PIR MEHR ALI SHAH
ARID AGRICULTURE UNIVERSITY
RAWALPINDI

DEPARTMENT OF BIOCHEMISTRY

Self Assessment Report
(Period of Report)

Program Self Assessment Team

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Introduction

The discipline of Biochemistry in PMAS-AAUR was introduced as a separate Department in 2003. Earlier it was under the umbrella of the Department of Biological Sciences, under which M.Sc. and Ph.D. degree programmes were started in 1998 and 2001 respectively. M.Phil degree programme was initiated in year 2006. The Department has highly competent and qualified faculty, most of whom by the Department of Biochemistry have post doctoral experience from reputable International Universities/Institutes and five out of seven faculty members are HEC approved supervisors for Indigenous Ph.D. programme. The faculty has produced many publications in journals of international repute. The faculty members have specialization in the field of Biochemistry, Environmental Biochemistry, Molecular Biology, Biotechnology, Protein Chemistry and Enzymology. Presently the total strength of students in the Department is 173.

The courses offered for the degrees programs provide the students not only extensive exposure of basic Biochemistry but also of Molecular Biology and Biotechnology, to face the future challenges. As a result the Department has established good repute in a very short period of time. The Department has seven HEC sponsored Ph.D students. To strengthen the academic and research activities, Department has an active collaboration with University of California Davis, USA and Iowa State University, Iowa, USA. The Department is further in process of developing active collaboration with Universities in UK.

The program of Biochemistry is designed to provide necessary skills and knowledge in applying biochemical and molecular approaches for solution of problems related to health, agriculture and environment.

With the latest development in the field of Biochemistry, the department regularly updates its curriculum by keeping in view the recent advances in Biochemistry. The department offers a variety of study programs to enhance students’ professional training and career opportunities. It regularly holds national and international training workshop, seminars to exchange knowledge and views. The faculty is actively engaged in a number of research projects; some of which are internationally collaborated and funded.

This Self Assessment Report (SAR) contains eight sections. The first section outlines the program mission and objectives. Section-2 provides information about the curriculum development. Section-3 enlists the laboratories and other relevant information. The last four sections provide information about student support, process control, faculty characteristics and institutional facilities and support provided by the university.
SECTION 1:

Components of Self Assessment Process:
This Self Assessment has been prepared on the basis of following eight criteria as described in Self Assessment Manual.

Criterion-1: Program Mission, Objectives and Outcomes

Introduction
The discipline of Biochemistry deals with the Molecular Biology, Genetic Engineering and Biotechnology. There are four main and broad research domains in the department which are mainly focusing on the human and animal biochemistry and as well as plant and environment biotechnology.

Mission Statement of the Department of Biochemistry:
The mission of Department of Biochemistry is to deliver quality teaching and to conduct basic and applied research.

Standard 1-1: Documented measurable objectives

Strategic objectives of the department are as below:

1. To carry out teaching and research programs
2. To train young scientists and research students with advanced techniques in Biochemistry, Molecular Biology, Genetic Engineering and Biotechnology
3. To provide facilities for advanced research in Biochemistry, Molecular Biology and Biotechnology
4. To train academician and scientists of other Universities and Institutes through seminars and workshops
5. To conduct scientific meetings/conferences/workshops/seminars to facilitate exchange of ideas between scientists and transfer of technology

Objectives/Outcomes

1. To produce different lot of students and researchers e.g. M.Sc. M.Phil and Ph.D in Biochemistry and Biotechnology,
2. To make the students and researchers to handle the different techniques independently.
3. Different institutes and universities used the facility of advance techniques for their research problems like Sequencer, PCR.
4. Approximately seven workshops and seminars has been organized since 2004
5. Different scientific meetings and conferences has been organized to facilitate exchange of ideas.

Main elements of strategic plan to achieve mission and objectives

1. Post-graduate research with reports and theses
2. Setting up of well equipped specialized research laboratories depending on the available resources.
3. Development of a sound teaching system for the award of degrees based on the experience and vision gathered from world reviews, literature, innovations, proceedings, symposia etc
4. Publication of scientific papers, books, manuals etc.
5. Designing and constantly updating the curricula involving core subjects, elective subjects and specialized areas and study tours.
6. Implementation of research projects funded by the universities and other agencies.
7. Development of linkages with National and International research organizations to foster research.
### TABLE-1: PROGRAM OBJECTIVES ASSESSMENT

<table>
<thead>
<tr>
<th>S. #</th>
<th>Objective</th>
<th>How Measured</th>
<th>When Measured</th>
<th>Improvement Identified</th>
<th>Improvement made</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To carry out teaching and research programs</td>
<td>On the basis of evaluation by students.</td>
<td>It is a continuous process as per requirement</td>
<td>Course Contents</td>
<td>Course contents time to time and more audio visuals aids are being improved</td>
</tr>
<tr>
<td>2</td>
<td>To train young scientists and research students with advanced techniques in Biochemistry, Molecular Biology, Genetic Engineering and Biotechnology</td>
<td>Pre requisite information and status of knowledge of researchers and students through entry tests and student feedback</td>
<td>At the end of semester</td>
<td>Regular update curriculum</td>
<td>Revision of curriculum as per requirement. Scheme of Studies revised from time to time</td>
</tr>
<tr>
<td>3</td>
<td>To provide facilities for advanced research in Biochemistry, Molecular Biology and Biotechnology</td>
<td>Assessing interest of researcher and students</td>
<td>During routine exchange of various discussions</td>
<td>Students to make presentations and reports</td>
<td>Presentations, seminars, communication skill development</td>
</tr>
<tr>
<td>4</td>
<td>To conduct scientific meetings/conferences/workshops/seminars to facilitate exchange of ideas between scientists and transfer of technology</td>
<td>By inviting applications through proper channels</td>
<td>At the time of completion of seminars and workshops</td>
<td>By regular conducting seminars and workshops</td>
<td>Workshops and Seminars are conducted frequently</td>
</tr>
<tr>
<td>5</td>
<td>To train academician and scientists of other Universities and Institutes through seminars and workshops e.t.c</td>
<td>At the time of starting research and academic sessions</td>
<td>At the completion of research thesis</td>
<td>More need is required to trained academician and scientists</td>
<td>Academician and Scientists are trained</td>
</tr>
</tbody>
</table>

### TABLE-2  STANDARD 1-2: OBJECTIVES VS OUTCOMES

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sr. No.</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>1</td>
<td>++</td>
</tr>
<tr>
<td>2</td>
<td>++</td>
</tr>
<tr>
<td>3</td>
<td>++</td>
</tr>
<tr>
<td>4</td>
<td>++</td>
</tr>
<tr>
<td>5</td>
<td>++</td>
</tr>
</tbody>
</table>

Key:  ++  = Relevant  
      +++  =
The program outcomes are fully supportive to program objectives mentioned above. Outcomes are based on actual details obtained from department documents.

**Program Assessment Results:**

**Teachers’ Evaluation**

**Result of Proforma 10 of Teacher 1,**

The teachers were evaluated by the students at the end of the semester in accordance with Proforma-10. In the graph teachers are represented as 1, 2, 3…, instead of mentioning their names. The overall compiled results of teacher-1 showed that the strongest point of the teacher 1 is the “The Instructor shows the respect towards students and encourages class participation” who secured 70% and 29% the strongest agree towards this point.
The Instructor gives citations regarding current situations
With reference to Pakistani context:
- S.A: 23%
- A: 34%
- UC: 4%
- D: 11%
- S.D: 28%

The Instructor communicates the subject matter effectively:
- S.A: 40%
- A: 54%
- UC: 4%
- D: 2%
- S.D: 0%

The Instructor shows respect towards students and encourages class participation:
- S.A: 29%
- A: 0%
- UC: 0%
- D: 0%
- S.D: 71%

The Instructor maintains an environment that is conducive to learning:
- S.A: 33%
- A: 5%
- UC: 0%
- D: 0%
- S.D: 62%

The Instructor arrives on time:
- S.A: 30%
- A: 30%
- UC: 0%
- D: 0%
- S.D: 66%
The Instructor was available during the specified office hours and for after class consultations.

- 65%
- 31%
- 2%
- 2%
- 0%

S.A
A
UC
D
S.D

The Instructor leaves on time

- 67%
- 27%
- 4%
- 2%
- 0%

S.A
A
UC
D
S.D

The Instructor is fair in examination

- 61%
- 31%
- 8%
- 0%
- 0%

S.A
A
UC
D
S.D

The Instructor returns the graded scripts, etc in a reasonable amount of time.

- 49%
- 39%
- 10%
- 2%
- 0%

S.A
A
UC
D
S.D

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

- 65%
- 31%
- 2%
- 2%
- 0%

S.A
A
UC
D
S.D

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

- 59%
- 37%
- 2%
- 2%
- 0%

S.A
A
UC
D
S.D
The syllabus clearly states course objectives, requirements, procedures, and grading criteria.

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

The assignments and exams covered the materials presented in the course.

The course material is modern and updated.
Result of Proforma 10 of Teacher 2,
The overall compiled results of teacher-2 showed that the strongest point of the teacher 2 is the “The Instructor demonstrates knowledge of the subject” who secured 64% in the favour of agree and 20% the strongly disagree towards this point.

The Instructor is prepared for each class

The Instructor demonstrates knowledge of the subject

The Instructor has completed the whole course

The Instructor provides additional material apart from text

The Instructor gives citations regarding current situations With reference to Pakistani context
The Instructor communicates the subject matter effectively

- 17% S.A
- 34% A
- 25% UC
- 41% D
- 15% S.D

The Instructor shows respect towards students and encourages class participation.

- 31% S.A
- 34% A
- 23% UC
- 46% D

The Instructor maintains an environment that is conducive to learning.

- 23% S.A
- 46% A
- 23% UC
- 8% D
- 0% S.D

The Instructor arrives on time

- 38% S.A
- 12% A
- 0% UC
- 46% D
- 4% S.D

The Instructor leaves on time

- 15% S.A
- 0% A
- 0% UC
- 38% D
- 47% S.D
The Instructor is fair in examination

The Instructor returns the graded scripts, etc in a reasonable amount of time.

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

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

The syllabus clearly states course objectives requirements procedures and grading criteria.
The course integrates theoretical course concepts with real-world applications.

The assignments and exams covered the materials presented in the course.

The course material is modern and updated.
Result of Proforma 10 of Teacher 3,
The overall compiled results of Teacher-3 showed that the strongest point of the teacher is the “The Instructor returns the graded scripts etc in a reasonable amount of time” who secured 51% in the favour of agree.
The Instructor communicates the subject matter effectively

The Instructor shows respect towards students and encourages class participation.

The Instructor maintains an environment that is conducive to learning.

The Instructor arrives on time

The Instructor leaves on time
The Instructor is fair in examination

The Instructor returns the graded scripts, etc in a reasonable amount of time.

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

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

The syllabus clearly states course objectives, requirements, procedures and grading criteria.
The course integrates theoretical course concepts with real-world applications.

The assignments and exams covered the materials presented in the course.

The course material is modern and updated.
Result of Proforma 10 of Teacher 4,
The overall compiled results of Teacher-4 showed that the strongest point of the teacher 4 is the “The Instructor maintain the an environment that is conducive to learning” who secured 44% in the favour of agree and 8% e strongly disagree towards this point.
The Instructor communicates the subject matter effectively

- 35%: S.A
- 25%: A
- %: UC
- 17%: D
- 8%: S.D

The Instructor shows respect towards students and encourages class participation.

- 46%: S.A
- 17%: A
- 8%: UC
- 6%: D
- 8%: S.D

The Instructor maintains an environment that is conducive to learning.

- 44%: S.A
- 25%: A
- 17%: UC
- 11%: D
- 8%: S.D

The Instructor arrives on time

- 42%: S.A
- 17%: A
- 11%: UC
- 11%: D
- 8%: S.D

The Instructor leaves on time

- 34%: S.A
- 31%: A
- 15%: UC
- 8%: D
- 12%: S.D
The Instructor is fair in examination

The Instructor returns the graded scripts. etc in a reasonable amount of time.

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

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

The syllabus clearly states course objectives requirements procedures and grading criteria.
The course integrates theoretical course concepts with real-word applications.

The assignments and exams covered the materials presented in the course.

The course material is modern and updated.
Result of Proforma 10 of Teacher 5

The overall compiled results of Teacher-5 showed that the strongest point of the teacher 5 is the “The Instructor shows respect towards students and encourages class participation” who secured 77% in the favour of agree and 2% strongly disagree towards this point.
The Instructor communicates the subject matter effectively

- 67% S.A
- 17% A
- 4% UC
- 2% D
- 10% S.D

The Instructor shows respect towards students and encourages class participation.

- 77% S.A
- 11% A
- 6% UC
- 4% D
- 2% S.D

The Instructor maintains an environment that is conducive to learning.

- 68% S.A
- 12% A
- 8% UC
- 2% D
- 10% S.D

The Instructor arrives on time

- 66% S.A
- 17% A
- 13% UC
- 0% D
- 4% S.D

The Instructor leaves on time

- 39% S.A
- 39% A
- 6% UC
- 2% D
- 6% S.D
The Instructor is fair in examination

- 59% agree
- 33% neutral
- 2% disagree
- 4% strongly disagree

The Instructor returns the graded scripts, etc in a reasonable amount of time.

- 69% agree
- 16% neutral
- 14% disagree
- 8% strongly disagree

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

- 62% agree
- 16% neutral
- 14% disagree
- 8% strongly disagree

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

- 58% agree
- 22% neutral
- 16% disagree
- 4% strongly disagree

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

- 64% agree
- 34% neutral
- 6% disagree
- 6% strongly disagree
The course integrates theoretical course concepts with real-word applications.

- S.A: 49%
- A: 18%
- UC: 18%
- D: 4%
- S.D: 11%

The assignments and exams covered the materials presented in the course.

- S.A: 71%
- A: 18%
- UC: 7%
- D: 0%
- S.D: 4%

The course material is modern and updated.

- S.A: 61%
- A: 16%
- UC: 16%
- D: 5%
- S.D: 2%
Student Course Evaluation:

Results of Proforma No. 1 of Teacher 1
The course of the respective teacher was evaluated as per Proforma 1. The results are shown in graphs below. The level of satisfaction of students regarding course taught by Teacher No. 1, is satisfactory and level of satisfaction of student is 59%.

The course objectives were clear

- 35% S.A
- 13% A
- 9% UC
- 2% D
- 41% S.D

The course workload was manageable

- 34% S.A
- 13% A
- 18% UC
- 17% D
- 18% S.D

The course was well organized (e.g. timely access to materials, notification of changes, etc.)

- 33% S.A
- 23% A
- 26% UC
- 10% D
- 8% S.D

Approximate level of your own attendance during the whole course.

- 72% S.A
- 17% A
- 6% UC
- 4% D
- 4% S.D

I participated actively in the course

- 47% S.A
- 24% A
- 19% UC
- 7% D
- 3% S.D
I think I have made progress in this course

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

The learning and teaching methods encouraged participation.

The overall environment in the class was conducive to learning.

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

- 34%
- 48%
- 14%
- 2%
- 2%

Recommended reading books etc. were relevant and appropriate.

- S.A
- A
- UC
- D
- S.D

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

- S.A
- A
- UC
- D
- S.D

The provision of learning resources on the web was adequate and appropriate. (if relevant)

- S.A
- A
- UC
- D
- S.D

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

- S.A
- A
- UC
- D
- S.D
The pace of the course was appropriate

Ideas and concepts were presented clearly

The method of assessment were reasonable

Feedback on assessment was timely

Feedback on assessment was helpful
I understood the lectures

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.A.</td>
<td>1%</td>
</tr>
<tr>
<td>A</td>
<td>5%</td>
</tr>
<tr>
<td>UC</td>
<td>21%</td>
</tr>
<tr>
<td>D</td>
<td>22%</td>
</tr>
<tr>
<td>S.D.</td>
<td>51%</td>
</tr>
</tbody>
</table>

The material was well organized and presented

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.A.</td>
<td>0%</td>
</tr>
<tr>
<td>A</td>
<td>10%</td>
</tr>
<tr>
<td>UC</td>
<td>17%</td>
</tr>
<tr>
<td>D</td>
<td>57%</td>
</tr>
<tr>
<td>S.D.</td>
<td>16%</td>
</tr>
</tbody>
</table>

The instructor was responsive to student needs and problems

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.A.</td>
<td>2%</td>
</tr>
<tr>
<td>A</td>
<td>8%</td>
</tr>
<tr>
<td>UC</td>
<td>28%</td>
</tr>
<tr>
<td>D</td>
<td>47%</td>
</tr>
<tr>
<td>S.D.</td>
<td>15%</td>
</tr>
</tbody>
</table>

Had the instructor been regular throughout the course?

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.A.</td>
<td>2%</td>
</tr>
<tr>
<td>A</td>
<td>4%</td>
</tr>
<tr>
<td>UC</td>
<td>46%</td>
</tr>
<tr>
<td>D</td>
<td>48%</td>
</tr>
<tr>
<td>S.D.</td>
<td>0%</td>
</tr>
</tbody>
</table>

The material in the tutorials was useful

<table>
<thead>
<tr>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.A.</td>
<td>1%</td>
</tr>
<tr>
<td>A</td>
<td>9%</td>
</tr>
<tr>
<td>UC</td>
<td>26%</td>
</tr>
<tr>
<td>D</td>
<td>58%</td>
</tr>
<tr>
<td>S.D.</td>
<td>6%</td>
</tr>
</tbody>
</table>
I was happy with the amount of work needed for tutorials

The tutor dealt effectively with my problems

The materials in practical was useful

The demonstrators dealt effectively with my problems.
Results of Proforma No. 1 of Teacher 2

The course of the respective teacher was evaluated as per Proforma 1. The results are shown in graph below. The level of satisfaction of students regarding course taught by Teacher No. 2, is satisfactory and level of satisfaction of student is 36%.

- **The course objectives were clear**
  - 49% Very Clear
  - 27% Clear
  - 12% Somewhat Clear
  - 4% Clear
  - 8% Not Clear

- **The course workload was manageable**
  - 54% Manageable
  - 21% Somewhat Manageable
  - 13% Clear
  - 4% Somewhat Clear
  - 8% Not Manageable

- **The course was well organized (e.g. timely access to materials, notification of changes, etc.)**
  - 29% Well Organized
  - 29% Somewhat Well Organized
  - 25% Clear
  - 4% Somewhat Clear
  - 0% Not Well Organized

- **Approximate level of your own attendance during the whole course.**
  - 47% Regular
  - 38% Somewhat Regular
  - 5% Clear
  - 0% Somewhat Clear
  - 10% Not Regular

- **I participated actively in the course**
  - 62% Active
  - 15% Somewhat Active
  - 15% Clear
  - 0% Somewhat Clear
  - 8% Not Active
I think I have made progress in this course

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

The learning and teaching methods encouraged participation.

The overall environment in the class was conducive to learning.

Classrooms were satisfactory

Learning materials (lesson plans, course notes etc.) were relevant and useful.
Recommended reading books etc. were relevant and appropriate.

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

The provision of learning resources on the web was adequate and appropriate. (if relevant)

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

The pace of the course was appropriate.

Ideas and concepts were presented clearly.
The method of assessment were reasonable

Feedback on assessment was timely

Feedback on assessment was helpful

I understood the lectures

The material was well organized and presented
<table>
<thead>
<tr>
<th>Question</th>
<th>S.A</th>
<th>A</th>
<th>UC</th>
<th>D</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instructor was responsive to student needs and problems</td>
<td>20%</td>
<td>44%</td>
<td>24%</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>Had the instructor been regular throughout the course?</td>
<td>20%</td>
<td>44%</td>
<td>28%</td>
<td>0%</td>
<td>8%</td>
</tr>
<tr>
<td>The material in the tutorials was useful</td>
<td>17%</td>
<td>29%</td>
<td>50%</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td>I was happy with the amount of work needed for tutorials</td>
<td>4%</td>
<td>55%</td>
<td>29%</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>The tutor dealt effectively with my problems</td>
<td>5%</td>
<td>47%</td>
<td>48%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
The materials in practical was useful

- 12% S.A
- 12% A
- 24% UC
- 40% D
- 12% S.D

The demonstrators dealt effectively with my problems.

- 7% S.A
- 7% A
- 29% UC
- 43% D
- 14% S.D
Results of Proforma No. 1 of Teacher 3
The course of the respective teacher was evaluated as per Proforma 1. The results are shown in graph below. The level of satisfaction of students regarding course taught by Teacher No. 3, is satisfactory and level of satisfaction of student is 54%.
I think I have made progress in this course

- 30% S.A
- 26% A
- 26% UC
- 9% D
- 9% S.D

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

- 48% S.A
- 22% A
- 18% UC
- 6% D
- 6% S.D

The learning and teaching methods encouraged participation.

- 38% S.A
- 13% A
- 33% UC
- 11% D
- 5% S.D

The overall environment in the class was conducive to learning.

- 28% S.A
- 26% A
- 26% UC
- 2% D
- 2% S.D

Classrooms were satisfactory

- 49% S.A
- 43% A
- 2% UC
- 2% D
- 4% S.D

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

- 46% S.A
- 48% A
- 2% UC
- 2% D
- 4% S.D
Recommended reading books etc. were relevant and appropriate.

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

The provision of learning resources on the web was adequate and appropriate. (if relevant)

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

The pace of the course was appropriate.
Ideas and concepts were presented clearly

The method of assessment were reasonable

Feedback on assessment was timely

Feedback on assessment was helpful

I understood the lectures

The material was well organized and presented
The instructor was responsive to student needs and problems

- 77%
- 21%
- 2%
- 0%
- 0%

Had the instructor been regular throughout the course?

- 46%
- 31%
- 15%
- 8%
- 0%
- 0%

The material in the tutorials was useful

- 76%
- 14%
- 8%
- 2%
- 0%

I was happy with the amount of work needed for tutorials

- 43%
- 30%
- 21%
- 6%
- 0%

The tutor dealt effectively with my problems

- 37%
- 49%
- 0%
- 2%
- 0%
- 12%
The materials in practical was useful

The demonstrators dealt effectively with my problems.
Results of Proforma No. 1 of Teacher 4

The course of the respective teacher was evaluated as per Proforma 1. The results are shown in graph below. The level of satisfaction of students regarding course taught by Teacher No. 4, is satisfactory and level of satisfaction of student is 58%.

The course objectives were clear

- S.A: 5%
- A: 25%
- UC: 47%
- D: 18%
- S.D: 5%

The course workload was manageable

- S.A: 22%
- A: 5%
- UC: 33%
- D: 17%
- S.D: 23%

The course was well organized (e.g. timely access to materials, notification of changes, etc.)

- S.A: 22%
- A: 3%
- UC: 33%
- D: 25%
- S.D: 17%

Approximate level of your own attendance during the whole course.

- S.A: 61%
- A: 34%
- UC: 3%
- D: 2%
- S.D: 0%

I participated actively in the course

- S.A: 65%
- A: 18%
- UC: 8%
- D: 6%
- S.D: 3%
I think I have made progress in this course

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

The learning and teaching methods encouraged participation.

The overall environment in the class was conducive to learning.

Classrooms were satisfactory

Learning materials (lesson plans, course notes etc.) were relevant and useful.
Recommended reading books etc. were relevant and appropriate.

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

The provision of learning resources on the web was adequate and appropriate. (if relevant)

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

The pace of the course was appropriate
Ideas and concepts were presented clearly

- 21%
- 48%
- 14%
- 14%
- 3%

S.A
A
UC
D
S.D

The method of assessment were reasonable

- 10%
- 67%
- 20%
- 3%
0%

S.A
A
UC
D
S.D

Feedback on assessment was timely

- 7%
- 49%
- 29%
- 12%
- 3%

S.A
A
UC
D
S.D

Feedback on assessment was helpful

- 9%
- 50%
- 29%
- 5%
- 7%

S.A
A
UC
D
S.D

I understood the lectures

- 15%
- 68%
- 14%
- 10%
- 3%

S.A
A
UC
D
S.D
The material was well organized and presented

- 51% S.A
- 19% A
- 14% UC
- 14% D
- 2% S.D

The instructor was responsive to student needs and problems

- 50% S.A
- 18% A
- 16% UC
- 14% D
- 2% S.D

Had the instructor been regular throughout the course?

- 44% S.A
- 22% A
- 13% UC
- 16% D
- 5% S.D

The material in the tutorials was useful

- 59% S.A
- 21% A
- 12% UC
- 8% D
- 0% S.D

I was happy with the amount of work needed for tutorials

- 32% S.A
- 28% A
- 28% UC
- 6% D
- 6% S.D
The tutor dealt effectively with my problems

- 6% S.A
- 6% A
- 32% UC
- 28% D
- 28% S.D

The materials in practical was useful

- 7% S.A
- 14% A
- 19% UC
- 46% D
- 14% S.D

The demonstrators dealt effectively with my problems.

- 9% S.A
- 5% A
- 20% UC
- 50% D
- 16% S.D
Results of Proforma No. 1 of Teacher 5

The course of the respective teacher was evaluated as per Proforma 1. The results are shown in graph below. The level of satisfaction of students regarding course taught by Teacher No. 5, is satisfactory and level of satisfaction of student is 49%.

1. The course objectives were clear
   - Clear: 47%
   - Unclear: 28%
   - Satisfactory: 23%
   - Poor: 2%
   - Very Poor: 0%

2. The course workload was manageable
   - Manageable: 46%
   - Slightly Manageable: 22%
   - Unclear: 16%
   - Poor: 12%
   - Very Poor: 4%

3. The course was well organized (e.g. timely access to materials, notification of changes, etc.)
   - Well Organized: 46%
   - Slightly Well Organized: 29%
   - Unclear: 15%
   - Poor: 8%
   - Very Poor: 2%

4. Approximate level of your own attendance during the whole course.
   - 0-20%: 39%
   - 21-40%: 32%
   - 41-60%: 22%
   - 61-80%: 5%
   - 81-100%: 2%

5. I participated actively in the course
   - Actively Participated: 41%
   - Slightly Actively Participated: 21%
   - Unclear: 22%
   - Poor: 4%
   - Very Poor: 0%
I think I have made progress in this course

- 49%
- 27%
- 13%
- 7%
- 4%

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

- 61%
- 25%
- 12%
- 2%
- 0%

The learning and teaching methods encouraged participation.

- 44%
- 29%
- 13%
- 7%
- 7%

The overall environment in the class was conducive to learning.

- 41%
- 20%
- 33%
- 4%
- 2%

Classrooms were satisfactory

- 44%
- 29%
- 13%
- 7%
Learning materials (lesson plans, course notes etc.) were relevant and useful.

Recommended reading books etc. were relevant and appropriate.

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

The provision of learning resources on the web was adequate and appropriate. (if relevant)

The course stimulated by interest and thought on the subject area.
The pace of the course was appropriate

- 49% agree,
- 31% neither agree nor disagree,
- 11% disagree,
- 9% strongly disagree.

Ideas and concepts were presented clearly

- 48% agree,
- 38% neither agree nor disagree,
- 5% disagree,
- 9% strongly disagree.

The method of assessment were reasonable

- 44% agree,
- 29% neither agree nor disagree,
- 15% disagree,
- 4% strongly disagree.

Feedback on assessment was timely

- 44% agree,
- 33% neither agree nor disagree,
- 15% disagree,
- 8% strongly disagree.

Feedback on assessment was helpful

- 50% agree,
- 24% neither agree nor disagree,
- 16% disagree,
- 8% strongly disagree.
I understood the lectures

- 38% agreed
- 44% disagreed
- 12% strongly disagreed
- 2% strongly agreed
- 4% agreed

The material was well organized and presented

- 40% agreed
- 44% disagreed
- 6% strongly disagreed
- 2% strongly agreed
- 8% agreed

The instructor was responsive to student needs and problems

- 45% agreed
- 43% disagreed
- 4% strongly disagreed
- 2% strongly agreed
- 6% agreed

Had the instructor been regular throughout the course?

- 44% agreed
- 46% disagreed
- 2% strongly disagreed
- 2% strongly agreed
- 6% agreed

The material in the tutorials was useful

- 47% agreed
- 27% disagreed
- 15% strongly disagreed
- 7% strongly agreed
- 4% agreed
I was happy with the amount of work needed for tutorials

- 27% S.A
- 44% A
- 18% UC
- 9% D
- 2% S.D

The tutor dealt effectively with my problems

- 39% S.A
- 36% A
- 16% UC
- 9% D
- 0% S.D

The materials in practical was useful

- 41% S.A
- 22% A
- 22% UC
- 6% D
- 9% S.D

The demonstrators dealt effectively with my problems.

- 43% S.A
- 15% A
- 23% UC
- 19% D
- 0% S.D
Skills and Capabilities Reflected in Performance as Biochemistry:

Students develop ability to apply knowledge of Biochemistry and to work as professionals, to build confidence and communicate effectively in writing, oral and demonstration to use modern tools, techniques and skills for their profession, to formulate and design the experiments/project and to work effectively in a team, to manage different problems and imbibe ability to recognize future needs.

Strength of the Department:
The main strength of the department is the availability of highly qualified and skilled teachers, with full acquaintance of their respective subjects, having vast knowledge of Biochemistry, Molecular Biology and Biotechnology. Majority of the faculty members have foreign degrees/post-doc experience and are experts in their fields and knowledge of latest and modern molecular approaches. They have implemented National/International research projects and are highly conscious of the problems to be taken by the post-graduate students. One Foreign Professor from Higher Education Commission (HEC) is also in department who is competent and specialized in his subject.

Weakness Identified in the Program:
There is shortage of faculty members in department and due to their heavily engaged in teaching activities are not at their full pace. Advanced teaching and research is being handicapped due to deficiency of lecture rooms and post-graduate laboratories. Access to literature has been erratic due to regular problem in Internet.

Major Future Improvement Plans:
- Developing of human resource for the highly advanced fields of biochemistry, biotechnology and bioinformatics to play a crucial role in national development.
- Strengthening graduate, post graduate and postdoctoral programmes in Biochemistry, Biotechnology and Bioinformatics.
- Up-gradation of research by integrating biochemistry, biotechnology and bioinformatics into existing traditional systems.
- To emphasize biochemical and molecular approaches and in vitro techniques in plant propagation, crop improvement and plant disease management as well as animal disease management.
- Strengthening our capabilities in cloning animal, plant, viral and bacterial genes to be utilized in various ways.
- Introduction of genetic engineering of crops as a regular feature for crop improvement.
- Production of recombinant proteins, enzymes, hormones, antibiotics or vaccines etc for therapeutic use/diagnostic purposes for human, plants and animals
- Development of efficient microbes for treatment of waste and other hazardous materials and to take care of environmental pollution
- Preparation of data of indigenous organisms especially in wake of possible WTO implementation

### TABLE-3: QUANTITATIVE ASSESSMENT OF THE DEPARTMENT (Last three years)

<table>
<thead>
<tr>
<th>Sr. #</th>
<th>Particular</th>
<th>No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>M.Sc produced</td>
<td>172</td>
<td>M.Sc. Graduates from the Department are working in public as well as private sector in research, teaching, diagnostics, pharmaceuticlas, chemical and equipment supplies. Many ex-students have joined M.Phil. and Ph.D. programs in PMAS-AAUR, QAU, PU &amp; UAF</td>
</tr>
<tr>
<td>ii</td>
<td>M.Phil</td>
<td>-</td>
<td>First batch will graduate in summer 2008</td>
</tr>
<tr>
<td>iii</td>
<td>Ph.D.</td>
<td>-</td>
<td>In employment</td>
</tr>
<tr>
<td>iv</td>
<td>Post-Doc fellowship by faculty</td>
<td>4</td>
<td>USA &amp; UK</td>
</tr>
<tr>
<td>v</td>
<td>Students: Faculty ratio</td>
<td>29:1</td>
<td></td>
</tr>
</tbody>
</table>
The department is well established and its distinguishing feature is the availability of all expertise (Molecular Biology, Plant Biotechnology, Environment Biotechnology and Enzymology).

The Department is providing following community Services:

To enhance the quality and quantity of scientific trainings, the Department has organized the following workshops and seminars. The basic aim is also to provide a forum for knowledge/information exchange between academic disciplines and raising general awareness about Biochemistry and Biotechnology.

Faculty Satisfaction Regarding the Administrative Services:

- The department maintains a ratio of 1:29, 1:43 and 1:57 for the academic, administrative and non-technical staff to the students respectively.
- Administrative meetings (departmental, university, academic council, and syndicate) are attended as and when required. Generally two meetings of academic council are held per year. Board of studies of the department meets quarterly.
- Quick office disposal; no complaint pertaining to delay has ever been received from authorities.
- Proper records of individuals, students and their theses are maintained.

CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION

Degree Title: M.Sc. (Biochemistry)

Intent:

Curriculum design and update is initiated by the faculty members of the Department after the approval of Board of Studies which is comprised of senior faculty members and subject specialist who is taken from other faculties or from other Universities or research Institutions. It is headed by the Chairman of the Department. The approved curriculum is then sent to Board of Faculty, headed by the Dean Faculty of Sciences. This Board consist senior faculty members from all the Departments of the faculty and subject specialists. Finally the curriculum is presented before the Academic Council which is comprised of the Professor, Associate Professor, Faculty Representatives and very senior subject specialists.

Definition of Credit Hour:

A student must complete a definite number of credit hours. One credit hour is one theory lecture or two hours laboratory (practical / week). One credit hour carries 20 marks. A semester is of 18 weeks.
Presently following degrees are offered by the Department:

<table>
<thead>
<tr>
<th>Degrees</th>
<th>Min. Course Hrs</th>
<th>Thesis</th>
<th>Duration (in Semesters)</th>
<th>Passing CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Min</td>
</tr>
<tr>
<td>M.Sc. (without thesis)</td>
<td>55</td>
<td>-</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>M.Sc (with thesis)</td>
<td>45</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>M.Phil.</td>
<td>30</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>18</td>
<td>50</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

**Pre-requisites**

**Minimum Academic Requirements:**
A person holding B.Sc. in science or equivalent degree from any recognized institute with at least second division or overall 45% marks is eligible to get admission.

The admission to the university is on merit which is determined by entry test and past academic performance as per following formula:

Matric: 10%
Intermediate: 15%
B.Sc.: 35%
Enter test: 40%

**Degree Requirements:**

Degrees are awarded after completing the required number of credit hours (courses). Minimum Grade Point Average for obtaining the degree in 2.50. To remain on the roll of the university, a student shall be required to maintain the following minimum GPA/CGPA in each semester

<table>
<thead>
<tr>
<th>Semester</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>1.50</td>
</tr>
<tr>
<td>Second</td>
<td>1.75</td>
</tr>
<tr>
<td>Third</td>
<td>2.00</td>
</tr>
<tr>
<td>Fourth</td>
<td>2.50</td>
</tr>
</tbody>
</table>

**Examination & Weight-age:**

**a) Theory**
In course work, student's evaluation is done by mid-term examination, assignments/quizzes and final examination. A student, who misses the mid-term examination, is not allowed a make-up examination and is awarded zero marks in that examination. In case a student does not appear in the final examination of a course, he shall be deemed to have failed in that course. In theory, weightage to each component of examination is as prescribed here under:

Mid Examination: 30%
Assignments: 10%
Final Examination: 60%

**b) Practical**
For practical examination (if applicable) 100% weightage is given to practical as scored final examination

**Eligibility for Examination:**
A student is eligible to sit for the examination provided that he/she has attended not less than 75% of the classes in theory and practical, separately.
The minimum pass marks for each course are 40% for M.Sc. and M.Phil. while 50% for Ph.D.

**TABLE-5: SCHEME OF STUDIES FOR M.Sc. in Biochemistry**

**First semester**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH-701</td>
<td>Biochemistry</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BIOL-701</td>
<td>Cellular Biology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BIOL-709</td>
<td>Fundamentals of Microbiology and Immunology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>STAT-700</td>
<td>Elements of Statistics and Biometry</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ZOOL-703</td>
<td>Principle of Genetics</td>
<td>3(2-2)</td>
</tr>
</tbody>
</table>

**Second semester**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH-703</td>
<td>Metabolism</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-704</td>
<td>Molecular Biology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-705</td>
<td>Enzymology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-707</td>
<td>Cellular Signaling Mechanisms</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>BIOL-703</td>
<td>Plant Physiology</td>
<td>3(2-2)</td>
</tr>
</tbody>
</table>

**Third semester**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH-702</td>
<td>Bioinformatics</td>
<td>3(0-6)</td>
</tr>
<tr>
<td>BCH-709</td>
<td>Biological Methods and Instrumentation</td>
<td>2(0-4)</td>
</tr>
<tr>
<td>BCH-710</td>
<td>Protein Chemistry</td>
<td>2(2-0)</td>
</tr>
<tr>
<td>BCH-712</td>
<td>Genetic Engineering</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-720</td>
<td>Seminar I</td>
<td>1(1-0)</td>
</tr>
<tr>
<td>BIOL-711</td>
<td>Research Planning and Report Writing</td>
<td>3(1-4)</td>
</tr>
</tbody>
</table>

**Fourth semester**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH-706</td>
<td>Tissue and Cell Culture</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-708</td>
<td>Human Physiology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-711</td>
<td>Biomembranes</td>
<td>2(2-0)</td>
</tr>
<tr>
<td>BCH-713</td>
<td>Biotechnology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BIOL-729</td>
<td>General Pharmacology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-714</td>
<td>Clinical Biochemistry</td>
<td>3(0-6)</td>
</tr>
<tr>
<td>BCH-716</td>
<td>Nutrition and Dietetics</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-721</td>
<td>Environmental Biochemistry</td>
<td>3(2-2)</td>
</tr>
</tbody>
</table>

**TABLE-6: POST GRADUATE COURSES (M.Phil/Ph.D)**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH-701</td>
<td>Biochemistry</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-702</td>
<td>Bioinformatics</td>
<td>3(0-6)</td>
</tr>
<tr>
<td>BCH-703</td>
<td>Metabolism</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-704</td>
<td>Molecular Biology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-705</td>
<td>Enzymology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>BCH-706</td>
<td>Tissue and Cell Culture</td>
<td>3(2-2)</td>
</tr>
</tbody>
</table>
Standard 2.1: Assessment of the Biochemistry Curriculum

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

**TABLE-7: CURRICULUM VS PROGRAM OUTCOME**

<table>
<thead>
<tr>
<th>Programme Outcomes</th>
<th>Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HDR Priority of Research Integrated approaches</td>
</tr>
<tr>
<td>M.Sc.</td>
<td>x x x x x x</td>
</tr>
<tr>
<td>M.Phil.</td>
<td><strong>x x x x x x</strong></td>
</tr>
<tr>
<td>Ph.D.</td>
<td><strong>x x x x x x x x</strong></td>
</tr>
</tbody>
</table>

- x = Satisfactory
- x x = Relevant & satisfactory
- x x x = Very relevant & satisfactory
- x x x x = Highly relevant & highly satisfactory

- The curriculum fulfills and satisfies the core requirements for the program, as specified by the respective accreditation body and HEC.
Standard 2-2: Theoretical backgrounds, problem analysis, solution design given as under

Meeting Standard 2-2: Percentage of Elements in Courses

<table>
<thead>
<tr>
<th>Elements</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory only</td>
<td>85%</td>
</tr>
<tr>
<td>Theory + Practical</td>
<td>53%</td>
</tr>
<tr>
<td>Only Practical</td>
<td>18%</td>
</tr>
</tbody>
</table>

Note: Table E-6 and E-7

Standard 2-3: The curriculum satisfied the core requirements for the programmes as specified by HEC

Standard 2-4: The curriculum satisfied the core requirements for the programmes as specified by HEC

Standard 2-5: The curriculum satisfied the core requirements for the programmes as specified by HEC

Standard 2-6: Information technology components of the curriculum has been applied by offering a different course like Experimental Design and Computer Applications,

Standard 2-7: Enhancing Oral and Written Communication Skills of the students

- One seminar in M.Sc. and two seminars carrying one credit hour each at M.Phil. and Ph.D. level are compulsory.
- Students are assigned to present generally the recent status/status on various global and local issues/problems.
- Assignments are given to M.Sc, M.Phil & Ph.D. students on specific titles (part of the course) which are submitted as written report, to increase their writing skills.

Criterion 3: Laboratories and Computer Facilities
There are four laboratories in the department. The facilities and shortcomings of these laboratories are listed as under.

1. Biotechnology and Molecular Biology Lab I
2. Biochemistry and Molecular Biology Lab II
3. Biotechnology Lab
4. General Biochemistry Lab

- Location: Faculty of Sciences 1st Floor, Main Campus Academic Block
- Objectives: Laboratories are used for: Practical exercise and demonstrations to the students in their introductory and major courses. Research work for the graduate and post-graduate students. For implementing the projects funded by the University, HEC, PSF, PARC and other agencies.
• **Shortcoming:** Laboratories are reasonably equipped but not spacious and adequate. However these problems will be circumvented in the near future when the Department will shift to new building.

• **Safety Regulations:** Fire extinguishers and first aid kits are available. However, the University maintains a Medical Dispensary for such incidents.

**Standard 3-1:** **Laboratory Manuals:**
Laboratory manuals for each subject are available. The departmental library has not all the relevant books. However, teachers have their own books to prepare the lectures.

**Standard 3-2:** **Support/Laboratory Personal for Maintenance of Laboratory**
One Lab Assistant is available to maintain laboratory, equipments, glassware, chemicals, materials etc. Three laboratory attendants assist the students in practicals, cleaning and washing. The laboratory attendants may not have the relevant knowledge.

**Standard 3-3:**

**Computing Infrastructure and Facilities**

- **Computing facilities support:** Not available to all faculty members and the post graduate students.
- **Shortcoming in computing infrastructure:** Computers with internet facilities should be available to all faculty members and postgraduate students.
- **Safety Arrangements:** There are no proper safety arrangements and no security plan is available in case of emergency. The department is located on the 1st floor; there are no emergency exits for the labs.
Criterion 4: Student Support and Advising

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

Standard 4-1: Frequency of Courses

- Courses are taught as per policy at the University/Academic Council.
- Elective courses are offered as per policy of HEC and the University.
- For post graduate programs, a variety of courses is offered according to demand of the profession.

Standard 4-2: Structure of the Courses

To ensure effective interaction between students, faculty and teaching assistants, at the time of course formulation both theoretical and field/practical aspects are focused. Theoretical problems are explained and assignments are also given to the students whereas practical are carried out in the labs and field. Study tours to various research organizations are also organized to keep them update on the latest developments in the area and to stimulate them for discussion through teacher/student interaction.

Standard 4.3: Guidance to the students

Several steps have been taken to provide students guidance such as:

- Students are informed about the program requirement through the office of the head of the department.
- Through the personal communication of the teachers with the students.
- In case of some problem Director Student Affairs appointed by the university, helps the students. Students can interact with the teachers/scientist in universities or research organization whenever they needed and there is an open option for the students to get the membership in the professional societies.
- Realizing the need for exploring job opportunities for the university graduates, Directorate of Placement Bureau has been established.

Criterion 5: Process Control

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

Standard 5.1: Program Admission Criteria

- The process of admission is well established and followed as per rules and criteria set by HEC and the University. For this purpose an advertisement is published in the National News Papers by the Registrar Office.
- Admission criteria for M.Sc in Biochemistry is B.Sc.(with Chemistry) or equivalent and entry test.
- Admission criteria for M.Phil and Ph.D. are same as mentioned in section 2.
- Admission criteria are revised whenever needed.

Standard 5.2: Process of Registration

- The student name, after completion of the admission process, is forwarded to the Registrar Office for proper registration in the specific program and the registration number is issued to the student.
- Students are evaluated through Mid, Final and Practical exams and through Assignments.
Registration is done for one time for each degree but evaluation is done through the result of each semester. Only those students who fulfill the criteria of the University, they are promoted to the next semester.

In general, the students are registered on competition bases keeping in view the academic and research standards.

**Standard 5.3: Recruiting Process for Faculty**

Recruitment policy followed by the University is recommended by HEC. Induction of all posts is done as per rule:

- Vacant and newly created positions are advertised in the national newspapers, applications are received by the Registrar office, call letters are issued to the short-listed candidates on the basis of experience, qualification, publications and other qualities/activities as determined by the University.
- The candidates are interviewed by the University Selection Board and Principal and alternate candidates are selected.
- Selection of candidates is approved by the Syndicate for issuing orders to join within a specified period.
- Induction of new candidates depends upon the number of approved vacancies.
- Standards set by HEC are followed.
- At present, no procedure exists for retaining highly qualified faculty members. Tenure Track System recommended by HEC has been twice approached by the syndicate but not yet practical.
- HEC also supports appointment of highly qualified members as foreign faculty Professors, National Professors and deputes them in concerned departments of the University.

**Standard 5.4: Teaching and Delivery of Course Material**

- To provide high quality teaching, department periodically revises the curriculum depending upon requirements, innovations and new technology.
- With the emergence of new fields, new courses are introduced, and included in the curriculum.
- Students usually buy cheap Asian editions of technology books. These are also available in the University library, where modest documentation, copying and internet facilities are available.
- Almost all the lectures are supplemented by multimedia overheads, slides and pictures.
- All efforts are made that the courses and knowledge imparted meet the objectives and outcome. The progress is regularly reviewed in the staff meetings.

**Standard 5.5: Completion of Program Requirements**

- The controller of examinations announces the dates of commencement of examination. After each semester, the controller office notifies the results of the students. The evaluation procedure consists of quizzes, mid and final examinations, practicals, assignments/reports, oral and technical presentations. The minimum pass marks for each course is 40% for undergraduate and Master degree and 50 % for Ph.D. in theory and practical separately.
- In theory, weightage to each component of examination is as prescribed here under:
  
<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid Examination</td>
<td>30%</td>
</tr>
<tr>
<td>Assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>60%</td>
</tr>
</tbody>
</table>

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

- Gold medals are awarded to the M.Sc. students who secure highest marks. Degrees are awarded to the students on the annual convocation that is held every year.

Criterion 6: Faculty

Table-8: Faculty Distribution in Biochemistry

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Qualification</th>
<th>Specialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Azra Khanum</td>
<td>Professor</td>
<td>Ph. D.</td>
<td>Biochemistry/Biotechnology</td>
</tr>
<tr>
<td>Dr. S.M.Naqvi</td>
<td>Professor</td>
<td>Ph. D.</td>
<td>Molecular Biology/ Biotechnology</td>
</tr>
<tr>
<td>Dr. M.Gulfras</td>
<td>Associate Professor</td>
<td>Ph. D.</td>
<td>Biochemistry/Natural Product Chemistry</td>
</tr>
<tr>
<td>Dr. Ghazala Kakub Raja</td>
<td>Associate Professor</td>
<td>Ph. D.</td>
<td>Biochemistry/ Molecular Biology</td>
</tr>
<tr>
<td>Dr. M.Javaid Asad</td>
<td>Assistant Professor</td>
<td>Ph. D</td>
<td>Industrial/Fermentation Biotechnology</td>
</tr>
<tr>
<td>Dr. Saima Naim</td>
<td>Assistant Professor</td>
<td>Ph. D</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Miss Mansoora</td>
<td>Lecturer</td>
<td>M.Phil.</td>
<td>Animal Sciences</td>
</tr>
<tr>
<td>Dr. M. Mukhtar</td>
<td>Professor</td>
<td>Ph. D.</td>
<td>Neurdegenerative disorders</td>
</tr>
</tbody>
</table>
List of Publications

Prof. Dr. Azra Khanum

INTERNATIONAL


NATIONAL


**In other HEC recognized Journals**


Publications in Other National/International Journals


Publications in HEC Journal carrying Impact Factor


Dr. Muhammad Gulfraz

PUBLICATIONS

INTERNATIONAL (HEC recognized journals having impact factor)

Published / Accepted


INTERNATIONAL (Journals having No impact factor)


HEC NON RECOGNIZED JOURNALS


NATIONAL


Dr. Muhammad Javaid Asad


Dr. Saima Naim


Dr. Muhammad Mukhtar


Criterion 7: Institutional Facilities

The institution must have the infrastructure to support new trends in learning such as e-learning including digital publications, library, video conference room and journals etc.

- The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel.
- These aspects need to be strengthened in number and space.
- Class rooms must be air conditioned and adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.
- The university did not provide computer facility to faculty members which adversely affect the quality of education.

Standard 7-1: Infrastructure:

The faculty has access to E-library which is very helpful for the high quality education and producing research of international standard. They also have access to the internet. However the department has the following shortcomings/problems:

- Majority of the faculty members have their own PCs. Computers are not provided by the university.
- The Internet services provided by the university are poor. The speed of internet is slow and often internet does not work. The telephones are also connected with the internet and the services are often breached.
- Breach of power intermittently, due to which research and academic work both are suffered, however university has provided quite a reasonable back-up by local generation.
- Untrained supporting staff.
- Scanty budget for consumables.
- Water coolers are out of order and are not properly and timely repaired.
- Washrooms are inadequate for male and female and as well for staff.
- The common rooms for male and female are not available in whole university
- Lifts are not available.

Standard 7-2: Library Facilities:

The University Central Library has very limited number of books, journals and periodicals. It’s a small library in term of space and facilities with no catalogue systems. It does not meet the standards of a University Library. However department itself owns few books.

Standard 7.3: Class Room and Faculty Offices

Currently the class rooms are not enough and the space is not only limited but also some basic facilities are lacking. Multimedia are not available for the lecture halls. Lecture rooms are not air conditioned and well ventilated, due to which teachers and students face extreme difficulty in summer. Many a time students faint in class-rooms and need to be transported to medical facility/ hospitals. Practical lab space is also lacking. This affects the quality of teaching. The faculty offices are another serious problem of the department. Some faculty members are sharing small rooms and the others are having their desks in the laboratories.

Criterion 8: Institutional Support

Unfortunately, this aspect is very weak; however it will be addressed after moving in to new building.

- 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.
• Space limitation is the major constraint in the development and strengthening of discipline.
• Insufficient secretarial support, technical staff and office equipment Due to unavailability of classrooms, classes are taken in the labs.
• The department at present avails all the human resources assigned with the addition of one Foreign Professor from HEC.
• Faculty offices are inadequate and therefore two or three teachers share one office room

The university administration has been struggling hard to strengthen all the departments, up-gradation of departments and establishing new faculties and Institutes.

Support and Financial Resources

• At present department is having a very meager financial resource to maintain its present needs. Individual research grants for students and Faculty are mainly supporting the departmental research activities. There is a dire need for increasing the financial resources allocated to the department to establish a library, laboratories and computer facilities. Biochemistry department has recently started a project for establishing a University Institute of Biochemistry and Biotechnology which will be one of the prime National institutions.

Standard 8-2: High Quality Graduate Students and Research Scholars

The M.Sc. and M.Phil students are admitted once in a year. However Ph.D. students may be enrolled in each semester. A strict merit policy is applied for admission coupled with GRE/NTS or entry test. A detail of the Students enrolled during the past years is given in the following Table.

<table>
<thead>
<tr>
<th>TABLE-9: ENROLLMENT IN DIFFERENT PROGRAMS FROM 2001-07</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Sc.</td>
</tr>
<tr>
<td>M.Phil</td>
</tr>
<tr>
<td>Ph.D.</td>
</tr>
</tbody>
</table>

Standard 8-3: Financial Resources

Total budget of the department for the financial year 2007-08 is Rs. 250,000/- which hardly fulfill the departmental needs particularly for the purchase of equipments, chemicals for laboratories and books for the department library.
# ANNEXURE I: DETAILED COURSE CONTENTS OF SCHEME OF STUDIES BIOCHEMISTRY

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BCH-701</td>
<td>Biochemistry</td>
<td>3(2-2)</td>
</tr>
<tr>
<td></td>
<td>BCH-702</td>
<td>Bioinformatics</td>
<td>3(0-6)</td>
</tr>
<tr>
<td></td>
<td>BCH-703</td>
<td>Metabolism</td>
<td>3(2-2)</td>
</tr>
<tr>
<td></td>
<td>BCH-704</td>
<td>Molecular Biology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td></td>
<td>BCH-705</td>
<td>Enzymology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td></td>
<td>BCH-706</td>
<td>Tissue and Cell Culture</td>
<td>3(2-2)</td>
</tr>
<tr>
<td></td>
<td>BCH-707</td>
<td>Cellular Signaling Mechanism</td>
<td>3(3-0)</td>
</tr>
<tr>
<td></td>
<td>BCH-708</td>
<td>Human Physiology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td></td>
<td>BCH-709</td>
<td>Biological Methods and Instrumentation</td>
<td>2(0-4)</td>
</tr>
<tr>
<td></td>
<td>BCH-710</td>
<td>Protein Chemistry</td>
<td>2(2-0)</td>
</tr>
<tr>
<td></td>
<td>BCH-711</td>
<td>Biomembranes</td>
<td>2(2-0)</td>
</tr>
<tr>
<td></td>
<td>BCH-712</td>
<td>Genetic Engineering</td>
<td>3(2-2)</td>
</tr>
<tr>
<td></td>
<td>BCH-713</td>
<td>Biotechnology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td></td>
<td>BCH-720</td>
<td>Seminar</td>
<td>1(1-0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Comprehensive Examination</td>
<td>0(0-0)</td>
</tr>
</tbody>
</table>

### Core Courses

In addition to the above courses, the students are required to take compulsory course:

i.) STAT-700 Elements of Statistics and Biometry 3(3-0)

ii.) BIOL-711/BOT-712/ZOOL-711 Research Planning and Report Writing 3(1-4)

(This course would be compulsory only for non-thesis students)

iii.) Thesis would be given to students in place of two optional courses and BIOL-711/ BOT-712/ZOOL-711 (Research Planning and Report Writing). Thesis would carry weightage of 10 credit hours. The thesis grading will be based on satisfactory/unsatisfactory.

### Minor Courses

In order to fulfill the requirement of minimum of 55 credit hours for the M.Sc. degree in Biochemistry, the students will have to take 1/3rd of the total courses from other discipline in consultation with Major Supervisor.

### Optional Courses

Remaining credit requirement to be fulfilled by the courses from those offered by the Department for post graduation studies in consultation with major supervisor.
SCHEME OF STUDIES FOR M. Phil. BIOCHEMISTRY
PROGRAMME AT PMAS-AAUR

Sr. No. Course No. Course Title Credit Hours

**Core Courses**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BCH-719</td>
<td>Special Problem</td>
<td>1(1-0)</td>
</tr>
<tr>
<td>2</td>
<td>BCH-720</td>
<td>Seminar-I</td>
<td>1(1-0)</td>
</tr>
<tr>
<td>3</td>
<td>BCH-720</td>
<td>Seminar-II</td>
<td>1(1-0)</td>
</tr>
<tr>
<td>4</td>
<td>BCH-731</td>
<td>Advances in Biochemistry</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>5</td>
<td>BCH-799</td>
<td>Comprehensive Examination</td>
<td>0(0-0)</td>
</tr>
<tr>
<td>6</td>
<td>BCH-799</td>
<td>Thesis</td>
<td>10(---)</td>
</tr>
</tbody>
</table>

**Compulsory Courses:**

In addition to the above courses, the students are required to take compulsory course:

i.) STAT-700 Elements of Statistics and Biometry 3(3-0)

**Minor Courses**

In order to fulfill the requirement of minimum of 30 credit hours of course work for the M.Phil. degree in Biochemistry, the students will have to take 1/3rd of the total courses from other discipline in consultation with Major Supervisor.

**Optional Courses**

Remaining credit requirement to be fulfilled by the courses from those offered by the Department for post-graduate studies in consultation with major supervisor.
**SCHEME OF STUDIES FOR Ph.D. BIOCHEMISTRY**
**PROGRAMME AT PMAS-AAUR**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BCH-720</td>
<td>Seminar-I</td>
<td>1(1-0)</td>
</tr>
<tr>
<td>1</td>
<td>BCH-720</td>
<td>Seminar –II</td>
<td>1(1-0)</td>
</tr>
<tr>
<td>2</td>
<td>BCH-751</td>
<td>Advances in Biotechnology</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Comprehensive Examination</td>
<td>0(0-0)</td>
</tr>
<tr>
<td>4</td>
<td>BCH-799</td>
<td>Thesis</td>
<td>50(----)</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Core Courses**

In addition to the above courses, the students are required to take compulsory course:

1. BOT-751 Integrated Agro-biological Resource Management 3(3-0)
2. ZOOL-751 Project Planning, Monitoring and Evaluation 3(3-0)
3. STAT-702 Experimental Design and Computer Application 3(2-2)

**Optional Courses**

Remaining credit requirement to be fulfilled by the courses from those offered by the Department for post graduate studies in consultation with major supervisor.
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BCH-101</td>
<td>General Biochemistry</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>2</td>
<td>BCH-102</td>
<td>Applied Biochemistry</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>3</td>
<td>BCH-201</td>
<td>Molecular Biology</td>
<td>2(2-0)</td>
</tr>
<tr>
<td>4</td>
<td>BCH-302</td>
<td>Introduction to Biochemistry</td>
<td>3(2-2)</td>
</tr>
</tbody>
</table>
THEORY

Introduction Hydrogen ion concentration, ionic product of water, The relationship between pH and pKa, Buffer solutions, Regulation of acid-base balance, functions of acid-base buffers, The Henderson Hasselbalch equation, The buffer systems of body fluids, Respiratory acids base balance, renal regulation of hydrogen ion concentration, Bionembrane; structures and related process, transport, passive diffusion, facilitated diffusion, Active transport, Carbohydrates; General characteristics, classification, Stereosioismism, Optical isomerism and Optical activity, Cyclic forms of sugars, Glycosidic linkagge, Chemical properties, Disaccharides, Polysaccharides, Proteins and amino acids; Structure, Amino acids occurring in protein molecules, Peptide linkage, Physiological significance, Classification, Amphoterice Properties, Isomerism, Structures, Primary secondary and tertiary, enzymes; General characteristics, Chemical nature, difference with non biological catalysts, Activity and unit, Mechanisms of enzyme reaction. Coenzymes, Factors affecting enzyme action, Inhibition, Importance in diagnosis. Lipids; Compound lipids, Derived lipids, fatty acids, Saturated and unsaturated with physical chemical properties. Triglycerides, Properties, Steroids and sterols, Cholesterol, 7-dehydrocholesterol, Ergosterol, Nucleic acids; Chemical composition and structures of DNA and RNA. Functions of DNA and different types of RNA in the cell. Extrunuclear DNA and plasmids. Central DOGMA and its significance. Introduction to replication, transcription and translation process.

Practical


Books Recommended


THEORY

Comparative biochemistry, Carbohydrate metabolism: Glycolytic pathway, Glycolysis, Tricarboxylic acid cycle, Electron transport chain, Oxidative phosphorylation and formation of ATP, Pentose phosphate shunt, pathway, GI Glucoronic acid pathway, Glucogenesis, Glycogenesis and Gluconeogenesis, Metabolism of Fruuctose and Galactose, Integration with amino acid metabolism, Protein and amino acid metabolism: Plasma amino acid, synthesis of nonessential amino acids, Fate of amino acids, Urea formation, other pathways of ammonia utilization, Fate of non nitrogenous residues of amino acids, creatinine and urea formation. Lipids metabolism. The Lipoprotein and their special function in transporting cholesterol and phospholipids. Biosynthesis of fatty acid, Triglycerides, Cholesterol and prostaglandins. Role of adipose tissue in fat metabolism, Metabolism of free fatty acids, Use of triglycerides for energy and formation of ATP, Factors affecting plasma cholesterol concentration. Ketogenesis and utilization of ketone bodies, Ketosis, Metabolism of bile acids and salts. Integration of metabolisms of carbohydrates, Proteins and Fats. Spectroscopy, Fate of carbohydrates, lipids and proteins in monogastric and ruminant animals. Importance of volatile fatty acids in ruminants, Use of agro-industrial wastes for the production of antibiotics, enzymes, hormones, proteins, steroids etc.

PRACTICAL


Books Recommended


**BCH-201**  Molecular Biology  2(2-0)

**THEORY**

Chromosome structure and genomic organisation, DNA as a carrier of genetic information, double helical structure of DNA, forces stabilising nucleic acid structures, supercoiled DNA, DNA replication general aspects and enzymes involved, prokaryotic and eukaryotic replication, mechanisms, repair of DNA, RNA, polymerase and transcription, post transcriptional processing, splicing, regulation of transcription in prokaryotes, genetic code, structure of transfer RNA, ribosome structure, translation mechanism, inhibitors of protein synthesis, post-translational modifications, nucleic acid fractionation and sequencing, chemical synthesis of oligonucleotides, DNA cloning technology. Vectors, hosts, enzymes involved in cloning Genomic and cDNA libraries, PCR and its use in forensics. Molecular Biology in veterinary medicine.

**Books Recommended**


**BCH-302**  Introduction to Biochemistry  3(2-2)

**Theory**


Enzymes and coenzymes. Metabolism of proteins and amino acids.

Lipids: sources, classification and energy values. Complex and derived lipids. Fatty acid classification, sources and chemical reaction related to fat/lipid metabolism.

Nucleic acids: definition, nitrogenous bases, purine and pyrimidine, nucleosome and nucleotides DNA and RNAs. Replication, transcription and translation.

Vitamins and hormones: Classification and importance.

**Practical**

Preparation of laboratory solutions and pH determination. Estimation of sugars from different biological samples, differentiation of sugars like, monosaccharide and disaccharides, reducing and non-reducing sugars. Extraction and detection of proteins. Fat extraction from plant material by using soxhlet methods. Determination of moisture in plant samples. Determination of vitamin C or ascorbic acid from citrus fruit. Determination of nucleic acids.

**Books Recommended**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credit Hours</th>
</tr>
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<td>Biochemistry</td>
<td>3(2-2)</td>
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<tr>
<td>2</td>
<td>BCH-702</td>
<td>Bioinformatics</td>
<td>3(0-6)</td>
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<tr>
<td>3</td>
<td>BCH-703</td>
<td>Metabolism</td>
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<tr>
<td>4</td>
<td>BCH-704</td>
<td>Molecular Biology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>5</td>
<td>BCH-705</td>
<td>Enzymology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>6</td>
<td>BCH-706</td>
<td>Tissue and Cell Culture</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>7</td>
<td>BCH-707</td>
<td>Cellular Signaling Mechanism</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>8</td>
<td>BCH-708</td>
<td>Human Physiology</td>
<td>3(2-2)</td>
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<td>9</td>
<td>BCH-709</td>
<td>Biological Methods and Instrumentation</td>
<td>2(0-4)</td>
</tr>
<tr>
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<td>BCH-710</td>
<td>Protein Chemistry</td>
<td>2(0-0)</td>
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<tr>
<td>11</td>
<td>BCH-711</td>
<td>Biomembranes</td>
<td>2(0-0)</td>
</tr>
<tr>
<td>12</td>
<td>BCH-712</td>
<td>Genetic Engineering</td>
<td>3(2-2)</td>
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<tr>
<td>13</td>
<td>BCH-713</td>
<td>Biotechnology</td>
<td>3(2-2)</td>
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<tr>
<td>14</td>
<td>BCH-714</td>
<td>Clinical Biochemistry</td>
<td>3(0-6)</td>
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<tr>
<td>15</td>
<td>BCH-715</td>
<td>Medical Microbiology</td>
<td>3(2-2)</td>
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<tr>
<td>16</td>
<td>BCH-716</td>
<td>Nutrition and Dietetics</td>
<td>3(2-2)</td>
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<tr>
<td>17</td>
<td>BCH-718</td>
<td>Plant Biochemistry</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>18</td>
<td>BCH-719</td>
<td>Special Problem</td>
<td>1(1-0)</td>
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<td>19</td>
<td>BCH-720</td>
<td>Seminar-I</td>
<td>1(1-0)</td>
</tr>
<tr>
<td>20</td>
<td>BCH-720</td>
<td>Seminar-II</td>
<td>1(1-0)</td>
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<td>22</td>
<td>BCH-722</td>
<td>Recent Topics in Molecular Biology</td>
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</tr>
<tr>
<td>23</td>
<td>BCH-723</td>
<td>Current Topics in Microbiology</td>
<td>3(3-0)</td>
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<tr>
<td>24</td>
<td>BCH-724</td>
<td>Fundamentals of Biotechnology</td>
<td>4(3-2)</td>
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<tr>
<td>25</td>
<td>BCH-725</td>
<td>Trends in Immunology</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>26</td>
<td>BCH-726</td>
<td>Advanced Biochemistry</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>27</td>
<td>BCH-727</td>
<td>General Microbiology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>28</td>
<td>BCH-728</td>
<td>Immunology and Immunochemistry</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>29</td>
<td>BCH-731</td>
<td>Advances in Biochemistry</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>30</td>
<td>BCH-732</td>
<td>Medical Nutrition Therapy</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>31</td>
<td>BCH-733</td>
<td>Plant Molecular Physiology</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>32</td>
<td>BCH-734</td>
<td>Numerical Problems in Biochemistry</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>33</td>
<td>BCH-735</td>
<td>Principles of Advanced Biochemical Techniques</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>34</td>
<td>BCH-736</td>
<td>Proteomics</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>35</td>
<td>BCH-751</td>
<td>Advances in Biotechnology</td>
<td>3(3-0)</td>
</tr>
</tbody>
</table>

**Practical**
Titrations curves, pKa determination, buffer preparation, amino acid and proteins determination, protein precipitations, carbohydrate and lipid determination. Sugar identification using paper chromatography, amino acid separation by two dimensional paper chromatography, steroid separation by thin layer chromatography (TLC).

**Books Recommended**


**Theory**
Introduction. Databases. DNA Sequence Analysis: Submission, Retrieval & Storage; Homology searches; sequence alignment; restriction analysis; motifs, palindromic, repetitive and putative regulatory sequences searching; primer design translation of DNA sequence into protein sequence, finding ORF; phylogenetic analysis. Protein Sequence Analysis: Retrieval; Homology searches; sequence alignment; motifs searching.; Pair-wise and multiple alignment, hydropathy profile, structure prediction, motif search, Prediction of protein structure and function; phylogenetic analysis.

**Recommended Books**

5. Ariyon K. Agota. (June 2002). Protein Structure Informatics. Publisher: Bioinformatics By the Bay; 1st edition

<table>
<thead>
<tr>
<th>BCH-703</th>
<th>Metabolism</th>
<th>3(2-2)</th>
</tr>
</thead>
</table>

Theory
The continuation of Biochemistry provides an introduction to the basic principles of metabolism. Basic energy metabolism is converted first including glycolysis/gluconeogenesis, citric acid cycle, oxidative and photo phosphorylation, pentose phosphate pathway, glycogen metabolism, fatty acid metabolism, amino acid degradation and urea cycle, biosynthesis of membrane, lipid and steroids, amino acids and heme, and nucleotides. Integration, regulation and organ specialization of metabolism. Digestion and transport.

Practical
Analysis of blood, gastric juice, estimation of chlorides and urea, analysis of milk, egg, meat, wheat flour, bread, potato. Determination of vitamin A, carotenes, riboflavin, ascorbic acid (vitamin C).

Books Recommended:


<table>
<thead>
<tr>
<th>BCH-704</th>
<th>Molecular Biology</th>
<th>3(2-2)</th>
</tr>
</thead>
</table>

Theory
Genes and genomes, DNA replication, repair and recombination, RNA synthesis and splicing, protein synthesis, targeting and turnover, regulation of gene expression in prokaryotes and eukaryotes, post transcriptional modifications in eukaryotes.

Practical

Books Recommended:

4. Lodish, Harvey; Berk, Arnold; Zipursky, S. Lawrence; Matsudaira, Paul; Baltimore, David; Darnell, James E (2000). Molecular Cell Biology. 4th ed. New York: W. H. Freeman & Co. USA

**Theory**


**Practical**


**Books Recommended**


**Theory**

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 micro-propagation, protoplast propagation.

**Books Recommended**


### BCH-707 Cellular Signaling Mechanism 3(3-0)

**Theory:**
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:**
12. Recent review papers.

### BCH-708 Human Physiology 3(2-2)

**Theory**

**Practical**

**Books Recommended**
Students will be exposed to methods, equipment and experimental procedures. Emphasis is placed on the theoretical and practical aspects of methods such as visible, UV, IR, mass, NMR, absorption spectroscopy, fluorescence and emission spectrometry, flame photometry, ultracentrifuge, ultrafiltration, lyophilization, electrophoresis, various types of chromatography, scintillation counter (beta and gamma), X-ray diffraction.

Books Recommended

Books Recommended

Books Recommended
Theory

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
6. Recent review papers.

Theory

Practical
Production of monoclonal antibodies and its use in immunological diagnosis. DNA diagnosis using PCR. Study tours to various biotechnological laboratories.

Books Recommended
8. Recent review papers.
9.
Books Recommended

11. Recent review papers.

BCH-715 Medical Microbiology 3(2-2)

Theory

Practical

Books Recommended


BCH-716 Nutrition and Dietetics 3(2-2)

Theory
Nutrition: Basic concepts, history, present status and future prospects. Selection of an adequate diet, balanced diet and its importance, food composition tables, food quality. Digestion and absorption in GIT, sources and role of digestive enzymes and hormones. Nutrients: Definition, types, major functions, nutrient density, dietary requirements, essentiality and associated toxicities, deficiencies and nutrient supplements. Energy metabolism: energy value of foods, body’s need for energy, respiratory quotient, basal metabolism, specific dynamic action, Water and electrolytes: Distribution in the body, functions and requirements, human water balance system, human acid-base (electrolyte) balance system, alkalosis, acidosis and dehydration. Nutritional requirements of humans; requirement for individual nutrient during different stages of human development and physiological states, body

Practical

Books Recommended

Pre-requisite: BCH-701

Theory

Books Recommended

Theory
Practical
Analysis of heavy metals for body fluids (blood and urine) and from environment (air, water & food) by atomic absorption. Analysis of pesticides residual for food/plants by chromatographic techniques. Determination of ED50 for heavy metals & pesticides.

Books Recommended

Books/Literature Recommended
12. Recent papers/review papers.

Theory
Addresses advanced topics in molecular biology, such as molecular biology of development, control of cell proliferation, genetic basis of cancer, evolution of the gene, origins of human cancer, DNA rearrangements and amplification, mutability and repair of DNA, the mitochondrial genome and genetic engineering.

Books/Literature Recommended
12. Recent papers/review papers.
Theory

Practical
Preparation and estimation of proteins in various samples (plants/animal origin). SDS-polyacrylamide gel electrophoresis, gel filtration chromatography, enzyme essays, growth of bacteria on solid medium, preparation of bacterial culture, DNA and RNA extraction from animal and plant tissues.

Books/Literature Recommended


Books/Literature Recommended

4. John H. L. Playfair & Benjamin Chain, (September 1, 2005) Immunology at a Glance.. Publisher: Blackwell Publishing Limited; 8th edition
18. Recent papers/review papers.
Advanced Biochemistry

Theory

Advanced level discussion of the application of biochemical principles to complex biological problems. Topics include structural and conformational properties of macromolecules with emphasis on macromolecular function and recognition, mechanism of enzymatic reactions, sensory adaptation and the biochemistry of transcription.

Books/Literature Recommended

6. Recent papers/review papers.

General Microbiology

Theory


Practical


Books Recommended


Immunology and Immunochemistry

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.
Practical

Books Recommended

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

Books Recommended

Theory

Practical
Analysis of different food samples collected from hotels and restaurants for evaluation of nutrients according to WHO standards by using chemical as well as soft ware methods. Analysis of protein, essential and non essential Amino acids fatty acids and cholesterol, vitamins and minerals by using different techniques like spectrophotometer, Atomic absorption and chromatography. Assessment of hemoglobin level from blood of anemic patients.

Books Recommended:

Books Recommended:

Numerical Problems in their solutions in the following areas will be studied. Acid-Base Chemistry: Aqueous Solutions, equilibrium constant, acids and bases, laboratory buffers, amino acids and peptides, blood buffers. Chemistry of Biological Molecules: Calculations related to peptide sequencing, nucleic acids, carbohydrates and fats, calculation of molecular weight. Bioenergetics: Exothermic and endothermic reactions, equilibrium concentrations, oxidation-reduction reactions, metabolism and ATP yield, oxidative and photo phosphorylation, active transport, enthalpy and entropy, activation energy. Isotopes in Biochemistry: Isotopes, radioactive and biological half life, solutions of radioactive compounds, assay using radioisotopes, double label analysis, dilution analysis, and stable isotopes

Books Recommended:

Numerical Problems in Biochemistry

Books Recommended:

Books Recommended:

GC-MS, LC-MS, their principles, theory, sampling techniques, instrumentation and recent developments. Capillary electrophoresis and its applications. FT-IR, principle, instrumentation, sampling techniques and applications. MALDI Toff (Matrix Assisted Laser Desorption Ionization Time of Flight), Quadrupole mass spectrometry (QMS), Tandem Mass Spectrometry (MS/MS). Flow cytometer principle, technique and applications. Real Time PCR, development, advantage, how it quantitate DNA or cDNA, Quantitation of mRNA levels, analysis and applications. Inductively coupled plasma emission spectroscopy (ICPMS)
Theory


Practical

Extraction, Separation and Purification of proteins using chromatographic and electrophoretic methods. Analysis of purified proteins prior to structural proteomics. Use of bioinformatic tools to analyze proteins structure function and interactions.

Books Recommended:


THEORY

Address advanced topics in microbial, animal and plant biotechnology such as biosensors, gene clip, gene silencing, immobilised biocatalysts. Gene therapy. Plants as bioresearcher, tissue culture and transgenic plants. Bioremediations and biomass utilizations. Computer based modeling and drug designing.

BOOKS RECOMMENDED

4. Recent papers/review papers.
Annex-II

Proforma No. 4: Research Student Progress Review Form

Results of Proforma No. 4:

According to the result of the proforma No. 4 which was filled by M.Phil and Ph.D. Students. Most of the students of M.Phil. and Ph.D. are interested to take training from abroad and they also keen interest to operate sophisticated equipments. The students of M.Phil. and Ph.D. also pointed out the problems regarding to the administrative and financial approval of the budget and as well as maintenance. They also pointed out the problems regarding to the availability of computers and internet which is very poor. They don’t have too much computer to download literature related to their research work.

Proforma No. 5: Results of Faculty Survey

According to Annexure III regarding the satisfaction of the Faculty, the weakest aspect is the amount of time teachers find to interact with their families. This is basically due to the shortage of teachers because two posts of lecturers are vacant while an Assistant Professor is on Post-Doc. assignment abroad.

On the other hand the satisfaction level of the faculty seems reasonable with the lowest from a Foreign Faculty Professor who has awarded lowest score on clarity about promotion followed by mentoring and administrative support.
Providing clarity about the faculty promotion process

Your prospects for advancement and progress through ranks

Salary and compensation packages
Job security and stability at the department

Amount of time you have for yourself and family

The overall climate at the department

Whether the department is utilizing your experience and knowledge
## ANNEXURE III: RESULTS OF GRADUATING STUDENTS SURVEY

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Parameter</th>
<th>Very satisfied (%)</th>
<th>Satisfied (%)</th>
<th>Uncertain (%)</th>
<th>Dissatisfied (%)</th>
<th>Very dissatisfied (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The work in the program is too heavy and induces a lot of pressure</td>
<td>33</td>
<td>42</td>
<td>25</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>The program is effective in enhancing team working abilities</td>
<td>15</td>
<td>62</td>
<td>23</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>The program administration is effective in supporting learning</td>
<td>8</td>
<td>46</td>
<td>38</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>The program is effective in developing analytical and problem solving skills</td>
<td>23</td>
<td>61</td>
<td>8</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>The program is effective in developing independent thinking</td>
<td>15</td>
<td>31</td>
<td>54</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>The program is effective in developing written communication skills</td>
<td>0</td>
<td>62</td>
<td>15</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>The program is effective in developing planning abilities</td>
<td>15</td>
<td>46</td>
<td>23</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>The objectives of the program have fully achieved</td>
<td>23</td>
<td>46</td>
<td>23</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Whether the contents of curriculum are advanced and meet program objectives</td>
<td>23</td>
<td>31</td>
<td>23</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Faculty was able to meet the program objectives</td>
<td>31</td>
<td>38</td>
<td>23</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>The environment was conducive for learning</td>
<td>23</td>
<td>46</td>
<td>16</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Whether the infrastructure of the department was good</td>
<td>33</td>
<td>33</td>
<td>25</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>Whether the program comprised of co-curricular and extra-curricular activities</td>
<td>15</td>
<td>47</td>
<td>30</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>14</td>
<td>Whether scholarships were available to students in case of hardship</td>
<td>15</td>
<td>62</td>
<td>15</td>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>