historical Perspective

a) Ideological rationale with special reference to Sir Syed Ahmed 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

Recommended Books:

1. Burki, Shahid Javed. *State & Society in Pakistan,* The MacMillan Press Ltd 1980.
2. Akbar, S. Zaidi. *Issue in Pakistan's Economy*. Karachi: Oxford University Press, 2000.
3. S.M. Burke and Lawrence Ziring. Pakistan's Foreign policy: An Historical
4. analysis. Karachi: Oxford University Press, 1993.
5. Mehmood, Safdar. *Pakistan Political Roots & Development.* Lahore, 1994.
6. Wilcox, Wayne. *The Emergence of Bangladesh*, Washington: American Enterprise, Institute of Public Policy Research, 1972.

7. Mehmood, Safdar. *Pakistan Kayyun Toota,* Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.
8. Amin, Tahir. *Ethno - National Movement in Pakistan,* Islamabad: Institute of Policy Studies, Islamabad.
9. Ziring, Lawrence. *Enigma of Political Development.* Kent England: WmDawson & sons Ltd, 1980.
10. Zahid, Ansar. *History & Culture of Sindh.* Karachi: Royal Book Company, 1980.
11. Afzal, M. Rafique. *Political Parties in Pakistan,* Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998
12. Sayeed, Khalid Bin. *The Political System of Pakistan.* Boston: Houghton Mifflin, 1967.
13. Aziz, K.K. *Party, Politics in Pakistan,* Islamabad: National Commission on Historical and Cultural Research, 1976.
14. 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.

SOC-301 Introduction of Sociology 3 (3-0)

OBJECTIVES

- The course is designed to introduce the basic concepts of sociology with particular reference to environment and social relationships.
- It provides understanding of the role of human being in creating and recreating the environment.
- It evaluates the development and environment relationships, environmental policies and environmental movements with referenceto environmental issues.

Course Detail

- Introduction: Sociology, the Science of Society, Scope and significance, Fields of Sociology, Sociology and other Social Sciences.
- Social interaction and social structure, Social Interaction, the Nature and Basis of Social Interaction.
- Social Processes, Social Structure, Status, Roles, Power and Authority and Role Allocation.
- Culture, Meaning and nature of culture, Elements of culture, Norms, values, beliefs, sanctions, and customs.
- Culture and Socialization Formal and non-formal socialization, and Transmission of Culture.
- Cultural Lag. Cultural Variation, Cultural Integration, Cultural Evolution, Cultural

Pluralism Culture and personality.

- Deviance and social control, Deviance and conformity, Mechanism and techniques of social control, Agencies of social control.
- Social organization, Social organization-Definition, meaning and forms, Social groups -Types and functions of groups, Social Institutions: forms, nature and inter-relationship.
- Community: definition and forms (Urban and rural).
- Social change, Processes of social change, Social change and conflict, Social change and social problems, Resistance to social change.
- Human ecology, Ecological processes, Ecological problems of Pakistan.

Semester V

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-501	Genetic Engineering	3(2-2)
2	BCH-502	Protein Chemistry	2(2-0)
3	BOT-501	Plant Physiology	3(2-2)
4	BCH-503	Biochemical Techniques	3(1-4)
5	BCH-504	Biosafety and Ethics	2(2-0)
6	BCH-505	Bioinformatics	3(2-2)

BCH-503 Biochemical Techniques 3(1-4)

Course Objective:

- The course is structured to provide the information of principles &mechanisms of different equipment and analysis of Biochemical and Biological samples
- The course will also focus on experimental design and result interpretation
- To provide hands on experience with variety of techniques

Course Outline:

- Introduction and principles of centrifugation and ultracentrifugation methods and their applications
- Ultrafiltration, dialysis and lyophilization 62
- Chromatography; principles, methods and applications of paper and thin layer chromatography
- Column chromatography (ion exchange and gel filtration)

- Gas chromatography (GC), GC-MS/LC-MS
- Hydrophobic interaction chromatography
- Affinity chromatography
- Electrophoresis, capillary electrophoresis
- Introduction to spectroscopy and spectrophotometry – Principles, methods and applications of infrared spectroscopy, FTIR
- Visible and ultraviolet absorption spectrophotometry and MALDI.
- Flamephotometer
- Atomic absorption spectro-photometry (AAS)
- Amino acids analyzer
- Electron microscopy
- X – ray diffraction
- Nuclear magnetic resonance

Practical:

- Centrifugation of fresh milk and Acetic Acid
- Fractionation of cells by density gradient centrifugation
- Separation of biomolecules by using TLC
- Separation of crud plants extracts by using TLC
- Separation of Biomolecules by affinity chromatography identification of sugars, proteins etc.
- Separation of mixture proteins by using Ion-Exchange chromatography
- Separation of biomolecules using size exclusion chromatography
- Agarose Gel Electrophoresis for the Separation of DNA Fragments
- Protein Separation by Protein Electrophoresis
- Analysis of drugs and related compounds by using Capillary Eectrophoresis
- Purification of proteins or biomolecules by using hydrophobic interaction chromatography
- Preparation of sample for mineral analysis by ashing method and Wet digestion procedure of sample preparation for mineral analysis
- Determination of sodium and potassium content in blood serum by flamephotometer
- Separation of amino acids by amino acid analyzer
- Structural elucidation of biomolecules

Recommended Books:

- Modern Experimental Biochemistry 3d Ed - Rodney F. Boyer
- Principles and Techniques of Biochemistry and Molecular Biology 6th Edition. Edited by K. Wilson & J. Walker.
- Introduction to Modern liquid chromatography (1979) by L.L.Snyder & J.J Kirkland. John Wiley & Sons
- Physical Biochemistry: Applications to Biochemistry and Moleculart Biology (1982) by David Freifelder, W. H. Freeeman.

BCH-505 Bioinformatics 3(2-2)

Course Objective:

- To familiarize students with biological data mining from online databases.
- To provide understanding of bioinformatic tools for biological sequence analysis and structure-function relationships of major macromolecules.
- The practical component will impart bioinformatics practical skills.

Course Outline:

- Basic concepts in bioinformatics.
- Biological Sequence Databases (including Genomic Databases).
- Information Retrieval from Biological Databases.
- Predictive Methods Using DNA Sequences.
- Sequence Polymorphisms.
- Predictive Methods Using Protein Sequences.
- Assessing Pairwise Sequence Similarity: BLAST and FASTA.
- Creation and Analysis of Protein Multiple Sequence Alignments.
- Phylogenetic Analysis. o Computational Approaches in Comparative Genomics.
- Proteomics and Protein Identification. o Molecular modeling and visualization.
- Protein Structure Prediction and Analysis. o Using Programming Language (e.g. Python) to Facilitate Biological Analysis.

Practical:

- Survey of Biological Sequence Databases.
- Sequence alignment by dot plot method.
- Sequence database searching by BLAST.
- Secondary structure prediction.
- Homology modeling of proteins.
- Genomic sequence analysis by ENSEMBL

Recommended Books:

- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, 3rd Edition, Andreas D. Baxevanis (Editor), B.F. Francis Oullette (Editor), ISBN: 978-0-471- 47878-2.
- Arthur M. Lesk, Introduction to Bioinformatics Oxford University Press. 56
- Introduction to Bioinformatics: A Theoretical and Practical Approach, Humana Press.
- DW Mount, Bioinformatics: Sequence and Genome Analysis, Second Edition, CSHL Press, USA

BOT-501 Plant Physiology 3(2-2)

Course Objective:

- To introduce key concepts of plant biochemistry.
- To impart knowledge regarding plant pigments, photosynthetic systems and pathways, phytohormones and naturally occurring compounds

Course Outline:

- Structure and functions of plant cell
- Photosynthesis; structure of chlorophyll, absorption of light energy, photosynthetic pigments
- Photosynthetic reaction center, photosystem-I, photosystem-II
- Hill's reaction, electron transport chain, ATP C3 and C4 pathways
- CAM photosynthetic pathways
- CO2 fixation (Calvin Benson cycle)
- Hatch Slack pathway and photorespiration
- Conversion of nitrogen into ammonia and other nitrogenous compounds
- Biosynthesis of Alkaloids, Flavonoids, Terpenes, Terpenoids, Phenolics and other secondary plant metabolites and their biological functions
- Phytohormones and related compounds
- Signal transduction in plant cells

Practical:

- Extraction and qualitative analysis of chlorophyll
- Extraction and qualitative analysis of starch
- Extraction and qualitative analysis of lipids
- Extraction and qualitative analysis of auxins
- Extractions and estimation of alkaloids, phenolics and flavonoids

BCH-502 Protein Chemistry 2(2-0)

Course Outline:

Basic structural principles: the building blocks of protein, alpha domain structures, alpha/beta domain structures, beta domain structures. Folding and Flexibility. Structure, function and engineering: DNA recognition in prokaryotes by helix-turn-helix motif, DNA recognition by

eukaryotic transcription factors, structure of spherical viruses, recognition of foreign molecules by immune system, membrane proteins, receptor families, proteins as catalysts, fibrous proteins. Prediction, engineering, and design of protein structure: some basic principles e.g Betabellin, some design principles for structurally stable proteins, design of amphiphilic peptides, redesigning proteins via genetic engineering, protein engineering of Subtilisin. Determination of protein structure: X-ray diffraction and NMR.

Books Recommended

- David Whitford. (May 20, 2005) Proteins: Structure and Function. Publisher: Wiley
- Daniel Chasman. (March 18, 2003). Protein Structure: Determination, Analysis, and Applications for Drug Discovery. Publisher: CRC
- Gregory A. Petsko & Dagmar Ringe. (August 2003). Protein Stucture and Function (Primers in Biology). Publisher: New Science Press, Ltd.
- Arthur M. Lesk. (2001). Introduction to Protein Architecture: The Structural Biology of Proteins. Publisher: Oxford University Press USA
- Branden, C. and Tooze, E. J. (1999) Introduction to Protein Structure. 2nd Ed. Garland Publishing, Inc. N.Y.
- Zubay, G. L., Parson, W. W. and Vance, D. E. (1995). Principle of Biochemistry. Wm.C. Brown Publishers. England.
- Thomas E Creighton. (1993) Proteins: Structures and Molecular Properties. Publisher: W.H. Freeman; 2nd edition
- Oxander, D. L. and Fox, C. F. (1987). Protein Engineering. Alan R. Liss, Inc. New York.

BCH-501 Genetic Engineering 3(2-2)

Course Outline:

Introduction, working with nucleic acids: isolation of DNA and RNA, quantification, radio-labeling, hybridization, electrophoresis, sequencing. Polymerase chain reaction. The tools of trade: restriction enzymes, DNA, modifying enzyme, DNA ligase. Biology of genetic engineering: host cell types, vectors, transformation. Cloning strategies. Selection, screening, and analysis of recombinants. Genetic engineering in action: analysis of gene structure and function, making proteins, transgenic plants and animals. Spin-off techniques: recombinant technology and medicine, food industry, diagnosis, human genome project.

Practical:

Growth of bacteria on solid medium, preparation of bacterial culture, preparation of plasmid DNA, restriction enzyme digestion of DNA preparation, separation and identification of DNA fragment by agarose gel electrophoresis, purification of DNA fragment by electroporation after digestion and

separation on agarose, PCR, sequencing, DNA extraction, preparation of probe for DNA fragment analysis, Southern blot and hybridization, RNA extraction and determination, RNA electrophoresis, probe preparation for RNA analysis, Northern blot.

Books Recommended

- Brown, T.A (2002) Genomes, New York and London: Garland Science
- Burden, D. W. and Whitney, D. B. (1995). Biotechnology: Proteins to PCR. Birkhauser, Boston.
- Lodish, H., Baltimore, D., Berk, A., Zipursky, S. L., Matsudaira, P and Darnell, J. (1995). Molecular Cell Biology. 3rd Ed. Scientific American Book, N.Y.
- Nicoll, D. S. T. (1994). An introduction to Genetic Engineering. Cambridge Univ. Press, England.
- Peters, P. (1993). Biotechnology: A Guide to Genetic Engineering. Wm. C. Brown Publishers, England. 6. Recent review papers.

Semester VI

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-506	Tissue and Cell Culture	3(2-2)
2	BCH-507	Biotechnology	3(2-2)
3	ZOOL-402	Human Physiology	3(3-0)
4	BCH-508	Cellular Signaling	3(3-0)
5	BCH-509	Biomembranes	2(2-0)
6	BCH-510	Plant Biochemistry	3(2-2)

BCH-506 Tissue and Cell Culture 3(2-2)

Course Outline:

Introduction, laboratory safety, culture environment, cell lines, media/components, cell culture theory, tissue types, genetic engineering of cultured animal and plant cells, selection strategies, virus elimination, micro-propagation, somaclonal variations, haploid culture, embryo rescue, protoplast culture and somatic hybridization, protoplast culture.

Practical:

Aseptic technique, microscopy, screening for contamination, freezing cells, media preparations, growth cycle, histology, DNA transfection, selection and analysis of transformed cells, tobacco anther culture, fern micropropagation, protoplast isolation.

Books Recommended:

- Davis,J.M.,(2006) Basic cell culture 2nd Ed.Oxford university press USA.

- Yadav P. R. and Rajiv Tyagi (2005) Cell Culture, Discovery Publishing Hpuse, New Delhi
- Dixon R. A. and Gonzales R. A. (1994) Plant Cell Culture A Practical Approach, Oxford University Press Inc. New York, USA
- Collin H. A. and Edwards S. (1998) Plant Cell Culture, BIOS Scientific Publishers Limited, UK
- Susan R. Bamum. (2004). Biotechnology an Introduction
- Kruse, P.F. and Patterson Jr. M.K. (1973). Tissue Culture, Methods and Application. Academic Press, N.Y.
- Lindsey, K. and Jones M.G.K. (1989) Plant Biotechnology in Agriculture. Open Univ. Press Milton, Keynes.
- Davis J.M. (1986). Basic Cell Culture. IRL Press.

ZOOL-402 Human Physiology 3(3-0)

Course Outline:

Introduction to Physiology. Functional organization of human body and Homeostasis Blood cell, anemia and its types. Nutrition and Physiology of digestion, movement of the food to the alimentary canal, digestion and absorption in the gastrointestinal tract-Respiration, pulmonary ventilation, physical principles of gaseous exchange, transport of oxygen and carbondioxide in the blood and body fluid and regulation of respiration. Circulatory system. Heart as a pump, circulatory system as a circuit. Nervous system organization, three major levels of nervous system. Skeletal system, bone anatomy, histology, development and growth and remodeling. Urinary system, formation of urine by kidney, glomerular filtration, tubular function and regulation of acid-base balance. Endocrinology and Reproduction, male and female reproductive systems and their hormones**.**

Practical:

Estimation of the amount of hemoglobin in human blood. Enumeration of red and white blood carpusles by haemocytometer. Coaggulation of blood Bleeding and clotting time of blood. Preparation of haemin crystal. Effect of osmolarity of salt solution and hemolytic agents on red blood carpusles. Study of circulation of blood in the capillaries of the web of frog. Record frog's heart and muscular contraction beat by using Sherrington drum. Determination of wiping reflex in frog.

Books Recommended

- Gerhard,M and W.H.Simmons (2006) Principles of Medical Biochemistry 2nd Ed.Mosby.N.Y.
- C. Guyton ad John E. 2000. Text Book of Medical Physiology. 10th Edition. William

Schmitt. W. B. Saundrs Company, NY USA.

- Rod R. Seeley, Trent D. Stephens and Philip Tate. 1998. Anatomy and Physiology 4th Edition. Mosby-Year Book, Inc, USA.
- John W. Hole. 1992. Essential of Human Anatomy Physiology, 4th Edition. Collin. H. Wheatley. Win. C. Brown Publishers, USA.
- Stuart Ira Fox. Human Physiology. 5th Edition. Colin H. Wheatley. The MeGraw Hill Companies, USA.
- Silverthorn. Human Physiology. 2001. An intergrated approach (2nd edition). Preutice Hall, ISBN 0130176974.
- Vander, Sherman and Luciano. 2001. Human Physiology: the mechanisms of body function (8th edition). MeGraw Hill ISBN 0072908017.
- Tortora & Grabowski. 2002. Principles of Anatomy and Physiology. (10 edition). Wiley ISBN 0471224. 9. Reed, Holmes, Weyers & Jones. 1998. Practical Skills in Bimolecular Sciences. Longman ISBN 0582298261.

BCH-507 Biotechnology 3(2-2)

Course Outline:

Introduction to Physiology. Functional organization of human body and Homeostasis Blood cell, anemia and its types. Nutrition and Physiology of digestion, movement of the food to the alimentary canal, digestion and absorption in the gastrointestinal tract-Respiration, pulmonary ventilation, physical principles of gaseous exchange, transport of oxygen and carbondioxide in the blood and body fluid and regulation of respiration. Circulatory system. Heart as a pump, circulatory system as a circuit. Nervous system organization, three major levels of nervous system. Skeletal system, bone anatomy, histology, development and growth and remodeling. Urinary system, formation of urine by kidney, glomerular filtration, tubular function and regulation of acid-base balance. Endocrinology and Reproduction, male and female reproductive systems and their hormones.

Practical:

Estimation of the amount of hemoglobin in human blood. Enumeration of red and white blood carpusles by haemocytometer. Coaggulation of blood Bleeding and clotting time of blood. Preparation of haemin crystal. Effect of osmolarity of salt solution and hemolytic agents on red blood carpusles. Study of circulation of blood in the capillaries of the web of frog. Record frog's heart and muscular contraction beat by using Sherrington drum. Determination of wiping reflex in frog.

Books Recommended:

- Gerhard,M and W.H.Simmons (2006) Principles of Medical Biochemistry 2nd Ed.Mosby.N.Y.

- C. Guyton ad John E. 2000. Text Book of Medical Physiology. 10th Edition. William Schmitt. W. B. Saundrs Company, NY USA.
- Rod R. Seeley, Trent D. Stephens and Philip Tate. 1998. Anatomy and Physiology 4th Edition. Mosby-Year Book, Inc, USA.
- John W. Hole. 1992. Essential of Human Anatomy Physiology, 4th Edition. Collin. H. Wheatley. Win. C. Brown Publishers, USA.
- Stuart Ira Fox. Human Physiology. 5th Edition. Colin H. Wheatley. The MeGraw Hill Companies, USA.
- Silverthorn. Human Physiology. 2001. An intergrated approach (2nd edition). Preutice Hall, ISBN 0130176974.
- Vander, Sherman and Luciano. 2001. Human Physiology: the mechanisms of body function (8th edition). MeGraw Hill ISBN 0072908017.
- Tortora & Grabowski. 2002. Principles of Anatomy and Physiology. (10 edition). Wiley ISBN 0471224.
- Reed, Holmes, Weyers & Jones. 1998. Practical Skills in Bimolecular Sciences. Longman ISBN 0582298261.

BCH-508 Cellular Signaling 3(3-0)

Course Outline:

This course both basic and state-of-art knowledge in: I. Biosynthetic and secretion of steroids, peptides and other hormones, II. Modes and mechanisms of hormone action at the cellular and molecular levels with specific emphasis on receptor structure/function, receptor action and signal transduction mechanism that operates at the nuclear and cell surface levels and in normal and cancerous cells.

Books Recommended:

- John D. Nelson. (August 30, 2007) Structure and Function in Cell Signalling. Publisher: John Wiley and Sons Ltd
- Pramod C. Rath. (August 30, 2007) Cell Signalling. Publisher: Anshan Ltd
- Dorothy T. Leeds. (April 18, 2006) Focus on Cellular Signalling Research. Publisher: Nova Science Publishers; 1 st edition
- Brian Henderson & A. Graham Pockley. (July 18, 2005). Molecular Chaperones and Cell Signalling. Publisher: Cambridge University Press
- John T. Hancock. (April 15, 2005) Cell Signalling. Publisher: Oxford University Press, USA; 2nd edition
- Fairweather. (December 31, 2003) Cell Signalling in Prokaryotes and Lower Metazoa. Publisher: Springer; 1st edition
- Bastien D. Gomperts. (October 15, 2003) Signal Transduction. Publisher: Academic

Press; New Ed edition

- Ernst J. M. Helmreich. (August 20, 2001) The Biochemistry of Cell Signalling. Publisher: Oxford University Press, USA Lodish, H., Berk, A., Zipursky, S.L., Matsdaira, P. and Darnell, J. (1999). 4th Ed. W.H. Freeman and Co., USA.
- Lodish, H., Baltimore, D., Erk, A., Zipursky, S. L., Matsudaira, P. and Darnell, J. (1995). Molecular Cell Biology. 3rd Ed. Scientific American Books, N.Y.
- Stryer, L. (1995). Biochemistry. 4th Ed. W.H. Freeman and Co., N.Y.
- Alberts, B., Bary, D., Lewis, J., Raff, M., Roberts, K. and Watson, J. D. (1994). Molecular Biology of Cell. 3rd Ed. Garlands Publishing Inc., N.Y.
- Recent review papers

BCH-509 Biomembranes 2(2-0)

Course Outline:

Introduction, lipids, oligomers and proteins, carbohydrates and cytoskeletal components and interactions, physiological properties of membranes, molecular models of cell membranes, supra-molecular membrane structure. Bioenergetics: putting membrane to work, transport across membranes, receptors and responses, membrane fusion, formation and flow, membrane in cancer.

Books Recommended:

- Zubay,G. L., Parson, W. W. and Vance, D. E. (1995). Principles of Biochemistry. 4th Ed. Wm.C. Brown Publ. England.
- Stryer, L. (1995). Biochemistry. 4th Ed. W.H. Freeman and Co., N.Y.
- Petty, H. R. (1993). Molecular Biology of Membranes: Structure and Function. Plenum Press, N.Y.
- DeRobrtis, E. D. P. and DeRobetries, E. M. F. Jr. (1987). Cell and Molecular Biology. Lea and Febiger, N.Y.
- Moran, L. A., Scrimgeour, K. G., Horton, H. R. Ochs, R. S. and Rawn, J. D. (1994). Biochemistry. 2nd Ed. Niel Patterson Publishers, Prentice Hall Inc., N.Y.
- Lehninger, A. L., Nelson, D. L. and Cox, M. M. (1993). Principles of Biochemistry, 2nd Ed. Work Publ. Inc., N.Y.
- Alberts, B., Bary, D., Lewis, J., Raff, M., Roberts, K. and Watson, J. D. (1994). Molecular Biology of Cell. 3rd Ed. Garland Publishing Inc, N.Y.

Semester VII

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-601	Industrial Biochemistry	3(2-2)
2	BCH-602	Good Laboratory Practices & Quality Control	2(2-0)

3	BCH-604	Research Planning & Report Writing	3(1-4)
4	BCH-605	Nutritional Biochemistry	3(2-2)
5		Optional-I	3 (*-*)
6		Optional-II	3 (*-*)

BCH-601 Industrial Biochemistry 3(2-2)

Course Objective:

- Equip students with a basic understanding of industrial biochemical systems and processes for production of products with commercial value.
- Enable students to use microorganisms in the production of pharmaceuticals, foods, enzymes and organic acids that have direct economic value.

Course Outline:

- Introduction to industrial biochemistry
- Types of industries
- Introduction to fermentation and its applications.
- Selection of industrially important organism for food, pharmaceutical, fertilizer, textile, tanneries, paper and other related industries
- Brief introduction to microbial metabolites.
- Production of enzymes, antibiotics, acetic acid and ethanol by microbial fermentation.
- Manipulation of fermentation for enhanced production of targeted metabolite.
- Plant extraction and purification of extracted components.
- Manufacturing of glucose from rice, corn, potato and wheat for their industrial applications
- Quality assurance and value addition

Practical:

- Determination of ethanol percentage in the fermentation broth
- Estimation of total proteins in the given sample
- Purification of proteins by column chromatography
- Determination of citric acid by titration method in the fermentation medium
- Extraction of plant seeds oil by using Soxhelt apparatus
- Determination of acid value of oil extracted from plant seeds
- Determination of Iodine value of Fat/oil
- Separation of phospholipids by Thin Layer Chromatography
- Preservation of food by UV-radiation /chemical method
- Estimation of glucose in the given sample

BCH-604 Research Planning & Report Writing 3(1-4)

Course Objective:

- To impart knowledge regarding literature survey and review
- To develop/structure research synopsis for thesis and research grants
- To develop the technical skills for writing research reports, articles and thesis

Course Outline:

- Introduction of research philosophy and types of research
- Extensive literature review to develop new research ideas
- Project selection and its development, role of students & supervisor 75
- Designing and structuring different sections of the synopsis for thesis and research grants •
- Experimental design and investigation, methodology, control, sampling methods
- Primary and secondary data sources
- Data recording, analysis and presentation in the form of suitable and self-explanatory tables and figures
- Interpretation of results and discussion
- Report writing
- Selection of relevant and suitable journals for publishing research papers
- Preparing and submitting research papers according to specific journal formats and requirements
- Review process, reviewer's comments/suggestions, preparing and sending a revised manuscript and acceptance letter.
- Compilation of results and write up of research reports and thesis
- Acknowledgements, conflict of interest, ownership of data, similarity index, plagiarism issues and how to avoid plagiarism
- Preparing and delivering effective scientific presentation
- Written essays, poster preparation and presentation

Recommended Books:

- Graduate research: A guide for students in the science (1998) 3 Rev Sub edition by Robert V. Smith University of Washington Press.
- Writing, Reading & Research Clifford (1985)by R. Veit, and J. Clifford Bobbs-Merrill Educational Pubications.
- Practical Research: Planning & Design (2009) by P.D. Leedy and J.F., Ormrod Publishers: Merrill.
- Research methods: A process of Inquiry by Grazinao &Ranlin (2006)
- Conducting Research Literature Reviews: From the Internet to Paper (2004) by A. G.

Fink. Saga Publications.

BCH-605 Nutritional Biochemistry 3(2-2)

Course Objective:

- Biochemical activities of nutrients and food constituents in human body
- To understand the role of nutrition in health and diseases
- Influence of dietary modification/nutrition intervention during disease process

Course Outline:

- Nutrients structure& functional characteristics
- Role of nutrients in metabolism
- Healthy diet: types and constituents
- Recommended dietary allowance (RDA), adequate intake (AI), tolerable upper intake level, dietary reference intakes for macronutrients and micronutrients
- Estimation of dietary intake (FFQ, 24 hour dietary recall, questionnaires etc)
- Nutritional status biomarkers
- Basic metabolic rate (BMR), body mass index calculations (BMI)
- Respiratory quotient calculations
- Nutritional disorders

Practical:

- Sample collection, processing and storage
- Anthropometric data collection (Weight, Height, BMI)
- Nutritional assessment
- Calculation of basal energy expenditure (BEE)
- Calculation of basal metabolic rate (BMR)
- Dietary analysis using Windiets© software

Semester VIII

Sr. No	Course Code	Course Name	Credit Hours
1	BCH-606	Immunology & Immunochemistry	3(3-0)
2	BCH-607	Current Trends in Biochemistry	3(3-0)
		Optional-III	3 (*-*)
		Optional-IV	3 (*-*)
3	BCH-620	Seminar	1(1-0)

4	BCH-621	Research Project/Internship	3(0-6)

BCH-606 Immunology & Immunochemistry 3(3-0)

Course Outline:

- Theory Introduction to the immune system. Elements of innate & acquired immunity
- immunogens and antigens. Antibody structure and function, antigen-antibody interactions
- genetic basis of antibody structure.
- Biology of the B lymphocyte, the role of MHC in the immune system, biology of the T lymphocyte, activation and function of T and B cells, Control mechanisms in immune response, cytokines, complement, hypersensitivity reactions; type I, II, III, IV.
- Autoimmunity, immunodeficiency and other disorders of the immune system, transplantation immunology, tumor immunology, resistance and immunization to infectious diseases.
- Practical application of immunological function.

Books Recommended:

- Eli Benjamini, Richard Coico, and Geoffery Sunshine. (2000). Immunology: A Short Course. 4th Ed. Wiley-Liss Inc, Canada.
- Cappuccino, J.G. and Sherman, N. (1996). Microbiology. A Laboratory Manual. 4th Ed. Benjamin/Cummings Publishing Co., Inc. N.Y.
- Joklik, W.K., Willert, H.P., Amos, D.B. and Wilfert, C.M. (1996). Zinsser Microbiology. 20th Ed. Appleton and Lange, Norwalk, Connecticut.
- Fleisher, T. A., Schwartz, B. D., Shearer, W. T. and Strober, W. (1995). Clinical Immunology: Principles and Practice. Mosby, London.
- Kurby, J. (1994). Immunology. 2nd Ed. W.H. Freeman and Co., N.Y.
- Stites, D. P., Terr, A. I. and Parslow, T. G. (1994). Basic and Clinical Immunology. Appleton and Lange, Connecticut.
- Riott, I., Brostoff, J. and Male, D. (1993). Immunology. 3rd Ed. Mosby-Year Book, Europe Ltd., London.
- Johnstone, A. and Thorpe, R. (1988). Immunochemistry in Practice. Blackwell Scientific Publications, London.
- Roitt, I. (1988). Essential Immunology. 6th Ed. Blackwell Scientific Publications, MA.

BCH-607 Current Trends in Biochemistry 3(3-0)

Course Outline:

Advanced level course will cover all recent advances in Biochemistry including genomes, proteomics etc.

Books Recommended

- Prennington, S.R and Dunn, M.J. (2002). Proteomics from protein sequence to function Viva book private Ltd. New Delhi.
- Berg J. M. Tymoczko, J. L. and Stryer, L. C. (2002) Biochemistry. W. H. Freeman and Co., New Delhi.
- Mckee, T. Mckee, J.R. (2003), Biochemistry: The Molecular Basis of Life, Mac Graaw Hill.
- Brown, T.A (2002). Genomics, Bios Scientific Publishing Ltd. UK.
- Petsko, G. C. (2004). Protein Structure and Function. Humana Pres, USA.
- Twyman, R.N. (2004). Principles of Proteomics.
- Nelson D. L. and Cox. M.M (2005). Principles of Biochemistry, W.H. Freeman and Company NY
- Liebles, D.G. (2002). Introduction to proteomics.
- Dunham, (2003) Genome mapping and sequencing. Gemome Mapping and Sequencing. Horizon Scientific.

ANNEXURE 2: SURVEY OF GRADUATING STUDENTS

As the Department of Biochemistry initiated in year 2021, No students have graduated and thus survey of Graduating students is not applicable in this case

ANNEXURE 3: ALUMNI SURVEY

As the Department of Biochemistry initiated in year 2021, No students have graduated and thus survey of Alumni Survey is not applicable in this case.

ANNEXURE 4: Employer Survey

As the Department of Biochemistry initiated in year 2021, thus survey of Employer Survey is not applicable in this case.

ANNEXURE 5: FACULTY RESUME

Name	**Farah Tawakkal**
Personal Information	Father's Name: Tawakkal Hussain Email: farahtawakkal78@gmail.com Mobile: 0331-6997149 Date of Birth: 13-10-1995 Qualification: MPhil Address: House# 68, F block Burewala

Experience

1 years

Title: Lecturer
Institution: Government college for Women Burewala
Job Description: teach chemistry and allied subjects to f.sc students

6 months
Title: Teacher
Institution: American Lyc stuff Academy
Job Description: Science teacher

Honor and Awards

	Awarded with laptop and scholarships

Memberships

	N/A

Honour Students

	N/A

Service Activity

	N/A

Brief Statement of Research Interest

	Development of Transgenic Chlamydomonas reinhardtii expressing codon optimized interferon lamda 1 also known as inter leukin 29 (IL29)

Publications

Research Grants and Contracts

	N/A

Other Research or Creative Accomplishments

	N/A

Selected Professional Presentations

	N/A

Name	**Munaza Shaheen**
Personal Information	Father's Name: M. Rafiq Email: munazashaheen03@gmail.com

Mobile: 0304-2480767
Date of Birth: 27-03-1995
Qualification: MPhil
Address: Shah Faiz park, House no 153 Street no 2 Burewala.

Experience

4 years

Title: Lecturer
Institution: University of Agriculture Burewala campus
Job Description: teach biochemistry related subjects to undergraduate students

1 year

Title: Teacher
Institution: Gift College Burewala
Job Description: teach chemistry to undergraduate students

Honor and Awards

N/A

Memberships

N/A

Honour Students

N/A

Service Activity

N/A

Brief Statement of Research Interest

The Genotypic Distribution pattern of HCV and the Association with viral load

Publications

1

Research Grants and Contracts

N/A

Other Research or Creative Accomplishments

N/A

Selected Professional Presentations

N/A

Name	Sehar Javed

Personal Information	Father's Name: Javed Akhtar Email: diyajaved786@gmail.com Mobile: 03326558486 Date of Birth: 8-3-1990 Qualification: MPhil Address: Model Town 437 burewala

Experience

2 years

Title: Lecturer
Institution: Sir Syed College Chichawatni
Job Description: Botany and biology subject lecturer

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3 years
Title: Lecturer
Institution: University of Education
Job Description: lecturer (botany + basic agriculture)

Honor and Awards	
	N/A
Memberships	
	N/A
Honour Students	
	N/A
Service Activity	
	N/A
Brief Statement of Research Interest	
	N/A
Publications	
Research Grants and Contracts	
	N/A
Other Research or Creative Accomplishments	
	N/A
Selected Professional Presentations	
	N/A

Name	**Muhammad Qamar Fareed**		
Personal	**Address: Anwar town street No 1**, **Burewala, Pakistan** Contact No.**03347194044** Email: **qamarfareed49@gmail.com**		
Qualification	**M.phil Statistics**		
Experience	**Date**	**Title**	**Institution**
	April, 2014-Present	**Permanent Lecturer**	PMAS-Barani Institute of Sciences, Burewala (Pakistan)
	October, 2012-May, 2013	**Visiting Lecturer**	Govt. Commerce College, Burewala (Pakistan)
Honor and Awards	**Part of different societies to organize events at NCB&E-National College of Business Administration and Economics.**		
Memberships			
Graduate Students Postdocs Undergraduate Students Honor Students	Years	Degree	Name
	N/A		
Service Activity	N/A		
Brief Statement of Research Interest	**Forecasting for Cultivated Area and Production of Sesame in Pakistan using ARIMA Model**		
Publications	N/A		
Research Grants And Contracts	N/A		
Other Research Or Creative Accomplishments	N/A		
Selected Professional Presentations	N/A		

Name	**MUHAMMAD SAJID S/O GULZAR AHMAD**
Personal	Address: HOUSE NO. 562, STREET NO. 20, HABIB COLONY, TEHSIL BUREWALA, DISTRICT VEHARI. Contact No. 0332-7105641 Email: BZUSAJID@GMAIL.COM

Qualification	MS MATHEMATICS		
Experience	**Date**	**Title**	**Institution**
	01-JUL-2017 to 31-DEC-2018	Lecturer of Mathematics	HCCS Educational System, Islamabad
Honor and Awards	Awarded Laptop by Prime Minster Laptop Scheme.		
Memberships	Event Organizer in University.		
Graduate Students Postdocs Undergraduate Students Honor Students	Years	Degree	Name
	N/A		
Service Activity	N/A		
Brief Statement of Research Interest	N/A		
Publications	N/A		
Research Grants And Contracts	N/A		
Other Research Or Creative Accomplishments	N/A		
Selected Professional Presentations	N/A		

Name	**Muhammad Ahmad**		
Personal	Address: Chah boote wala P/O boonga machi tehsil Minchiabad Contact No.03428535092 Email: ahmadjammo555@gmail.com		
Qualification	MSCS		
Experience	**Date**	**Title**	**Institution**
	24/03/2015 To 10/01/2016	Web Developer	EIGLOU SOFTWARE HOUSE
	01/02/2016 To 30/09/2017	Team Lead	TECHNOJIN SOLUTIONS

			SOFTWARE HOUSE
	09/10/2017 To continue	Lecturer	BIS Burewala
Honor and Awards	On Spot programming competition Winner 2014 COMSATS University		
Memberships	Stack Overflow, Quera		
Graduate Students Postdocs Undergraduate Students Honor Students	Years	Degree	Name
	N/A		
Service Activity	Lecturer and Final Year Project Incharge		
Brief Statement of Research Interest	Keen to work on different DBMSs , SQL injection and query Optimization		
Publications	N/A		
Research Grants And Contracts	N/A		
Other Research Or Creative Accomplishments	N/A		
Selected Professional Presentations	N/A		

Name	**Wasim Sarwar**		
Personal	Address: chak no 259 E.B lot no 2 tehsil burewala district Vehari Contact No. 0321-6997258 Email: wasimsarwar259@gmail.com		
Qualification	M.Phil history		
Experience	**Date**	**Title**	**Institution**
	01-10-2013	31-05-2014	Govt College chichawatni
	01-10-2014	10-04-2015	
Honor and Awards			
Memberships			
Graduate Students Postdocs Undergraduate Students Honor Students	Years	Degree	Name
Service Activity	Lecturer Pakistan studies		

Brief Statement of Research Interest	
Publications	In queue
Research Grants and Contracts	N/A
Other Research or Creative Accomplishments	N/A
Selected Professional Presentations	N/A

ANNEXURE 6: FACULTY COURSE REVIEW REPORT

Performa2

FacultyCourse Review Report

(Tobefilledbyeachteacheratthetime ofCourseCompletion)

Forcompletionbythecourseinstructorandtransmissiontoh eadofDepartmentofhis/hernominee(Dept.Quality Officer) together with copiesof the Course Syllabus outline

Department:	Biochemistry		Faculty:	Life Sciences	
Course Code:	STAT-301	Title:	Statistics & Biometery		
Session:	Spring 2022	Semester:	Autumn ☐	Spring ☑	Summer ☐
CreditValue:	3(3-0)	Level:	BCH. 2nd	Prerequisites:	None.
Nameof Course Instructor:	Qamar Fareed	No.of Students Contact Hours	Lectures 16	Other(PleaseState)	
			Seminars	None.	
AssessmentMethods: give precise details (no & length ofassignments,exams,weightingsetc)			Assignments + Quizes : 20%. Mid term : 30%. Final term : 50%.		

DistributionofGrade/MarksandotherOutcomes:(adoptthegradingsystemasrequired)

Undergraduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	F	No Grade	Withdrawal	Total
No.ofStudents	17	35%.	41%.	17.6%.	5.8%.					
Post-Graduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	NoGrade		Withdrawal	Total
No.ofStudents										

Performa2

FacultyCourse Review Report

(Tobefilledbyeachteacheratthetime ofCourseCompletion)

Forcompletionbythecourseinstructorandtransmissiontoo HeadofDepartmentofhis/hernominee(Dept.Quality Officer) together with copiesof the Course Syllabus outline

Department:	Biochemistry		Faculty:	Life Sciences	
Course Code:	CS-301	Title:	Introduction to Computing		
Session:	Spring 2022	Semester:	Autumn ☐	Spring ☑	Summer ☐
CreditValue:	3(2-2)	Level:	BCH. 2nd	Prerequisites:	None
Nameof Course Instructor:	Mohammad Ahmad	No.of Students Contact Hours	Lectures 32	Other(PleaseState)	
			Seminars	None	
AssessmentMethods: give precise details (no & length ofassignments,exams,weightingsetc)		Assignments + Quizzes : 20%. Mid term : 30%. Final term : 50%.			

DistributionofGrade/MarksandotherOutcomes:(adoptthegradingsystemasrequired)

Undergraduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	F	No Grade	Withdrawal	Total
No.ofStudents	17	17.6%	52.9%	29.4%						
Post-Graduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	NoGrade		Withdrawal	Total
No.ofStudents										

Performa2

FacultyCourse Review Report

(Tobefilledbyeachteacheratthetime ofCourseCompletion)

Forcompletionbythecourseinstructorandtransmissiontoo HeadofDepartmentofhis/hernominee(Dept.Quality Officer) together with copiesof the Course Syllabus outline

Department:	Biochemistry		Faculty:	Life Sciences	
Course Code:	BCH-307	Title:	Introduction to Bioenergetics		
Session:	Spring 2022	Semester:	Autumn ☐	Spring ☒	Summer ☐
CreditValue:	2(2-0)	Level:	BCH 2nd	Prerequisites:	None
Nameof Course Instructor:	Sabar Javed	No.of Students Contact Hours	Lectures 16	Other(PleaseState)	
			Seminars	None	
AssessmentMethods: give precise details (no & length ofassignments,exams,weightingsetc)		Assignments + Quizes : 20%. Mid term : 30%. Final term : 50%.			

DistributionofGrade/MarksandotherOutcomes:(adoptthegradingsystemasrequired)

Undergraduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	F	No Grade	Withdrawal	Total
No.ofStudents	17	35%	41.17%	23.5%						
Post-Graduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	NoGrade		Withdrawal	Total
No.ofStudents										

Performa2

FacultyCourse Review Report

(Tobefilledbyeachteacheratthetime ofCourseCompletion)

Forcompletionbythecourseinstructorandtransmissiontoheadof Departmentofhis/hernominee(Dept./Quality Officer) together with copiesof the Course Syllabus outline

Department:	Biochemistry		Faculty:	Life Science I	
Course Code:	BCH-304	Title:	Inorganic Chemistry		
Session:	Spring 2022	Semester:	Autumn ☐	Spring ☑	Summer ☐
CreditValue:	3(2-2)	Level:	BCH - 2nd	Prerequisites:	None
Nameof Course Instructor:	Hina Anjum	No.of Students Contact Hours	Lectures 32	Other(PleaseState)	
			Seminars	None	
AssessmentMethods: give precise details (no & length ofassignments,exams,weightingetc)		Assignments + Quizes : 20%. Mid term : 30%. Final term : 50%.			

DistributionofGrade/MarksandotherOutcomes:(adoptthegradingsystemasrequired)

Undergraduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	F	No Grade	Withdrawal	Total
No.ofStudents	17	35%.	47%.	17.6%.						
Post-Graduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	NoGrade		Withdrawal	Total
No.ofStudents										

Performa2

FacultyCourse Review Report

(Tobefilledbyeachteacheratthetime ofCourseCompletion)

Forcompletionbythecourseinstructorandtransmissiontoheadofdepartmentofhis/hernominee(Dept.Quality Officer) together with copiesof the Course Syllabus outline

Department:	Biochemistry		Faculty:	Life Sciences	
Course Code:	BCH-306	Title:	General Microbiology		
Session:	Spring 2022	Semester:	Autumn ☐	Spring ☑	Summer ☐
CreditValue:	3(2-1)	Level:	BCH-3rd	Prerequisites:	None.
Nameof Course Instructor:	Mohsin Abbas	No.of Students Contact Hours	Lectures 30	Other(PleaseState)	
			Seminars	None	
AssessmentMethods: give precise details (no & length ofassignments,exams,weightingetc)			Assignments + Quizes : 20% Mid term : 30% Final term : 50%		

DistributionofGrade/MarksandotherOutcomes:(adoptthegradingsystemasrequired)

Undergraduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	F	No Grade	Withdrawal	Total
No.ofStudents	17	11.7%	11.7%	41%	35%					
Post-Graduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	NoGrade		Withdrawal	Total
No.ofStudents										

Performa2

FacultyCourse Review Report

(Tobefilledbyeachteacheratthetime ofCourseCompletion)

Forcompletionbythecourseinstructorandtransmissiontoheadof Departmentofhis/hernominee(Dept.Quality Officer) together with copiesof the Course Syllabus outline

Department:	Biochemistry		Faculty:	Life Sciences	
Course Code:	BCH-305	Title:	Molecular Biology		
Session:	Spring 2022	Semester:	Autumn ☐	Spring ☑	Summer ☐
CreditValue:	3(2-2)	Level:	BS 2nd	Prerequisites:	None
Nameof Course Instructor:	Farah Tanveer	No.of Students Contact Hours	Lectures 32	Other(PleaseState)	
			Seminars	(2) Cancer awareness + 3D Model Competition	
AssessmentMethods: give precise details (no & length ofassignments,exams,weightingsetc)		Assignments + Quizes 20% Mid term 30% Final term 50%			

DistributionofGrade/MarksandotherOutcomes:(adoptthegradingsystemasrequired)

Undergraduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	F	No Grade	Withdrawal	Total
No.ofStudents	17	29.4%	29.41%	41.1%						
Post-Graduate	Originally Registered	%Grade A	%Grade B	%Grade C	D	E	NoGrade		Withdrawal	Total
No.ofStudents										