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UNIVERSITY OF
CENTRAL PUNJAB

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Road, Johar Town, Lahore.

FACULTY OF LIFE SCIENCES



FACULTY OF LIFE SCIENCES





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A photograph of a laboratory bench. In the foreground, a white microscope is positioned on the right. To its left, several test tubes are held in a blue rack; one contains a red liquid, another a blue liquid. Further left, a white mortar and pestle sits on the surface. The background is softly blurred, showing laboratory cabinets and a window with bright light. The overall scene is clean and professional.

CAREER PROSPECTS

There has always been a general need for the study of life sciences. It pushes and advances society further every day and creates new demands for innovative individuals to keep the momentum. For centuries, life sciences have been at the forefront of scientific breakthroughs in medicine and helped in advancing other fields such as agriculture and food protection. Some of the most common careers in life sciences include biochemists, clinical research associates, research assistants and microbiologists. Other lesser-known career options include biomedical scientists, biotechnologists, computational biologists, industrial pharmacists and bioinformaticians.

DEAN'S MESSAGE

The Faculty of Life Sciences (FOLS) aims at researching life sciences at a molecular and cellular level in healthy and diseased organisms. Our emphasis is on the discovery of interventional molecules and the identification of targets for bacterial and viral infections, cancer, and neurodegenerative diseases. Our experienced faculty offers cutting edge interdisciplinary courses in Biotechnology, Microbiology, Biochemistry, and Food Science & Technology, keeping in view the demands by the student community, public and private sector, and other related industries.

The major focus of our research groups is the development of expertise in bacterial genomics, enzymology, protein structure & function, food biotechnology, microbiology, and computational biology. We have state-of-the-art facilities that include eight well-equipped labs for biotechnology, microbiology, biochemistry, and food science & technology, as well as, temperature and RH controlled animal houses for experimentation. FOLS has developed linkages with foreign universities (University of Edinburgh, UK, Umm-ul-Qura University, Makkah KSA, Res. Institute for Food Sci. & Tech, Mashhad, Iran, and Lincoln Hospital NHS Trust, UK, etc.) and with universities in Pakistan to undertake collaborative research on contemporary biological issues. The students joining FOLS will have ample opportunities to interact with eminent scientists both, locally and internationally.

Keeping in view the above facts and increasing demand for life scientists in public and private sectors of the world, I would like to add that a bright future is waiting for you, my dear students. I wish you the best of luck.



PROF. DR. MUSHTAQ A. SALEEM

HEAD OF DEPARTMENT



DR. MUHAMMAD AFZAL
BIOCHEMISTRY



DR. JAVED IQBAL
BIOTECHNOLOGY



DR. RAZA HUSSAIN
FOOD SCIENCE & TECHNOLOGY



DR. AATIF AMIN
MICROBIOLOGY

OUR FACULTY



OUR FACULTY



FACILITIES

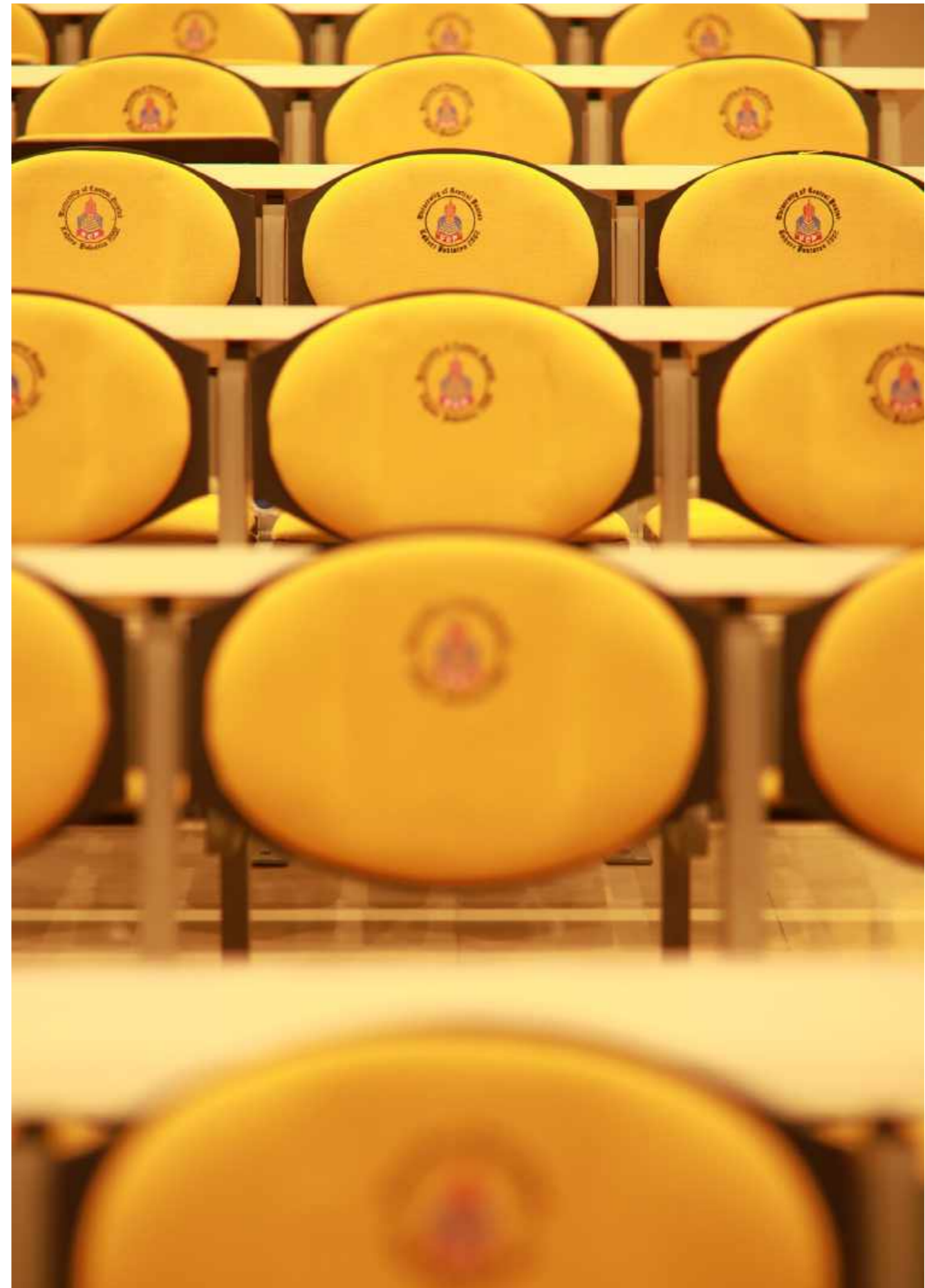
FOLS considers research as its most important component and has achieved a milestone by publishing 115 research articles in HEC recognized Impact Factor (IF) Journals and International Conferences. Thus, the UCP Directorate of Research has declared FOLS as one of the most productive faculties of the University in the past 2 years.

PROGRAM OBJECTIVES

- Specializations in areas of current relevance
- Interdisciplinary knowledge that allows for broadening career choices and options
- Vital transferable skills including teamwork, communication with peers and sector specialists
- Logical reasoning, innovation, organisation and business communication

PROGRAMS OFFERED

1. BS Biotechnology
2. BS Microbiology
3. BS Biochemistry
4. BS Food Science & Technology
5. MSc Biotechnology
6. MS Biotechnology
7. MS Microbiology
8. MS Biochemistry
9. PhD Microbiology
10. PhD Biochemistry



**SAMPLE
MODULE**



SAMPLE MODULE

12

BS MICROBIOLOGY

Admission Requirements

- (i) Higher Secondary School Certificate (FSc Pre-Medical) or Equivalent with Physics, Chemistry and Biology securing at least 45% marks in aggregate. In case of foreign qualification, equivalence from IBCC will be required.
- (ii) UCP admission test or HEC approved test.

Degree Requirements

Each candidate for the BS Microbiology degree is required to successfully earn 132 Cr. Hrs. with the CGPA of 2.0 on the scale of 4.0 as per the following detail:

Area	Cr. Hrs.
a) Microbiology Foundation Courses	31
b) Microbiology General Courses	24
c) Microbiology Interdepartmental Courses	21
e) Microbiology Core Courses	38
f) Microbiology Elective Depth Courses	12
g) Project	06
Total	132

a) Microbiology Foundation Courses (31 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Fundamentals of Microbiology-I	MB1603	3
Fundamentals of Microbiology-II	MB1613	3
Intro. to Medical Microbiology	MB2624	4
General Immunology	MB2703	3
Microbial Taxonomy	MB2713	3
General Virology	MB2723	3
Cell Biology	MB2523	3
Mycology	MB3113	3
Research Methodology	MB3003	3
Biosafety & Risk Management	MB3823	3

b) Microbiology General Courses (24 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Human Physiology	MB2403	3
Food Microbiology	MB3683	3
Biochemistry-I	MB1203	3
Sociology	MBHU1053	3
Biochemistry-II	MB2213	3
General Genetics	MB2103	3
Ecology & Ecosystem	MB2803	3
Biodiversity of Plants & Fungi	MB2813	3

c) Microbiology Interdepartmental Courses (21 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
English I	MBHU1013	3
Pakistan Studies	MBHU1023	3
Islamic Studies	MBHU1033	3
Computer Application	MBCS1013	3
English-II	MBHU1043	3
Biostatistics	MBMT1013	3
Mathematics		3

d) Microbiology Core Courses (38 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Pharmaceutical Microbiology	MB3643	3
Microbial Anatomy & Physiology	MB3423	3
Fresh Water Microbiology	MB3653	3
Bacterial Genetics	MB3124	4
Clinical Bacteriology	MB3734	4
Soil Microbiology	MB3663	3
Epidemiology, Public Health & Bioethics	MB3743	3
Environmental Biotechnology	MB4303	3
Molecular Mechanism of Antimicrobial Agent	MB4504	4
Genetic Engineering	MB4134	4
Medical Virology	MB4754	4

e) Microbiology Elective Depth Courses (12 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Applied Microbial Technology	MB4513	3
Cell & Tissue Culture	MB4673	3
Industrial Microbiology	MB4763	3
Nano-Biotechnology	MB4323	3

f) Project (06 Cr. Hrs.)

After the completion of 90 Cr. Hrs., the students are required to demonstrate their practical skills in the field of Microbiology by designing and implementing a research project worth 6 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title	Code	Cr. Hrs.
Research Project I	MB4903	3
Research Project II	MB4913	3

Community Work (MB3000)

Each student is required to complete 65 hours of community work, usually after 4th semester which would be a prerequisite for the award of degree.

Program Duration

This is a 4-year degree program comprising of 8 semesters. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship or deficiency courses. The maximum duration to complete BS Microbiology degree is 7-years.



SCHEME OF STUDIES BS MICROBIOLOGY

Semester-I (15 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MBHU1013	English I	Inter Department	3
MBHU1023	Pakistan Studies	Inter Department	3
MBHU1033	Islamic Studies	Inter Department	3
MBCS1013	Computer Application	Inter Department	3
MB1603	Fundamentals of Microbiology-I	MB Foundation	3

Semester-II (15 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MBHU1043	English-II	Inter Department	3
MBMT1013	Biostatistics	Inter Department	3
MB1203	Biochemistry-I	MB General	3
MBHU1053	Sociology	MB General	3
MB1613	Fundamentals of Microbiology-II	MB Foundation	3

Semester-III (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MBMT2023	Mathematics	Inter Department	3
MB2213	Biochemistry-II	MB General	3
MB2103	General Genetics	MB General	3
MB2624	Intro. to Medical Microbiology	MB Foundation	4
MB2703	General Immunology	MB Foundation	3

Semester-IV (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MB2803	Ecology & Ecosystem	MB General	3
MB2813	Biodiversity of Plants & Fungi	MB General	3
MB2713	Microbial Taxonomy	MB Foundation	3
MB2723	General Virology	MB Foundation	3
MB2523	Cell Biology	MB Foundation	3
MB2403	Human Physiology	MB General	3

Semester-V (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MB3633	Mycology	MB Foundation	3
MB3903	Research Methodology	MB Foundation	3
MB3423	Microbial Anatomy & Physiology	MB Core	3
MB3653	Fresh Water Microbiology	MB Core	3
MB3683	Food Microbiology	MB General	3
MB3743	Epidemiology, Public Health & Bioethics	MB Core	3

Semester-VI (17 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MB3823	Biosafety & Risk Management	MB Foundation	3
MB3124	Bacterial Genetics	MB Core	4
MB3734	Clinical Bacteriology	MB Core	4
MB3663	Soil Microbiology	MB Core	3
MB3643	Pharmaceutical Microbiology	MB Core	3

Semester-VII (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MB4303	Environmental Biotechnology	MB Core	3
MB4504	Molecular Mechanism of Antimicrobial Agent	MB Core	4
MB4513	Applied Microbial Technology	MB Elective	3
MB4673	Cell & Tissue Culture	MB Elective	3
MB4903	Research Project-I	Research Project	3

Semester-VIII (17 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MB4134	Genetic Engineering	MB Core	4
MB4754	Medical Virology	MB Core	4
MB4763	Industrial Microbiology	MB Elective	3
MB4323	Nano-Biotechnology	MB Elective	3
MB4913	Research Project-II	Research Project	3

MS MICROBIOLOGY

Admission Requirements

- A minimum of 16 years of education leading to BS degree in relevant discipline.
- Minimum 2.00/4.00 CGPA or 50% marks in annual system
- Admission Test/HEC Approved Test.

Degree Requirements

A student admitted in this program will have to complete the degree requirements by following any one of the options given below:

- 24 Cr. Hrs course work with 6 Cr. Hrs Thesis
- Course work only (10 Courses)

Each candidate for the MS Microbiology degree is required to successfully earn 30 Cr. Hrs. as per the following detail:

Area	Cr. Hrs.
a) Course Work	24
b) Thesis/Additional Courses	06
Total	30

a) Graduate Courses

Course Title	Code	Cr. Hrs.
Molecular Microbial Genetics	MB5103	3
Industrial Microbiology	MB5603	3
Frontiers in Microbiology	MB5613	3
Food Microbiology	MB5623	3
Microbial Biochemistry	MB5203	3

Microbial Biotechnology	MB5303	3
Advances in Microbiology	MB5633	3
Advanced Techniques in Microbiology	MB5643	3
Advanced Medical Microbiology	MB5653	3
Biostatistics	MBMT5003	3
Advanced Virology	MB5703	3
Advanced Immunology	MB5713	3
Microbial Genetics	MB5113	3
Bioinformatics	MB5503	3

b) Research Thesis

Course Title	Code	Cr. Hrs.
Research Thesis	MB6916	6
Thesis Continuation	MB6921	1

CGPA Requirement

A student is required to earn a minimum of 2.50/4.00 CGPA on the completion of his/her degree requirements.

Program Duration

This is nominally a 2-year degree program comprising of 4 semesters. There will be a Fall and a Spring semester in each year. The maximum duration to complete MS Microbiology degree is 4-years.

PHD MICROBIOLOGY

The program offers a dynamic research environment to excel our students in the field of Microbiology through highly qualified HEC approved supervisors. We furnish platform to work with our Collaborative Research Partners in different universities such as University of Edinburgh, UK and King Abdul Aziz University, Saudi Arabia etc. Our PhD Scholars would work in unique environment to acquire advanced/ applied training in the scientific study of microbes and their impact on human beings. We undertake research work in the fields of Bacteriology (Generation of Biofuels, Bioremediation, Microbial Ecology and Antimicrobials for Treatment of Disease), Immunology, Microbiome and Virome Analyses. We encourage our PhD Scholars to produce quality research to be published in HEC Approved Impact Factor Journals and present in International Conferences. Our graduates are securing bright careers in different universities, research organizations and industries in Pakistan and abroad.

Admission Requirements

- MS/ MPhil degree in relevant discipline
- Minimum CGPA 3.00/ 4.00 (Semester System) or 60% marks (Annual System)
- Admission Test/ HEC Approved Test
- Interview

Degree Requirements

A PhD candidate shall be awarded degree on successful completion of the following requirements:

- 18 Cr. Hrs. Course Work with minimum CGPA 3.00/4.00
- Comprehensive Examination (written and oral)
- Synopsis Defense
- 30 Cr. Hrs. Research Work
- Publication of at least one research paper in HEC approved journal
- Dissertation Foreign Reviews
- Dissertation Final Defense

Note: PhD scholars are required to comply with the following timeline:

Activity	Preferred Time	Maximum
Course Work	2 Semesters	3 Semesters
Comprehensive Exam	3 Semesters	4 Semesters
Synopsis Qualification	4 Semesters	6 Semesters
Thesis Submission	6 Semesters	14 Semesters (7 years)

BS BIOTECHNOLOGY

Admission Requirements

- (i) Higher Secondary School Certificate (FSc Pre-Medical) or Equivalent with Physics, Chemistry and Biology securing at least 45% marks in aggregate. In case of foreign qualification, equivalence from IBCC will be required.
- (ii) UCP admission test or HEC approved test.

Degree Requirements

Each candidate for the BS Biotechnology degree is required to successfully earn 136 Cr. Hrs. with the CGPA of 2.0 on the scale of 4.0 as per the following detail:

Area	Cr. Hrs.
a) Biotechnology Foundation Courses	36
b) Biotechnology General Courses	24
c) Biotechnology Interdepartmental Courses	26
d) Biotechnology Core Courses	32
e) Biotechnology Elective Depth Courses	12
f) Industrial Internship	00
g) Research Project/Internship/Review Paper	06
Total	136

a) Biotechnology Foundation Courses (36 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Introduction to Biotechnology	BT1303	3
Biochemistry-I	BT1233	3
Biochemistry-II	BT2243	3
Cell Biology	BT2603	3
Classical Genetics	BT2103	3
Probability & Biostatistics	BTMT2023	3
Analytical Chemistry & Instrumentation	BT2253	3
Molecular Biology	BT2503	3
Immunology	BT3703	3
Methods in Molecular Biology	BT3513	3
Genetic Resources & Conservation	BT3113	3
Microbial Biotechnology	BT3323	3

b) Biotechnology General Courses (24 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Physical Chemistry	BT1203	3
Inorganic Chemistry	BT1213	3
Organic Chemistry	BT1223	3
Ecology, Biodiversity & Evolution-I	BT1803	3
Ecology, Biodiversity & Evolution-II	BT2813	3
Biological Physics	BT2403	3
Sociology	BTMG2003	3
Marketing & Management	BTMG2013	3

c) Biotechnology Interdepartmental Courses (26 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
English I	BTHU1003	3
Pakistan Studies	BTHU1013	3
Islamic studies	BTHU1023	3
Introduction to Computer Science	BTCS1003	3
English-II	BTHU1033	3
Mathematics	BTMT1003	3
English-III (Writing & Comp)	BTHU2043	3
Biomathematics	BTMT2013	3
Biosafety & Bioethics	BT4032	2

d) Biotechnology Core Courses (32 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Principles of Biochemical Engineering	BT3263	3
Agriculture Biotechnology	BT3313	3
Principles of Biochemical Engineering	BT3273	3
Health Biotechnology	BT3333	3
Environmental Biotechnology	BT3343	3
Food Biotechnology	BT3353	3
Genomics & Proteomics	BT4123	3

Course Title	Code	Cr. Hrs.
Entrepreneurship in Biotechnology	BT4002	2
Bioinformatics	BT4823	3
Industrial Biotechnology	BT4373	3
Research Methodology & Skill Enhancement	BT4023	3

e) Biotechnology Elective Depth Courses (12 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Nano-Biotechnology	BT3363	3
Cell & Tissue Culture	BT4623	3
Virology	BT4713	3
Fermentation Biotechnology	BT4383	3

f) Research Project (06 Cr. Hrs.)

After the completion of 90 Cr. Hrs., the students are required to demonstrate their practical skills in the field of Biotechnology by designing and implementing a research project worth 6 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title	Code	Cr. Hrs.
Research Project/ Internship/Review Paper I	BT4903	3
Research Project/ Internship/Review Paper II	BT4913	3

Community Work (BT3000)

Each student is required to complete 65 hours of community work, usually after 4th semester which would be a prerequisite for the award of degree.

Program Duration

This is a 4-year degree program comprising of 8 semesters. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship or deficiency courses. The maximum duration to complete BS Biotechnology degree is 7-years.

SCHEME OF STUDIES BS BIOTECHNOLOGY

Semester-I (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BTHU1003	English I	Inter. Dept.	3
BTHU1013	Pakistan Studies	Inter. Dept.	3
BTHU1023	Islamic studies	Inter. Dept.	3
BTCS1003	Introduction to Computer Science	Inter. Dept.	3
BT1203	Physical Chemistry	BT General	3
BT1303	Introduction to Biotechnology	BT Foundation	3

Semester-II (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BTHU1033	English-II	Inter. Dept.	3
BTMT1003	Mathematics	Inter. Dept.	3
BT1213	Inorganic Chemistry	BT General	3
BT1223	Organic Chemistry	BT General	3
BT1803	Ecology, Biodiversity & Eval.-I	BT General	3
BT1233	Biochemistry-I	BT Foundation	3

Semester-III (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BTHU2043	English-III (Writing & Comp)	Inter. Dept.	3
BTMT2013	Biomathematics	Inter. Dept.	3
BT2813	Ecology, Biodiversity & Eval.-II	BT General	3
BT2403	Biological Physics	BT General	3
BT2243	Biochemistry-II	BT Foundation	3
BT2603	Cell Biology	BT Foundation	3

Semester-IV (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BTMG2003	Sociology	BT General	3
BTMG2013	Marketing & Management	BT General	3
BT2103	Classical Genetics	BT Foundation	3
BTMT2023	Probability & Biostatistics	BT Foundation	3
BT2253	Analytical Chemistry & Instrumentation	BT Foundation	3
BT2503	Molecular Biology	BT Foundation	3

Semester-V (15 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BT3263	Principles of Biochemical Engineering	BT Core	3
BT3313	Agriculture Biotechnology	BT Core	3
BT3273	Microbiology	BT Core	3
BT3703	Immunology	BT Foundation	3
BT3513	Methods in Molecular Biology	BT Foundation	3

Semester-VI (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BT3113	Genetic Resources & Conservation	BT Foundation	3
BT3323	Microbial Biotechnology	BT Foundation	3
BT3333	Health Biotechnology	BT Core	3
BT3343	Environmental Biotechnology	BT Core	3
BT3353	Food Biotechnology	BT Core	3
BT3363	Nano-Biotechnology	BT Elective	3

Semester-VII (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BT4123	Genomics & Proteomics	BT Core	3
BT4002	Entrepreneurship in Biotechnology	BT Core	2
BT4823	Bioinformatics	BT Core	3
BT4373	Industrial Biotechnology	BT Core	3
BT4623	Cell & Tissue Culture	BT Elective	3
BT4903	Research Project-I	Project	3

Semester-VIII (14 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BT4713	Virology	BT Elective	3
BT4383	Fermentation Biotechnology	BT Elective	3
BT4023	Research Methodology & Skill Enhancement	BT Core	3
BT4032	Biosafety & Bioethics	Inter. Dept.	2
BT4913	Research Project-II	Project	3



MS BIOTECHNOLOGY

Admission Requirements

- (i) A minimum of 16 years of education leading to BS Degree in relevant discipline.
- (ii) Minimum 2.00/4.00 CGPA or 50% marks in annual system.
- (iii) Admission Test/HEC Approved Test

Degree Requirements

A student admitted in MS program will have to complete the degree requirements by following any one of the options given below:

- (i) 24 Cr. Hrs course work with 6 Cr. Hrs Thesis
- (ii) Course work only (10 Courses)

Each candidate for the MS Biotechnology degree is required to successfully earn 30 Cr. Hrs. as per the following detail:

Area	Cr. Hrs.
a) Course Work	24
b) Thesis/Project/Additional Courses	06
Total	30

a) Graduate Courses

Course Title	Code	Cr. Hrs.
Advances in Biotechnology	BT5303	3
Biostatistics	BT5003	3
Recombinant DNA and Applied GMO Technology	BT5103	3
Stem Cell Technology & Cell Culture	BT5113	3
Advanced Immunology	BT5703	3
Advances in Agriculture Biotechnology	BT5123	3
Bioinformatics	BT5803	3

Course Title	Code	Cr. Hrs.
Nano-Biotechnology	BT5313	3
Microbial Biotechnology & Immunology	BT5703	3
Health Biotechnology	BT5333	3
Advance Cell & Tissue Culture	BT5603	3
Genomics, Transcriptomics & Proteomics	BT5133	3
Recombinant DNA Technology	BT5143	3
Food Biotechnology	BT5343	3
Agricultural Biotechnology	BT5353	3
Advance Biochemistry	BT5203	3
Introduction to Molecular Biology & Biotechnology	BT5613	3
Genetic Resources & Conservation	BT5153	3
Industrial Biotechnology	BT5363	3
Environmental Biology	BT5013	3
Advances in Biotechnology	BT5373	3

b) Research Thesis

Course Title	Code	Cr. Hrs.
Research Thesis	BT6916	6
Thesis Continuation	BT6921	1

CGPA Requirement

A student is required to earn a minimum of 2.50/ 4.00 CGPA on the completion of his/her degree requirements.

Program Duration

MS Biotechnology is nominally a 2-year degree program comprising of 4 semesters. There will be a Fall and a Spring semester in each year. The maximum duration to complete MS Biotechnology degree is 4-years.

BS BIOCHEMISTRY

Admission Requirements

- (i) Higher Secondary School Certificate (FSc Pre-Medical) or Equivalent with Physics, Chemistry and Biology securing at least 45% marks in aggregate. In case of foreign qualification, equivalence from IBCC will be required.
- (ii) UCP admission test or HEC approved test.

Degree Requirements

Each candidate for the BS Biochemistry degree is required to successfully complete 134 Cr. Hrs. with the CGPA of 2.0 on the scale of 4.0 as per the following detail:

Area	Cr. Hrs.
a) Biochemistry Foundation Courses	21
b) Biochemistry General Courses	27
c) Biochemistry Interdepartmental Courses	24
d) Biochemistry Core Courses	41
e) Biochemistry Elective Depth Courses	12
f) Research Project	06
Total	134

a) Biochemistry Foundation Courses (21 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Introduction to Biochemistry	BC1213	3
Carbohydrates and Lipids	BC1323	3
Amino Acid & Proteins	BC2343	3
Human Physiology	BC2423	3
Enzymes	BC2533	3
Molecular Biology	BC2543	3
Metabolism	BC2223	3

b) Biochemistry General Courses (27 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Social Science I	BCHU1043	3
Social Science II	BCHU1063	3
Marketing and Management	BCMG1013	3
Organic Chemistry	BC1313	3

Course Title	Code	Cr. Hrs.
Inorganic Chemistry	BC1333	3
Physical Chemistry	BC2413	3
Biophysics	BC2613	3
Genetics	BC2513	3
Microbiology	BC2623	3

c) Biochemistry Interdepartmental Courses (24 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
English I	BCHU1013	3
Pakistan Studies	BCHU2023	3
Islamic studies	BCHU1033	3
Introduction to Computer Science	BCCS1013	3
English-II	BCHU1053	3
Biostatistics	BCMT1013	3
English-III	BCHU2073	3
Mathematics	BCMT2023	3

d) Biochemistry Core Courses (44 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Cell Biology	BC3633	3
Biochemistry Techniques	BC3233	3
Biosafety & Ethics	BC3013	3
Plant Biochemistry	BC3243	3
Clinical Biochemistry	BC3253	3
Bio-Membranes & Cell Signaling	BC3563	3
Bioenergetics	BC3572	2
Nutritional Biochemistry	BC3263	3
Bioinformatics	BC3023	3
Industrial Biochemistry	BC4273	3
Biotechnology	BC4033	3

Course Title	Code	Cr. Hrs.
Immunology	BC4653	3
Current Trends in Biochemistry	BC4283	3
Environmental Biochemistry	BC4293	3
Biochemistry and Entrepreneurship	BC4203	3

e) Biochemistry Elective Depth Courses (12 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
General Virology	BC3643	3
Cell & Tissue Culture	BC3553	3
Fermentation Biotechnology	BC3583	3
Toxicology	BC4663	3

f) Research Project (06 Cr. Hrs.)

After the completion of 90 Cr. Hrs., the students are required to demonstrate their practical skills in the field of Biochemistry by designing and implementing a research project worth 6 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title	Code	Cr. Hrs.
Research Project I	BC4903	3
Research Project II	BC4913	3

Community Work (BC3000)

Each student is required to complete 65 hours of community work, usually after 4th semester which would be a prerequisite for the award of degree.

Program Duration

This is a 4-year degree program comprising of 8 semesters. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship or deficiency courses. The maximum duration to complete BS Biochemistry degree is 7-years.

SCHEME OF STUDIES BS BIOCHEMISTRY

Semester-I (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BCHU1013	English I	Inter. Dept.	3
BC1333	Inorganic Chemistry	BC General	3
BCHU1033	Islamic studies	Inter. Dept.	3
BCCS1013	Introduction to Computer Science	Inter. Dept.	3
BCHU1043	Social Science I	BC General	3
BC1213	Introduction to Biochemistry	BC Foundation	3

Semester-II (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BCHU1053	English-II	Inter. Dept.	3
BCMT1013	Biostatistics	Inter. Dept.	3
BCHU1063	Social Science II	BC General	3
BCMG1013	Marketing and Management	BC General	3
BC1313	Organic Chemistry	BC General	3
BC1323	Carbohydrates and Lipids	BC Foundation	3

Semester-III (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BCHU2073	English-III	Inter. Dept.	3
BCMT2023	Mathematics	Inter. Dept.	3
BCHU2023	Pakistan Studies	Inter. Dept.	3
BC2413	Physical Chemistry	BC General	3
BC2343	Amino Acid & Proteins	BC Foundation	3
BC2423	Human Physiology	BC Foundation	3

Semester-IV (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BC2613	Biophysics	BC General	3
BC2513	Genetics	BC General	3
BC2623	Microbiology	BC General	3
BC2533	Enzymes	BC Foundation	3
BC2243	Plant Biochemistry	BC Core	3
BC2223	Metabolism	BC Foundation	3

Semester-V (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BC3633	Cell Biology	BC Core	3
BC3233	Biochemistry Techniques	BC Core	3
BC3013	Biosafety & Ethics	BC Core	3
BC3243	Plant Biochemistry	BC Core	3
BC3253	Clinical Biochemistry	BC Core	3
BC3643	General Virology	BC Elective	3

Semester-VI (17 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BC3553	Cell & Tissue Culture	BC Elective	3
BC3563	Bio-Membranes & Cell Signaling	BC Core	3
BC3583	Fermentation Biotechnology	BC Elective	3
BC3572	Bioenergetics	BC Core	3
BC3263	Nutritional Biochemistry	BC Core	3
BC3023	Bioinformatics	BC Core	3

Semester-VII (15 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BC4273	Industrial Biochemistry	BC Core	3
BC4033	Biotechnology	BC Core	3
BC4653	Immunology	BC Core	3
BC4283	Current Trends in Biochemistry	BC Core	3
BC4903	Research Project I	Project	3

Semester-VIII (12 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BC4293	Environmental Biochemistry	BC Core	3
BC4203	Biochemistry and Entrepreneurship	BC Core	3
BC4663	Toxicology	BC Elective	3
BC4913	Research Project II	Project	3

MS BIOCHEMISTRY

Admission Requirements

- (i) A minimum of 16 years of education leading to BS Degree in relevant discipline
- (ii) Minimum 2.00/4.00 CGPA or 50% marks in annual system
- (iii) Admission Test/HEC Approved Test

Degree Requirements

A student admitted in this program will have to complete the degree requirements by following any one of the options given below:

- (i) 24 Cr. Hrs. course work with 6 Cr. Hrs Thesis
- (ii) Course work only (10 Courses)

Each candidate for the MS Biochemistry degree is required to successfully earn 30 Cr. Hrs. as per the following detail:

Area	Cr. Hrs.
a) Course Work	24
b) Thesis/ Project/Additional Courses	06
Total	30

a) Graduate Courses

Course Title	Code	Cr. Hrs.
Applied Enzymology	BC5613	3
Nutritional Biochemistry	BC5213	3
Metabolic Pathways	BC5513	3
Molecular Genetics	BC5623	3
Environmental Biochemistry	BC5223	3
Frontiers in Biochemistry	BC5233	3
Advanced Biochemistry	BC5243	3
Advanced Techniques in Biochemistry	BC5253	3
Biochemistry of Cell Signaling	BC5263	3
Biostatistics	BC5013	3
Advanced Clinical Biochemistry	BC5273	3
Advances in Recombinant DNA Technology	BC5633	3
Advanced Toxicology	BC5283	3
Bioinformatics	BC5023	3

b) Research Thesis

Course Title	Code	Cr. Hrs.
Research Thesis	BC6916	6
Thesis Continuation	BC6921	1

CGPA Requirement

A student is required to earn a minimum of 2.50/ 4.00 CGPA on the completion of his/ her degree requirements.

Program Duration

This is nominally a 2-year degree program comprising of 4 semesters. There will be a Fall and a Spring semester in each year. The maximum duration to complete MS Biochemistry degree is 4-years.

PHD BIOCHEMISTRY

The Department of Biochemistry offers conducive Teaching and Research Environment for our PhD Scholars through highly qualified and HEC approved PhD supervisors. We have developed well-established laboratories with state-of-the-art facilities and equipment to polish and enhance the research skills of PhD Scholars. Research projects are in progress on Proteomics, Genomics, Toxicology, Immunology, Molecular aspects of Disease Diagnosis and Isolation of Biomolecules from Natural Products etc. For Collaborative research on advanced and recent topics, we have developed linkages with several Foreign Universities such as Metropolitan Manchester University UK, University of Oxford, UK, Umm Al-Qura University Saudi Arabia etc. We provide competitive platform to obtain research outcomes for the betterment of this country and globe, and publications in High Impact Journals and International Conferences. Our graduates are securing bright careers in different universities, research organizations and industries in Pakistan and abroad.

Admission Requirements

- (i) MS degree in relevant discipline
- (ii) Minimum CGPA 3.00/4.00 (Semester System) or 60% marks (Annual System)
- (iii) Admission Test/HEC Approved Test
- (iv) Interview

Degree Requirements

A PhD candidate shall be awarded degree on successful completion of the following requirements:

- (i) 8 Cr. Hrs. Course Work with minimum CGPA 3.00/4.00
- (ii) Comprehensive Examination (written and oral)
- (iii) Synopsis Defense
- (iv) 30 Cr. Hrs. Research Work
- (v) Publication of at least one research paper in HEC approved journal
- (vi) Dissertation Foreign Reviews
- (vii) Dissertation Final Defense

Note: PhD scholars are required to comply with the following timeline:

Activity	Preferred Time	Maximum
Course Work	2 Semesters	3 Semesters
Comprehensive Exam	3 Semesters	4 Semesters
Synopsis Qualification	4 Semesters	6 Semesters
Thesis Submission	6 Semesters	14 Semesters (7 years)

BS FOOD SCIENCES AND TECHNOLOGY

Admission Requirements

- (i) Higher Secondary School Certificate (FSc Pre-Medical) or Equivalent with Physics, Chemistry and Biology securing at least 45% marks in aggregate. In case of foreign qualification, equivalence from IBCC will be required.
- (ii) UCP admission test or HEC approved test.

Degree Requirements

Each candidate for the BS Food Sciences and Technology degree is required to successfully earn 135 Cr. Hrs. with the CGPA of 2.0 on the scale of 4.0 as per the following details:

Area	Cr. Hrs.
a) Foundation Courses	24
b) General Courses	42
c) Interdepartmental Courses	33
d) Core Courses	20
e) Elective Courses	10
f) Research Project	06
Total	136

a) Foundation Courses (24 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Confectionery and Snack Foods	FS3453	3
Sugar Technology	FS3653	3
Food Process Engineering	FS3663	3
Instrumental Techniques in Food Analysis	FS3433	3
Beverage Technology	FS3533	3
Fruits and Vegetables Processing	FS2623	3
Meat and Sea Food Processing Technology	FS3513	3
Public Health, Milk and Meat Hygiene	FS3633	3

b) Core Courses (20 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Bakery Products Technology	FS3463	3
Food Biotechnology	FS3543	3
Food Laws & Regulation	FS3703	3
Technology of Oils and Fats	FS2553	3
Food Packaging	FS4563	3
Sensory Evaluation of Foods	FS4482	2
Extrusion Technology	FS3573	3

c) General Courses (42 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Introduction to Food Science & Technology	FS1103	3
Essentials of Biochemistry	FS1203	3
Principles of Human Nutrition	FS1403	3
Food Chemistry	FS1213	3
General Microbiology	FS1303	3
Food Microbiology	FS2313	3
Postharvest Technology	FS2413	3
Community Nutrition	FS2423	3
Dairy Technology	FS3503	3
Food Processing & Preservation	FS2603	3
Unit Operation in Food Processing	FS2613	3
Food Plant Layout and Sanitation	FS2523	3
Cereal Technology	FS2643	3
Food Toxicology	FS3473	3

d) Interdepartmental Courses (33 Cr Hrs.).

Course Title	Code	Cr. Hrs.
Islamic Studies	FSHU1003	3
Introduction to Information Technology	FSCS1003	3
Pakistan Studies	FSHU1013	3
English-I	FSHU1023	3

Course Title	Code	Cr. Hrs.
Mathematics-I	FSMT1013	3
English-II	FSHU1043	3
Statistics	FSMT1003	3
Mathematics-II	FSMT2023	3
Entrepreneurship in Food Science and Technology		3
Biostatistics		3
Research Methodology and Skills		3

e) Elective Courses (10 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Food Product Development	FS4683	3
Food Safety and Quality Management	FS4492	2
Poultry and Egg Processing	FS4673	3
Food Service Management	FS4472	2

f) Research Project (06 Cr. Hrs.)

After the completion of 90 Cr. Hrs., the students are required to demonstrate their practical skills in the field of Food Science and Technology by designing and implementing a research project worth 6 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title	Code	Cr. Hrs.
Research Project I	FS4903	3
Research Project II	FS4913	3

Community Work (BT3000)

Each student is required to complete 65 hours of community work, usually after 4th semester which would be a prerequisite for the award of degree.

Program Duration

This is a 4-year degree program comprising of 8 semesters. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship or deficiency courses. The maximum duration to complete BS Food Sciences and Technology degree is 7-years.

SCHEME OF STUDIES BS FOOD SCIENCES AND TECHNOLOGY

Semester-I (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
FS1103	Introduction to Food Science & Technology	General	3
FSHU1003	Islamic Studies	Inter Department	3
FS1203	Essentials of Biochemistry	General	3
FSCS1003	Introduction to Information Technology	Inter Department	3
FSHU1013	Pakistan Studies	Inter Department	3
FSHU1023	English-I	Inter Department	3

Semester-II (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
FS1403	Principles of Human Nutrition	General	3
FSMT1013	Mathematics-I	Inter Department	3
FS1213	Food Chemistry	General	3
FSHU1043	English-II	Inter Department	3
FSMT1003	Statistics	Inter Department	3
FS1303	General Microbiology	General	3

Semester-III (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
FS2313	Food Microbiology	General	3
FS2413	Postharvest Technology	General	3
FSMT2023	Mathematics-II	Inter Department	3
FS2423	Community Nutrition	General	3
FS2503	Dairy Technology	General	3
FS2603	Food Processing & Preservation	General	3

Semester-IV (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
FS2553	Technology of Oils and Fats	Core	3
FS2613	Unit Operation in Food Processing	General	3
FS2623	Fruits and Vegetables Processing	Foundation	3
FSMT2033	Biostatistics	Inter Department	3
FS2643	Cereal Technology	General	3
FS2653	Sugar Technology	Foundation	3



SCHEME OF STUDIES BS FOOD SCIENCES AND TECHNOLOGY

Semester-V (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
FS3523	Food Plant Layout and Sanitation	General	3
FS3513	Meat and Sea Food Processing Technology	Foundation	3
FS3633	Public Health, Milk and Meat Hygiene	Foundation	3
FS3663	Food Process Engineering	Foundation	3
FS3433	Instrumental Techniques in Food Analysis	Foundation	3
FS3533	Beverage Technology	Foundation	3

Semester-VI (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
FS3573	Extrusion Technology	Core	3
FS3473	Food Toxicology	General	3
FS3453	Confectionery and Snack Foods	Foundation	3
FS3463	Bakery Products Technology	Core	3
FS3543	Food Biotechnology	Core	3
FS3703	Food Laws & Regulation	Core	3

Semester-VII (14 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
FSMG4003	Entrepreneurship in FST	Inter Department	3
FS4563	Food Packaging	Core	3
FS4673	Poultry and Egg Processing	Elective	3
FS4482	Sensory Evaluation of Foods	Core	2
FS4903	Research Project I	Project	3

Semester-VIII (12 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
FS4472	Food Service Management	Elective	2
FS4683	Food Product Development	Elective	3
FS4492	Food Safety and Quality Management	Elective	2
FSHU4053	Research Methodology & Skills	Inter Department	3
FS4913	Research Project II	Project	3

