



**MASTER OF SCIENCE & MASTER
DEGREE PROGRAMS, POSTGRADUATE
DIPLOMA & POSTGRADUATE
CERTIFICATE COURSE
IN**

BIOCHEMISTRY AND BIOTECHNOLOGY

PROSPECTUS

(2023 Onwards)

**Department of Chemistry
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Postgraduate Programs in Biochemistry and Biotechnology:

MSc in Biochemistry and Biotechnology, Master of Biochemistry and Biotechnology, Postgraduate Diploma in Biochemistry and Biotechnology and Postgraduate Certificate in Biochemistry and Biotechnology

1.0 Preamble

The Department of Chemistry at the University of Kelaniya presently offers theory and laboratory course units in Chemistry and Biochemistry for undergraduate students. In addition to Chemistry, some of the undergraduate and postgraduate research in the Department of Chemistry also focuses on Biochemistry and Biotechnology. Biochemical, Molecular Biology, Bioinformatics techniques are increasingly being used in healthcare, medical, environmental, agricultural and forestry sectors as well as in food processing and manufacturing value-added products. Application of these techniques would enhance the competitiveness of Sri Lankan products in premier export markets. There is a dearth of trained individuals with practical knowledge and know-how on these areas who could contribute in the development of such industries.

Graduates with first degrees in Sri Lanka do not have adequate opportunity to get exposure to Advanced Biochemistry and Biotechnology and hands-on practical experience in these fields. In order to address this issue, **four** postgraduate programs in Biochemistry and Biotechnology namely **MSc in Biochemistry and Biotechnology Degree Program** [MSc (Biochem & Biotech), with course work and a research component, SLQF 10: 2 year duration, 60 credits], **Master of Biochemistry and Biotechnology Degree Program** [M Biochem & Biotech, with course work only, SLQF 9: 1 year duration, 30 credits] and **Postgraduate Diploma in Biochemistry and Biotechnology** [PG Dip (Biochem & Biotech), SLQF 8: 1 year duration, 25 credits] and **Postgraduate Certificate in Biochemistry and Biotechnology** [PG Cert (Biochem & Biotech), SLQF 7, 1 year duration, 20 credits] are introduced by the Department of Chemistry, University of Kelaniya. (SLQF: Sri Lanka Qualification Framework)

2.0 Aims and Objectives of the Postgraduate Degree Programs

2.1 Aims of the MSc (Biochem & Biotech) Degree Program with course work and a research component, M Biochem & Biotech Degree Program with course work only, PG Dip (Biochem & Biotech) and PG Cert (Biochem & Biotech)

Aims of the Postgraduate Certificate, Diploma, M Biochem & Biotech and MSc (Biochem & Biotech) Degree Programs are to produce graduates and professionals with scientific knowledge and laboratory skills required by industries and organizations dealing in Biochemistry, Biotechnology, research and development and other laboratory work in these areas.

In addition, the MSc Degree Program with course work and a research component would enable graduates and professionals to develop the ability to carry out research independently, in an area related to Biochemistry and Biotechnology.

2.2 Objectives of the MSc, Masters Degree Programs, PG Dip and PG Cert (Biochem & Biotech) Programs,

On the completion of the PG Cert (Biochem & Biotech), the Certificate holders will gain sufficient knowledge on basic biochemical, biotechnology and bioinformatics techniques that are important in understanding their use in industry to prepare the students for a career in science and to produce trained graduates equipped with highly marketable skills to meet the needs of academia and industry.

On the completion of the PG Dip (Biochem & Biotech), diplomates will gain sufficient theoretical knowledge on basic and advanced biochemical and biotechnology techniques including molecular biology and bioinformatics and basic practical skills that are important for understanding and application in relevant biotechnology industries.

On the completion of the M Biochem & Biotech Degree Program, the postgraduates will gain adequate knowledge and necessary skills and expertise to solve problems in the areas of Biochemistry and Biotechnology to flourish in competitive translational research and industrial environments.

Further, on completion of the MSc (Biochem & Biotech) Degree Program with course work and a research component, the postgraduates will be able to make significant contributions to the research and development programs aimed at initiation and improvement in relevant Biochemical and Biotechnology industries and organizations.

3.0 Target Groups

The postgraduate courses [MSc (Biochem & Biotech) Degree Program with course work and a research component, M Biochem & Biotech Degree Program with course work only, PG Dip and PG Cert (Biochem & Biotech)] are intended for graduates, who are engaged or seeking career opportunities in,

- Industries dealing with Biochemistry and Biotechnology
- Academic Institutes
- Organizations dealing with Agriculture and Environmental resources
- Scientific Services (Government, Corporation and other Statutory bodies)
- Research Institutes
- Medical laboratories
- and
- University graduates who are seeking further qualifications to apply for PhD degrees abroad.

4.0 Duration and Course Structure of the Postgraduate Programs

Postgraduate Programs will be operated in a credit based course unit system.

For a theory course unit, **one** credit is equivalent to **15** contact hours and will consist of interactive lectures, tutorials and assignments. For a laboratory course unit and course units on case studies and industrial training, one credit is equivalent to **45** contact hours involving laboratory work, assignments, report writing and presentations.

Postgraduate Programs are conducted mainly by the academic staff of the Department of Chemistry, University of Kelaniya and when necessary, visiting lecturers will be drawn from other Departments of the University of Kelaniya, other Universities, research institutes, industries, government departments, corporations and other statutory organizations. Medium of instruction of the postgraduate programs is **English**. Lectures and most of the laboratory experiments will be conducted during the weekends. Lectures will

be conducted online while for the practicals and examinations students have to attend physically.

4.1 MSc in Biochemistry and Biotechnology Degree Program

MSc in Biochemistry and Biotechnology is a full time postgraduate degree program of **two**-year duration.

This MSc Degree Program consists of two parts namely **Part I** and **Part II**. (Table I). Each part is of **one**-year duration. For a candidate to qualify for the MSc Degree with course work and a research component he/she should accumulate **30** credits in Part I and **30** credits in Part II.

Part I:

- Part I of the program involves theory courses, two compulsory laboratory courses, and one compulsory case study.

Part II:

- To be eligible to proceed to Part II of the MSc Degree program the candidate should accumulate 30 credits from Part I examinations.
- Part II of the program (BCBT 6386W) involves a research project.
- A candidate should carry out a research project of 10 to 12 month duration on a selected topic and submit a dissertation incorporating the results of the research project. The research project has to be carried out at the University under the supervision of a senior member of the academic staff or at a research institute or an industry or any other organization acceptable to the Department of Chemistry, University of Kelaniya. In the event that the research is carried out at an organization other than the Department of Chemistry, University of Kelaniya a research scientist with postgraduate qualifications above MSc level should act as the supervisor and a senior member of the Department of Chemistry, University of Kelaniya should act as the co-supervisor.
- Before the commencement of the research project, a candidate should make a presentation on the plan of the project and methodology to the Department.
- During the Part II of the program the candidate should submit quarterly, a brief progress report to the coordinator of the program. The progress report should be certified by the supervisor. If a candidate fails to submit **two** consecutive progress reports without a valid reason he/she shall be deemed to have voluntarily withdrawn from the MSc Degree Program.
- The dissertation should be submitted at the end of the second academic year.
- A *Viva voce* examination will be held after evaluating the dissertation.
- A candidate who had submitted quarterly progress reports and has failed to submit the dissertation at the end of the second academic year will be considered as a repeat candidate unless the request for the extension is accepted by the Faculty of Graduate Studies. Extensions up to a maximum of **two** years may be granted under special circumstances on the recommendation of the Faculty of Graduate Studies.

4.2 Master of Biochemistry and Biotechnology [M Biochem & Biotech] Degree Program

Master of Biochemistry and Biotechnology [M Biochem & Biotech] Degree Program is a full time postgraduate program of **one**-year duration. Course units (BCBT 51713 to BCBT 54852) in the Part I of the MSc in Biochemistry and Biotechnology Degree Program will be offered for the M Biochem & Biotech Degree Program. To complete the M Biochem & Biotech Degree Program with coursework a candidate should accumulate **30 credits from Part I including all compulsory courses** (Table I).

4.3 Postgraduate Diploma in Biochemistry and Biotechnology

Postgraduate Diploma in Biochemistry and Biotechnology is a full time postgraduate program of **one**-year duration. Compulsory Course units and necessary Optional course units of candidates' choice to complete 25 credits in the Part I of the MSc in Biochemistry and Biotechnology Degree Program will be offered for the Postgraduate Diploma. To complete the Postgraduate Diploma a candidate should accumulate **25 credits from Part I including all compulsory courses** (Table I).

4.4 Postgraduate Certificate in Biochemistry and Biotechnology

Postgraduate Certificate in Biochemistry and Biotechnology is a full time postgraduate program of **one**-year duration. Compulsory Course units and necessary Optional course units of candidates' choice to complete 20 credits in the Part I of the MSc in Biochemistry and Biotechnology Degree Program will be offered for the Postgraduate Certificate. To complete the Postgraduate Certificate a candidate should accumulate **20 credits from Part I including all compulsory courses** (Table I).

All course units offered in the Postgraduate Programs are summarized in Table I.

Table I: Course Units Offered for the Postgraduate Programs

Program Structure for Master of Science in Biochemistry and Biotechnology					
Semester	Course Code	Course Name	Credit Value	Status (Compulsory /Optional)	Existing/ New
1	BCBT 51713	Principles of Biochemistry	3	Compulsory*	Existing
1	BCBT 51722	Analytical Biochemistry	2	Compulsory	Existing
1	BCBT 51732	Cell Biology	2	Optional	Existing
1	BCBT 51742	Molecular Biology and Biotechnology	2	Compulsory*	Existing
1	BCBT 54813	Biostatistics	3	Compulsory	Existing
1	BCBT 54762	Research Methodology and Scientific Communication	2	Compulsory	Existing
1	BCBT 54772	Case Study in Biochemistry Research Development in Industry	2	Compulsory	Existing
1	BCBT 51782	Analytical Biochemistry and Structural Bioinformatics Laboratory	2	Compulsory	Existing
2	BCBT 52792	Advanced Molecular Biology	2	Optional	Existing
2	BCBT 52803	Bioinformatics	3	Optional	Existing
2	BCBT 54753	Food and Nutrition	3	Optional	Existing
2	BCBT 52822	Current Topics in Molecular Biology and Biochemistry	2	Optional	Existing
2	BCBT 52832	Advanced Molecular Biology and Bioinformatics Laboratory	2	Compulsory	Existing
2	BCBT 54843	Biotechnology Industry Management and Entrepreneurship	3	Optional	Existing
2	BCBT 54852	Case Study -Management and Entrepreneurship of Biotechnology Industry	2	Optional	Existing
3 & 4	BCBT 6386W	Postgraduate Research	30	Compulsory	Existing
Total Credits Needed			60		
Total credits offered			65		

* Optional for those with equivalent course units taken at undergraduate level

5.0 Admission to Postgraduate Programs

5.1 Intake

At least 25 candidates per batch will be enrolled for the MSc (Biochem & Biotech) and M Biochem & Biotech Degree Programs, PG Dip (Biochem & Biotech) and PG Cert (Biochem & Biotech). The number of candidates admitted to the four Postgraduate Programs will however be limited and determined annually by the Department.

5.2 Eligibility

Applicants with the following qualifications will be considered for admission to the MSc and Master Degree programs, Postgraduate Diploma and Postgraduate Certificate in (Biochem & Biotech).

B.Sc. in Biological Science or Physical Science with Biochemistry/ Microbiology/ Biology/ Botany/ Zoology/ Plant Science/ Plant Biology/ Molecular Biology and Plant Biotechnology and Chemistry as a subject, or equivalent qualifications at SLQF level 5 or 6 with Biology and Chemistry as subjects acceptable to Senate of the University of Kelaniya.

N.B. Provision is available for candidates registered for the M Biochem & Biotech Degree program with course work only to register for the MSc in Biochemistry and Biotechnology Degree program with course work and a research component after completing the Part I (Refer 11.0 ii).

5.3 Application Procedure

Each applicant should submit a duly filled application form to the Assistant Registrar, Faculty of Graduate Studies, University of Kelaniya, together with the following documents by the stipulated deadline.

- (a) Certified copies of academic records
- (b) A letter of recommendation
- (c) Letter from the employer confirming experience and leave to follow the postgraduate programs (where appropriate)
- (d) List of publications (if any)

Copies of the prospectus and the prescribed application form could be downloaded from the Department of Chemistry website (www.kln.ac.lk/science/chemistry). Prospectus and application forms are also available on the Faculty of Graduate studies website

5.4 Selection Procedure

Suitable applicants will be selected after an interview.

5.5 Course Fees

The following fees as stipulated by the Faculty of Graduate Studies, University of Kelaniya should be paid in full at the commencement of the Master Degree Programs, Postgraduate Diploma and Postgraduate Certificate. Fees paid will not be refunded unless otherwise indicated.

Registration fee

Library fee refundable

Library fee non-refundable

Internet/Wi-Fi fee

In addition, the following tuition fees have to be paid depending on the selected program.

Tuition Fee for MSc Degree Program with course work and a research component:

- Part I : Tuition fee of LKR 250,000.00 can be paid in two instalments. The first instalment of LKR 200,000.00 should be paid at the commencement of the course and the balance LKR 50,000.00 on or before three months after the commencement of the course. Those who do not pay the second instalment within 3 months will not be allowed to continue with the course.
- Part II : Tuition fee of LKR 175,000.00 should be paid in full at the commencement of the second year.

Tuition Fee for M Biochem & Biotech Degree Program with course work only:

Tuition fee is as for the Part I of the MSc Degree Program with course work and a research component.

Tuition Fee for Postgraduate Diploma Program:

Tuition fee of LKR 220,000.00 can be paid in two instalments. The first instalment of LKR 170,000.00 should be paid at the commencement of the course and the balance LKR 50,000.00 on or before three months after the commencement of the course. Those who do not pay the second instalment within 3 months will not be allowed to continue with the course.

Tuition Fee for Postgraduate Certificate Program:

Tuition fee of LKR 200,000.00 should be paid at the commencement of the course.

6.0 Evaluation Procedure

For the four postgraduate programs [MSc and Master Degree Programs, Postgraduate Diploma and Postgraduate Certificate (Biochem & Biotech)]

- All theory courses, the laboratory course, research project (where applicable), case study will be evaluated according to the criteria given in the syllabi.
- Each course unit will carry a maximum of 100 marks.
- A grade is assigned to each course unit depending on the overall performance in the course unit.
- The method of evaluation will be announced by the Department at the commencement of the particular course unit.

A candidate is entitled to receive a transcript giving grades obtained for each paper of the above examination after the confirmation of the results by the Senate of the University of Kelaniya.

6.1.1 MSc Degree Program with Course Work and a Research Component

Part I

A candidate registered for the MSc Degree Program with course work and a research component must obtain a minimum grade of **B** in each prescribed course unit with a minimum cumulative **GPA** of 2.7 to pass Part I of MSc Degree Program with course work and a research component.

Part II:

- The research project in Part II will be evaluated through continuous assessments of the progress, presentations, quarterly progress reports, dissertation and *viva-voce* examination. The percentage weight of each component in the evaluation of Part II will be announced by the Department before the commencement of Part II.
- The dissertation should be submitted at the end of the second academic year.
- A candidate must obtain a minimum grade of **B** to pass Part II of the MSc Degree Program with course work and a research component.

6.1.2 M Biochem & Biotech Degree Program with Course Work Only

A candidate registered for the **M Biochem & Biotech** Degree Program with course work must obtain a minimum grade of **B⁻** in each prescribed course unit (Part I of MSc Degree Program with course work and a research component) with a minimum cumulative **GPA** of 2.7 to pass M Biochem & Biotech Degree Program with course work.

6.1.3 Postgraduate Diploma

A candidate registered for the Postgraduate Diploma must obtain a minimum grade of **B⁻** in each prescribed course unit with a minimum cumulative GPA of 2.7 to pass the Postgraduate Diploma. To complete the Postgraduate Diploma, a candidate should accumulate 25 credits from Part I including all compulsory courses.

6.1.4 Postgraduate Certificate

A candidate registered for the Postgraduate Certificate must obtain a minimum grade of **B⁻** in each prescribed course unit with a minimum cumulative GPA of 2.7 to pass the Postgraduate Certificate. To complete the Postgraduate Certificate, a candidate should accumulate 20 credits from Part I including all compulsory courses.

6.2 Grading System

Marks obtained in respect of a course unit will be graded according to Table II. A Grade Point Value as indicated in Table II is assigned to each grade. Candidates should sit for the examinations in all the course units as indicated in Table I.

Table II: Grading System

Range of Marks	Grade	Grade Point Value
85- 100	A ⁺	4.0
70-84	A	4.0
65-69	A ⁻	3.7
60-64	B ⁺	3.3
55-59	B	3.0
50-54	B ⁻	2.7
45-49	C ⁺	2.3
40-44	C	2.0

35-39	C ⁻	1.7
30-34	D ⁺	1.3
25-29	D	1.0
00-24	E	0.0

6.3 Re-sit Examination for Postgraduate Programs

- A candidate who obtains a grade below B⁻ in a particular course unit may re-sit the examination in respect of the course unit for the purpose of passing and the best grade obtainable at a re-sit examination is B⁻.
- In the event a candidate obtains a lower grade while attempting to improve the grade he/she will be entitled to the previous grade.
- A candidate is required to pay a resit exam fee as stipulated by the Faculty of Graduate Studies for re-sitting the examination for each theory course unit and for repeating laboratory course units.
- A candidate repeating the examination or submitting the dissertation after the end of the second year is required to pay a registration fee as stipulated by the Faculty of Graduate Studies for each year of extension.
- Candidates who are deferred in a laboratory course unit should follow the laboratory course unit again with the following batch of candidates.
- Candidate should re-sit for the selected papers in the following programs in the next examination and the maximum number of re-sit examinations permitted will be as follows;

Master of Science – 3 consecutive re-sit exams

Master of Biochemistry & Biotechnology – 2 consecutive re-sit exams

Postgraduate Diploma in Biochemistry & Biotechnology - 2 consecutive re-sit exams

Postgraduate Certificate course - 2 consecutive re-sit exams

6.4 Grade Point Average

Grade Point Average (GPA) is the credit-weighted arithmetic mean of the Grade Point Values, i.e. the GPA is determined by dividing the total credit-weighted Grade Point Value by the total number of credits. GPA shall be computed to the second decimal place.

Example: A candidate who has completed one course unit with two credits, three course units each of three credits and two course units each of one credit with grades A, C, B, D, C⁺, and A⁺ respectively would have GPA of 2.48 as calculated below:

$$\begin{aligned} \text{GPA} &= \frac{(2 \times 4.0) + (3 \times 2.0) + (3 \times 3.0) + (3 \times 1.0) + (1 \times 2.3) + (1 \times 4.0)}{2 + 3 + 3 + 3 + 1 + 1} \\ &= \frac{32.3}{13} = 2.4846 \\ &= 2.48 \text{ (to the second decimal place)} \end{aligned}$$

All the prescribed course units for the program (Table I) will be taken into account in calculating the GPA for the award of the MSc Degrees (Part I and Part II) and the Postgraduate Diploma.

7.0 Criteria for the Award of the MSc in Biochemistry and Biotechnology

Pass

A candidate registered for the MSc Degree Program with course work and a research component will be awarded the **MSc in Biochemistry and Biotechnology** (with course work

and a research component) if he/she satisfies the following requirements:

- (i) accumulated 30 credits in Part I and 30 credits in Part II.
- (ii) obtained grades of **B** or better for 30 credits in registered course units in Part I including all compulsory course units and a minimum cumulative GPA of 2.7 in Part I.
- (iii) obtained a grade of **B** or better in Part II.
- (iv) completed the relevant requirements within a period of **four consecutive academic** years.

Merit Pass

A candidate registered for the MSc Degree Program will be awarded the MSc in Biochemistry and Biotechnology with merit if he/she satisfies all the following conditions:

- (i) accumulated 30 credits in Part I and 30 credits in Part II.
- (ii) obtained grades **B** or better for 30 credits in registered course units including all compulsory course units in Part I.
- (iii) obtained a grade of **A** or better in Part II.
- (iv) obtained a minimum cumulative GPA of 3.7 from 30 credits in registered course units including all compulsory course units in Part I and Part II.
- (v) completed the relevant requirements within a period of **two consecutive academic** years.

Distinction

A candidate registered for the MSc Degree Program will be awarded the MSc in Biochemistry and Biotechnology with distinction if he/she satisfies all the following conditions:

- (vi) accumulated 30 credits in Part I and 30 credits in Part II.
- (vii) obtained grades **A** or better for 30 credits in registered course units including all compulsory course units in Part I.
- (viii) obtained a grade of **A** or better in Part II.
- (ix) obtained a minimum cumulative GPA of 4.0
- (x) completed the relevant requirements within a period of **two consecutive academic** years.

A candidate is entitled to receive a transcript giving grades obtained for each paper of the above examination after the confirmation of the results by the Senate of the University of Kelaniya.

8.0 Criteria for the Award of the Master of Biochemistry and Biotechnology [M Biochem and Biotech]

Pass

A candidate registered for the Master of Biochemistry and Biotechnology [M Biochem and Biotech] Degree Program will be awarded the **Master of Biochemistry and Biotechnology [M Biochem & Biotech]** Degree if he/she satisfies the following requirements:

- (i) accumulated 30 credits in Part I
- (ii) obtained grades of **B** or better for 30 credits in registered course units in Part I including all compulsory course units and a minimum cumulative GPA of 2.7 in Part I.
- (iii) completed the relevant requirements within a period of **three consecutive academic** years.

Merit Pass

A candidate registered for the Master of Biochemistry and Biotechnology [M Biochem & Biotech] Degree Program will be awarded the Master of Biochemistry and Biotechnology [M Biochem & Biotech] Degree with merit if he/she satisfies all the following conditions:

- (i) accumulated 30 credits in Part I and
- (ii) obtained grades **B** or better for 30 credits in registered course units in Part I including all compulsory course units.
- (iii) Obtained grades **A** or better in course units aggregating to at least 50% of the course units considered under (ii) above
- (iv) obtained a minimum cumulative GPA of 3.7 from 30 credits in registered course units in Part I including all compulsory course units.
- (v) completed the relevant requirements within a period of **one academic** year.

Distinction

A candidate registered for the Master of Biochemistry and Biotechnology [M Biochem & Biotech] Degree Program will be awarded the Master of Biochemistry and Biotechnology [M Biochem & Biotech] Degree with distinction if he/she satisfies all the following conditions:

- (vi) accumulated 30 credits in Part I and
- (vii) obtained grades **A** or better for 30 credits in registered course units in Part I including all compulsory course units.
- (viii) obtained a minimum cumulative GPA of 4.0 from 30 credits in registered course units in Part I including all compulsory course units.
- (ix) completed the relevant requirements within a period of **one academic** year.

A candidate is entitled to receive a transcript giving grades obtained for each paper of the above examination after the confirmation of the results by the Senate of the University of Kelaniya.

9.0 Criteria for the Award of the Postgraduate Diploma in Biochemistry and Biotechnology

Pass

A candidate registered for the Postgraduate Diploma will be awarded the Postgraduate Diploma in Biochemistry and Biotechnology if he/she satisfies the following conditions

- (i) accumulated 25 credits in the registered course units from Part I including all compulsory courses.
- (ii) obtained grades of **B⁻** or better for 25 credits in registered course units from Part I including all compulsory courses.
- (iii) obtained a minimum cumulative GPA of 2.7 from 25 credits in registered course units from Part I including all compulsory courses
- (iv) completed the relevant requirements within a period of **three consecutive academic** years.

Merit Pass

A candidate registered for the Postgraduate Diploma in Biochemistry and Biotechnology Program will be awarded the Postgraduate Diploma in Biochemistry and Biotechnology with merit if he/she satisfies all the following conditions:

- (i) accumulated 25 credits in Part I including all compulsory courses
- (ii) obtained grades **B** or better for 25 registered course units in Part I including all compulsory courses.
- (iii) Obtained grades **A** or better in course units aggregating to at least 50% of the course units considered under (ii) above

- (iv) obtained a minimum cumulative GPA of 3.7 from 25 credits in registered course units in Part I including all compulsory courses.
- (v) completed the relevant requirements within a period of **one academic year**.

Distinction

A candidate registered for the Postgraduate Diploma in Biochemistry and Biotechnology Program will be awarded the Postgraduate Diploma in Biochemistry and Biotechnology with distinction if he/she satisfies all the following conditions:

- (i) accumulated 25 credits in Part I including all compulsory courses
- (ii) obtained grades **A** or better for 25 registered course units in Part I including all compulsory courses.
- (iii) obtained a minimum cumulative GPA of 4.0 from 25 credits in registered course units in Part I including all compulsory courses.
- (iv) completed the relevant requirements within a period of **one academic year**.

A candidate is entitled to receive a transcript giving grades obtained for each paper of the above examination after the confirmation of the results by the Senate of the University of Kelaniya.

10.0 Criteria for the Award of the Postgraduate Certificate in Biochemistry and Biotechnology

Pass

A candidate registered for the Postgraduate Certificate will be awarded the Postgraduate Certificate in Biochemistry and Biotechnology if he/she satisfies the following conditions

- (v) accumulated 20 credits in the registered course units from Part I including all compulsory courses.
- (vi) obtained grades of **B** or better for 20 credits in registered course units from Part I including all compulsory courses.
- (vii) obtained a minimum cumulative GPA of 2.7 from 20 credits in registered course units from Part I including all compulsory courses
- (viii) completed the relevant requirements within a period of **three consecutive academic years**.

Merit Pass

A candidate registered for the Postgraduate Certificate in Biochemistry and Biotechnology Program will be awarded the Postgraduate Certificate in Biochemistry and Biotechnology with merit if he/she satisfies all the following conditions:

- (i) accumulated 20 credits in registered courses in Part I including all compulsory courses.
- (ii) obtained grades **B** or better for 20 credits in registered course units in Part I including all compulsory courses.
- (iii) Obtained grades **A** or better in course units aggregating to at least 50% of the course units considered under (ii) above
- (iv) obtained a minimum cumulative GPA of 3.7 from 20 credits in registered course units in Part I including all compulsory courses.
- (v) completed the relevant requirements within a period of **one academic year**.

Distinction

A candidate registered for the Postgraduate Certificate in Biochemistry and Biotechnology

Program will be awarded the Postgraduate Certificate in Biochemistry and Biotechnology with merit if he/she satisfies all the following conditions:

- (i) accumulated 20 credits in registered courses in Part I including all compulsory courses.
- (ii) obtained grades **A** or better for 20 credits in registered course units in Part I including all compulsory courses.
- (iv) obtained a minimum cumulative GPA of 4.0 from 20 credits in registered course units in Part I including all compulsory courses.
- (v) completed the relevant requirements within a period of **one academic year**.

A candidate is entitled to receive a transcript giving grades obtained for each paper of the above examination after the confirmation of the results by the Senate of the University of Kelaniya.

11.0 Multiple Options in Postgraduate Programs

- (i) A candidate who had initially registered for the MSc in Biochemistry and Biotechnology and had obtained a minimum grade of **B⁻** in all the prescribed course units in Part I and accumulated a minimum cumulative GPA of 2.7 could apply for Master of Biochemistry and Biotechnology [M Biochem & Biotech], if he/she does not wish to continue with the MSc in Biochemistry and Biotechnology.
- (ii) A candidate who had initially registered for M Biochem & Biotech and had obtained a minimum grade of **B⁻** in all the prescribed course units and a minimum cumulative GPA of 2.7 may register for MSc in Biochemistry and Biotechnology and continue with the research project without any discontinuation.
- (iii) A candidate who had registered for the MSc in Biochemistry and Biotechnology but not eligible to obtain MSc or Masters (Biochem & Biotech) Degree may apply for the Postgraduate Diploma in Biochemistry and Biotechnology if he/she satisfies the conditions in 9.0.
- (iv) A candidate who had registered for the MSc in Biochemistry and Biotechnology but not eligible to obtain MSc or Masters (Biochem & Biotech) Degree or Postgraduate Diploma may apply for the Postgraduate Certificate in Biochemistry and Biotechnology if he/she satisfies the conditions in 10.0.

11.0 Program Content

Semester 1			
Course Code:	BCBT 51713		
Course Name:	Principles of Biochemistry		
Credit Value:	03		
Core/Optional	Core Course (MSc and M (Biochem & Biotech) Degree Programmes and Postgraduate Diploma)		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	–	105
<p>Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to</p> <ul style="list-style-type: none"> ➤ use their knowledge of structures and properties of the four major classes of biomolecules to study them based on the structure and function. ➤ determine the properties of enzymes based on the catalytic reactions. ➤ describe the metabolic pathways and apply the knowledge in metabolic pathways and diseases to study metabolic disorders. 			
<p><u>Introductory Biochemistry</u> Structure and properties of the main classes of biomolecules; amino acids, peptides, proteins, carbohydrates, lipids, nucleic acids.</p> <p><u>Proteins</u> Protein Function: glycoproteins, multienzyme complexes, DNA binding proteins, levels of proteins (primary, secondary, tertiary and quaternary structures) and protein folding, biological activity, denaturation, Ligand protein interactions, Proteins in solution and membranes</p> <p><u>Enzymes</u> Principles of enzyme catalysis, advanced methods of enzyme kinetics and inhibition. Enzyme regulation and mechanism of selected enzymes, macro molecular interactions, interactions with other molecules and coenzymes.</p> <p><u>Nucleic acids</u> Chromosome structure and organization</p> <p><u>Lipids and membranes</u> Functions of biologically important lipids, lipid modifications Biological membranes and membrane transport, intracellular transport mechanisms, endocytosis, organelle biogenesis, pumps, channels, transporters, receptors, cellular signaling, signal transduction Membrane structure Major structural features; plasma membrane, nucleus, membrane bound organelles</p> <p><u>Metabolism</u> Bioenergetics, Major metabolic pathways and control sites of carbohydrate metabolism, lipid metabolism, amino acid metabolism and integration of metabolism. Metabolic disorders and their biochemical assessment.</p> <ul style="list-style-type: none"> • Metabolism in Starvation, Diabetes and Exercise • Basics in Xenobiotic metabolism and toxicity 			

Teaching /Learning Methods: A combination of lectures, and problem-based learning.			
Assessment Strategy: Continuous assessment and end of semester evaluation.			
Continuous Assessment10.....%		Final Assessment90.....%	
Details: quizzes %, mid-term %, other% (homework)50..... %%50.....%	Theory (%)100.....	Practical (%)	Other (%)(specify)
References/Reading Materials: ➤ <u>Nelson D L, Cox M M (4thEdn), <i>Principles of Biochemistry</i>, Lehninger.</u>			

Semester 1			
Course Code:	BCBT 51722		
Course Name:	Analytical Biochemistry		
Credit Value:	02		
Core/Optional	Core Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	30	–	70
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to ➤ analyze biochemical data and draw conclusions based on the findings. ➤ apply the different techniques for separation and analysis of biomolecules			
Course Content: <u>Purification of macromolecules</u> Chromatographic techniques, Centrifugation techniques, Electrophoretic techniques <u>Labeling techniques</u> Radioisotope and non-isotope labeling of proteins. <u>Blotting techniques</u> Western Blot, Southern Blot, Northern Blot <u>Synthesis and analysis of macromolecules</u> Solid phase protein synthesis, protein structure determination (Edman degradation), solid phase oligonucleotide synthesis, Mass Spectrometry, application of analytical Biochemistry in disease diagnosis.			

Teaching /Learning Methods: A combination of lectures, discussions and problem-based learning.			
Assessment Strategy: Continuous assessment and end of semester evaluation			
Continuous Assessment10.....%		Final Assessment90.....%	
Details: quizzes %, mid-term %, other % (homework)50 %%50%	Theory (%)100.....	Practical (%)	Other (%)(specify)
References/Reading Materials: Boyer R (2 nd Edn) <i>Biochemistry Laboratory, Modern Theory and Techniques</i> , Pearson. <u>Selected research articles in Analytical Biochemistry</u>			

Semester 1			
Course Code:	BCBT 51732		
Course Name:	Cell Biology		
Credit Value:	02		
Core/Optional	Optional Course)		
Hourly Breakdown	Theory	Practical	Independent Learning
	30	–	70
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to <ul style="list-style-type: none"> ➤ describe key stages of cell-to-cell communication, cellular transport, cell cycle and carcinogenesis ➤ apply knowledge on cellular structure and function to study cellular activities in normal and disease cells. ➤ illustrate how defects in cell cycle leads to cancer. ➤ design an experiment to study cell biology. 			
Course Content: <u>Cell structure</u> chloroplast and mitochondria, cytoplasm with its cytoskeleton, the extracellular matrix and the cell wall. Molecular constituents of the cell, Cell types and tissues. Viruses, viroids and prions. <u>Cellular functions</u> nerve cells, immunity and host pathogen interactions, cellular movement, cell division and the cell cycle, cell differentiation, replication, transcription in prokaryotic and eukaryotic systems, operon principle, translation, post translational modifications, Protein folding,			

genetic recombination, mutations and DNA repair, oncogenes and cancer, cellular senescence, cell death. <u>Major investigative methods of cell biology</u> Cell immortalization, cell culture techniques, hybridoma technology, immunofluorescent microscopy, immunocytochemistry, immunohistochemistry, FACS, ELISA.			
Teaching /Learning Methods: A combination of lectures, and problem-based learning.			
Assessment Strategy: Continuous assessment and end of semester evaluation			
Continuous Assessment 10.....%		Final Assessment 90.....%	
Details: quizzes %, mid-term %, other % (homework) 50 %%50%	Theory (%) 100.....	Practical (%) 	Other (%) (specify)
References/Reading Materials: Lodish H, Berk A, Zipursky SL <i>et al.</i> , (2000), <i>Molecular Cell Biology</i> , Freeman.			

Semester 1			
Course Code:	BCBT 51742		
Course Name:	Molecular Biology and Biotechnology		
Credit Value:	02		
Core/Optional	Core Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	30	–	70
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to <ul style="list-style-type: none"> ➤ describe application of molecular biology tools in biotechnology efficiently and effectively. ➤ apply knowledge in molecular cloning to design laboratory experiments. ➤ discuss applications of biotechnology in medicine and health care, environmental science, agriculture and in forestry. 			
Course Content: <u>Molecular Biology</u> Genes and genomes, cytoplasmic genetic elements. Molecular cloning; restriction and DNA modifying enzymes, cloning vectors, recombinants, DNA transfer into hosts, gene libraries and screening, restriction mapping, molecular probes, molecular markers and gene mapping, DNA sequencing, PCR.			

<p>DNA, RNA and protein synthesis, Mutations and DNA repair, epigenetics,</p> <p><u>Biotechnology</u> Scope and importance, bioprocess and enzyme technology, single cell protein, bioenergy and biofuels, biotechnological applications in medicine and health care, environmental science, agriculture and in forestry; biofertilizers, biodegradation pathways and bioremediation, biopesticides, biochemical and molecular techniques in pest/disease management, biosensors and biochips.</p>			
<p>Teaching /Learning Methods:</p> <p>A combination of lectures, and problem-based learning.</p>			
<p>Assessment Strategy:</p> <p>: Continuous assessment and end of semester evaluation.</p>			
<p>Continuous Assessment</p> <p>.....10.....%</p>		<p>Final Assessment</p> <p>.....90.....%</p>	
<p>Details: quizzes %, mid-term %, other % (homework)</p> <p>.....50 %%50%</p>	<p>Theory (%)</p> <p>.....100.....</p>	<p>Practical (%)</p> <p>.....</p>	<p>Other (%) (specify)</p> <p>.....</p>
<p>References/Reading Materials:</p> <ul style="list-style-type: none"> ➤ Sambrook, J., Fritsch, E. F., and Maniatis, T. (1989), Molecular cloning, A laboratory manual, Cold Spring Harbor. ➤ Smith J. E. (1997), Biotechnology, Cambridge University Press. 			

Semester 1			
Course Code:	BCBT 54813		
Course Name:	Biostatistics		
Credit Value:	03		
Core/Optional	Core Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	–	105
<p>Course Aim/Intended Learning Outcomes:</p> <p>At the completion of this course student will be able to</p> <ul style="list-style-type: none"> ➤ apply key statistical concepts as they relate to biological sciences to determine appropriate statistical methods for interpretation of data. ➤ perform basic statistical analysis and interpret data. 			

<p>➤ critically evaluate the data analysis and interpretations in scientific literature, industrial and institutional reports.</p>								
<p><u>Descriptive Statistics:</u> Graphical presentation of data, Numerical summaries of data, Measures of location and dispersion.</p> <p><u>Principles of Probability and Probability Distributions:</u> Probability laws, Conditional probability, Discrete Distributions: Binomial, Poison, Continuous Distributions: Normal, Exponential</p> <p><u>Estimation & Hypothesis Testing:</u> Point and Interval estimation, Test of significance, t-test, z-test, χ^2 test for goodness of fit</p> <p><u>Correlation & Linear regression</u> Coefficient of correlation, Simple Linear Regression model, least squares estimators, Residual plots</p> <p><u>Analysis of Designed Experiments</u> Completely randomized design, Randomized block design</p>								
<p>Teaching /Learning Methods: A combination of lectures, and problem-based learning using statistical software in practical sessions.</p>								
<p>Assessment Strategy: Continuous assessment and end of semester evaluation</p>								
<table border="1"> <tr> <td>Continuous Assessment10.....%</td> <td colspan="3">Final Assessment90.....%</td> </tr> <tr> <td>Details: quizzes %, mid-term %, other % (homework/in class assignments) %%100..%</td> <td>Theory (%)100.....</td> <td>Practical (%)</td> <td>Other (%)(specify)</td> </tr> </table>	Continuous Assessment10.....%	Final Assessment90.....%			Details: quizzes %, mid-term %, other % (homework/in class assignments) %%100..%	Theory (%)100.....	Practical (%)	Other (%)(specify)
Continuous Assessment10.....%	Final Assessment90.....%							
Details: quizzes %, mid-term %, other % (homework/in class assignments) %%100..%	Theory (%)100.....	Practical (%)	Other (%)(specify)					
<p>References/Reading Materials: ➤ Pezzulo J. (2013), <i>Biostatistics for Dummies</i>, John Wiley & Sons..</p>								

Semester 1			
Course Code:	BCBT 54762		
Course Name:	Research Methodology and Scientific Communication		
Credit Value:	02		
Core/Optional	Core Course		
Hourly Breakdown	Theory	Practical	Independent

			Learning
	30	–	70
<p>Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to</p> <ul style="list-style-type: none"> ➤ apply research methodology in designing and implementing research. ➤ accurately collect, analyze and report data. ➤ communicate research findings and scientific information effectively. ➤ present complex data or situations clearly. ➤ Apply ethical practices in conducting and reporting research finding at all times 			
<p>Course Content:</p> <p><u>Research Process</u> Nature of scientific research, Inductive and deductive reasoning, Scientific method, identifying a research problem and postulating hypotheses, Research methods in pure and applied sciences, compiling a research proposal for solving the identified research problem.</p> <p><u>Academic Writing</u> Layout of a thesis, Guidelines for writing a thesis. Journal articles; Manuscript planning and organizational strategies, guidelines for writing a research paper. Abstracts; guidelines for preparation of abstracts and extended abstracts for presentations at research conferences/symposia. Applying for research grants.</p> <p><u>Research Presentation</u> Presenting research findings in the form of oral and poster presentations; Procedure for developing contents for oral and poster presentations. Presenting scientific data to a general audience.</p> <p><u>Research Ethics</u> Role and responsibilities of being a researcher/postgraduate research student, academic honesty and professional integrity, ethical concerns related to the research process, ethics of publication of research findings.</p>			
<p>Teaching /Learning Methods: A combination of lectures, and problem-based learning.</p>			
<p>Assessment Strategy: Continuous assessment and final assessment of presentation of mini project proposal based on literature survey</p>			
Continuous Assessment50.....%		Final Assessment50.....%	
Details: quizzes %, mid-term %, other % (homework)50. %%50....%	Theory (%)	Practical (%)	Other (%) (presentation)100.....

References/Reading Materials: ➤ Kothari C R (2004), <i>Research Methodology Methods and Techniques</i> , New Age		

Semester 1			
Course Code:	BCBT 54772		
Course Name:	Case Study in Biochemistry -Research Development in Industry		
Credit Value:	02		
Core/Optional	Core Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	–	–	100
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to ➤ demonstrate the skills to identify and scientifically analyze a real world problem in biochemistry and make recommendations			
Course Content: Biochemistry Research Development and Industry			
Teaching /Learning Methods: Problem-based learning			
Assessment Strategy: Presentation and Case-study Report.			
Continuous Assessment50.....%		Final Assessment50.....%	
Details: quizzes %, mid-term %, other % (program report) %%100..%	Theory (%)	Practical (%)	Other (%) (presentation/report)100.....
References/Reading Materials: ➤ Kothari C R (2004), <i>Research Methodology Methods and Techniques</i> , New Age.			

Semester 1			
Course Code:	BCBT 51782		
Course Name:	Advanced Analytical Biochemistry and Structural Bioinformatics Laboratory		
Credit Value:	02		
Core/Optional	Core Course		

Hourly Breakdown	Theory	Practical	Independent Learning
	–	60	40
<p>Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to</p> <ul style="list-style-type: none"> ➤ plan and carryout large scale protein expression and purification. ➤ use structural bioinformatics tools to predict protein purification methods based on the predicted physico-chemical properties of the protein, protein structure and function. ➤ Use structural bioinformatics tools to analyze protein structure to determine functional studies. 			
<p>Course Content:</p> <p><u>Biochemistry</u> Cell culture, Transfection, Recombinant protein expression, Protein purification (affinity purification, ion exchange chromatography, size exclusion chromatography), SDS-PAGE for protein visualization, Western blot, Enzyme Kinetics, EMSA, ELIZA</p> <p><u>Structural Bioinformatics</u> Determination of amino acid sequences and protein products, interpret Swissprot entry, primary protein structure and open reading frame, primary structure analysis of proteins and predict physico-chemical properties, secondary structure prediction, structural analogs for protein sequences. Protein folding, three-dimensional protein structure, three-dimensional structure retrieval from PDB, protein structure viewing software installation and configuration, protein structure model manipulation.</p>			
<p>Teaching /Learning Methods: Practical sessions designed as problem based student centered learning activities.</p>			
<p>Assessment Strategy: Continuous Assessment</p>			
<p>Continuous Assessment 100.....%</p>		<p>Final Assessment %</p>	
<p>Details: quizzes %, mid-term %, other % (pre-lab/post-lab reports) %%100....%</p>		<p>Theory (%) </p>	<p>Practical (%) </p>
			<p>Other (%) (specify) </p>
<p>References/Reading Materials: ➤ Boyer R (2ndEdn) <i>Biochemistry Laboratory, Modern Theory and Techniques</i>, Pearson.</p>			
Semester 2			
Course Code:	BCBT 52792		
Course Name:	Advanced Molecular Biology and Biotechnology		
Credit Value:	02		
Core/Optional	Optional Course		

Hourly Breakdown	Theory	Practical	Independent Learning
	30	–	70
<p>Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to</p> <ul style="list-style-type: none"> ➤ present ideas related to advanced molecular biology techniques and biotechnology proficiently. ➤ apply the knowledge on advanced molecular biology techniques to design experiments to investigate a biological system. ➤ analyze data related to advanced molecular biology and draw conclusions. 			
<p>Course Content:</p> <p><u>Special topics in molecular biology</u> Applications of PCR technology; Real-time gene expression analysis, next generation sequencing, Chromatin Immunoprecipitation, Cross-linked Immunoprecipitation, Chromosome Conformation Capture, FISH, RNA interference, Cellular memory/epigenetics</p> <p><u>Special topics in biotechnology</u> somaclonal variation in crop improvement, <i>in vitro</i> conservation of germplasm, transgenic plants and genetically modified food, transgenic animals, gene therapy, cellular totipotency and organogenesis, somatic embryogenesis and its applications.</p>			
<p>Teaching /Learning Methods:</p> <p>A combination of lectures, and problem-based learning</p> <p>Assessment Strategy: Continuous assessment and end of semester evaluation.</p>			
Continuous Assessment10.....%		Final Assessment90.....%	
Details: quizzes %, mid-term %, other % (homework)50.... %%50%	Theory (%)100.....	Practical (%)	Other (%) (specify)
<p>References/Reading Materials:</p> <ul style="list-style-type: none"> ➤ Hartwell, L. H., Hood, L., Goldberg, M. L., Reynolds, A. E., Silver, L. M. (2011), Genetics: From Genes to Genomes, McGraw-Hill. 			

Semester 2	
Course Code:	BCBT 52803
Course Name:	Bioinformatics
Credit Value:	03

Core/Optional	Optional Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	–	105
<p>Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to</p> <ul style="list-style-type: none"> ➤ use bioinformatics tools for single sequence analysis, sequence comparison and similarity searches. ➤ apply the knowledge on high throughput data analysis to evaluate and interpret scientific studies. ➤ apply the knowledge on protein and RNA structure prediction to determine structure and function of Proteins and RNA. ➤ use macromolecular structure viewing and docking programs to study macromolecular interactions. 			
<p>Course Content:</p> <p><u>Biological Databases</u> Use of appropriate databases on bio-informatics in problem analysis; primary vs secondary material, data formats, databases.</p> <p><u>Sequence Analysis</u> Single Sequences (Nucleotide) Analysis, Sequence Comparison and Similarity Search.</p> <p><u>Molecular phylogenetics and Comparative Genomics</u> Establishing phylogenetic relationships using bioinformatics; ClustalW alignment of FASTA sequences, sequence distance estimation, phylogentic tree construction algorithms, construction of phylogenetic trees, bootstrapping for evaluation of tree quality.</p> <p><u>Genomic data processing and data analysis</u> Gene expression omnibus; Data deposition, search, retrieving and integration of data. Data flow and processing; Processing biological sequence data, genome assembly and annotation, querying and linking the data.</p> <p><u>Protein Structures</u> Physical methods in protein structure determination; Protein NMR, Protein crystallization and X-Ray crystallography, Protein design and engineering, Gene and protein structure prediction, three-dimensional protein structure prediction and homology modeling; three-dimensional structure retrieval from PDB, protein structure viewing software installation and configuration, protein structure model manipulation, molecular dynamics of proteins, molecular docking.</p> <p><u>RNA Structures</u> RNA secondary structures, RNA structure prediction.</p>			
<p>Teaching /Learning Methods: A combination of lectures, and problem-based learning</p>			
<p>Assessment Strategy: Continuous assessment and end of semester evaluation</p>			
<p>Continuous Assessment</p> <p>.....10.....%</p>		<p>Final Assessment</p> <p>.....90.....%</p>	

Details: quizzes %, mid-term %, other % (in class assignments) %%100..%	Theory (%)100.....	Practical (%)	Other (%) (specify)
References/Reading Materials: <ul style="list-style-type: none"> ➤ Claverie J M (2ndEdn.) <i>Bioinformatics for Dummies</i>, Wiley. ➤ McEntyre J, Ostell J (2002), <i>The NCBI Handbook</i>, National Center for Biotechnology Information. 			

Semester 2			
Course Code:	BCBT 54753		
Course Name:	Food and Nutrition		
Credit Value:	03		
Core/Optional	Optional course		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	–	105

Course Aim/Intended Learning Outcomes:
 At the completion of this course student will be able to

- apply the knowledge on common food processing techniques.
- apply the knowledge on food safety regulations in food processing
- apply knowledge of the role of nutrition and healthy eating for disease prevention and wellness.

Course Content:

Food processing
 Processing of agricultural raw material into finished products (Dairy products, bakery products, meat & fish processing, vegetables, fruit, oil, coconut, non-alcoholic beverages (tea, fruit juices), alcoholic beverages, cocoa and chocolate, confectionary), Effect of food processing on quality, Toxic substances and effect of processing on the toxic substances, Product development in food.

Food safety
 Food spoilage, Food additives, contaminants and adulterants and adulteration, Food safety regulations, Food packaging

Nutrition
 Food as source of nutrients, Energy content of foods, Energy requirements, Nutrition and energy balance, Dietary Reference Intakes and Diet-planning Guides, Role of diet & nutrition in prevention & treatment of diseases, Role of dietary fiber in nutrition, Nutritional requirement in: Pregnancy, lactation and Infancy: Nutritional requirement in: Children, Teenagers, and the Elderly, Energy balance and weight management, Underweight and overweight, Protein Energy Malnutrition, Marasmus and Kwashiorkor diseases. Starvation, eating disorders, Dietary Supplements and Functional Foods, Nutrition and Fitness, Nutrition in health and disease; Promoting health and wellbeing

<p><u>Applied microbiology</u> Primary sources of microorganisms in foods, Factors influencing microbial growth in foods; extrinsic and intrinsic factors, Food sanitation in food manufacture, Spoilage of food, Microorganisms important to food industry; food and dairy microbiology, Food borne diseases, Food borne toxins, Microbial indicators of food safety, Sewage and wastewater treatment</p>			
<p>Teaching /Learning Methods: A combination of lectures, and problem-based learning.</p>			
<p>Assessment Strategy: Continuous assessment and end of semester evaluation.</p>			
<p>Continuous Assessment 10.....%</p>		<p>Final Assessment 90.....%</p>	
<p>Details: quizzes %, mid-term %, other % (homework) 50 %%50.%</p>	<p>Theory (%) 100.....</p>	<p>Practical (%) </p>	<p>Other (%) (specify) </p>
<p>References/Reading Materials: ➤ Wickramanayake T W (3rdEdn.) <i>Food and Nutrition</i>, Hector Kobbekaduwa Agrarian Research and Training Institute, Colombo ➤ Coultate T P (1996) <i>Food: The Chemistry of its Components</i>, RSC, Cambridge.</p>			

Semester 2			
Course Code:	BCBT 52822		
Course Name:	Current Topics in Molecular Biology and Biochemistry		
Credit Value:	02		
Core/Optional	Optional Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	–	–	100
<p>Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to ➤ use concepts in Biochemistry in modern applications and research to develop skills in critical and self-directed learning. ➤ critically consume research literature and data.</p>			
<p>Course Content ; current trends in Biochemical and Molecular Biology Research based on</p>			

recommended reading			
Teaching /Learning Methods: Problem-based distance learning.			
Assessment Strategy: Presentation and continuous assessment			
Continuous Assessment50.....%		Final Assessment50.....%	
Details: quizzes %, mid-term %, other % (discussions/presentation) %%100...%	Theory (%)100.....	Practical (%)	Other (%)(specify)
References/Reading Materials: Recent publications in current topics.			

Semester 2			
Course Code:	BCBT 52832		
Course Name:	Advanced Molecular Biology and Bioinformatics Laboratory		
Credit Value:	02		
Core/Optional	Core Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	–	60	40
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to <ul style="list-style-type: none"> ➤ design and implement molecular cloning experiments. ➤ Perform basic bioinformatics analysis of single sequences and interpret data. 			
<p>Course Content</p> <p><u>Molecular Biology</u> Biosafety, Molecular Cloning (microbial growth, DNA extraction, PCR, PAGE analysis, restriction enzyme digestion, target DNA amplification, target DNA isolation, Ligation, Transformation), Sequencing, RFLP, Southern blot, Practical application of gel-doc, RT-PCR</p> <p><u>Bioinformatics</u> Analysis of single sequences in NCBI database; errors, open-reading frames, introns, exons, promoter regions, transcription initiation and termination sites, GC content, internal repeats. Assemble sequence fragments, primer prediction for PCR amplification of DNA, RT-qPCR and <i>in silico</i> PCR prediction. Sequence Comparison and Similarity Search; Sequence alignment, homology calculation, BLAST, BLASTP, tBLASTn to compare</p>			

DNA and protein, PSI-BLAST to find related protein sequences, dot plots for sequence comparison, local alignment, global alignment and multiple sequence alignment and interpretation.			
Teaching /Learning Methods: Practical sessions designed as problem based student centered learning activities.			
Assessment Strategy: Continuous assessment			
Continuous Assessment100.....%		Final Assessment%	
Details: quizzes %, mid-term %, other % (in class assignments/homework/pre-lab, post-lab reports) %%100.....%	Theory (%)	Practical (%)	Other (%) (specify)
References/Reading Materials: ➤ Sambrook J, Fritsch E F, and Maniatis T (1989), <i>Molecular cloning, A laboratory manual</i> , Cold Spring Harbor			

Semester 2			
Course Code:	BCBT 54843		
Course Name:	Management and Entrepreneurship in Biotechnology		
Credit Value:	03		
Core/Optional	Optional Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	–	105
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to <ul style="list-style-type: none"> ▪ demonstrate knowledge and understanding of principles of new product development and quality, marketing and financial management. ▪ appreciate the benefits of proper management practices in the Biotech Industry and new enterprises. 			
<p>Course Content</p> <p><u>Principles of Management</u> Overview of Management, Role of a manager in competitive Biotechnology Industry or Research and Development, Motivation theories.</p> <p><u>New Product Development and Marketing Management in Biotechnology</u> Entrepreneurship and marketing, basics in preparing a marketing plan and marketing research for industrialization, Growth of marketing concepts in the consumer and industrial markets, behavior and trends in the two sectors, marketing mix and its application to industrial markets.</p>			

<p><u>New Product Development and Industrial Economics</u> Cost of producing biotechnology based products, Variable costs of raw materials, Energy input costs, fixed costs, Labor costs, Depreciation, Direct indirect and capital related costs, Profits, Effects of scale operation, Effect of low rate operation, diminishing return, Measuring profitability, Time value of money, Project Evaluation, resources for R&D activities.</p> <p>Accounting and Financial Management Introduction to accounting, Analysis of financial statements, understanding risk and return, financial planning and management.</p> <p><u>Quality Management</u> Concepts of quality management systems as they apply to Biotechnology, quality control systems, standardization and its principles, practices on quality control and standardization, quality control tools.</p> <p>.</p>			
<p>Teaching /Learning Methods: : A combination of lectures, tutorials, assignments and discussions.</p>			
<p>Assessment Strategy: Continuous assessment and end of course written examination.</p>			
<p>Continuous Assessment 10.....%</p>		<p>Final Assessment 90.....%</p>	
<p>Details: quizzes %, mid-term %, other % (homework) 50..... %%50..%</p>	<p>Theory (%) 100.....</p>	<p>Practical (%) </p>	<p>Other (%) (specify) </p>
<p>References/Reading Materials: ➤ Cottler P and Keller K L (2005) <i>Marketing Management</i>, Pronto Hall. ➤ Wood F (2005) <i>Business Accounting</i>, Prentice Hall.</p>			

Semester 2			
Course Code:	BCBT 54852		
Course Name:	Case Study - Management and Entrepreneurship of Biotechnology Industry		
Credit Value:	02		
Core/Optional	Optional Course		
Hourly Breakdown	Theory	Practical	Independent Learning
	–	–	100
Course Aim/Intended Learning Outcomes:			

At the completion of this course student will be able to ➤ demonstrate the skills to identify and scientifically analyze a real world problem in biochemistry and make recommendations.			
Course Content Biotechnology Industry Management and Entrepreneurship			
Teaching /Learning Methods: : Problem-based learning.			
Assessment Strategy: Presentation and Case-study Report.			
Continuous Assessment50.....%		Final Assessment50.....%	
Details: quizzes %, mid-term %, other % (program report) %%100..%	Theory (%)	Practical (%)	Other (%) (presentation/final report)100.....
References/Reading Materials: ➤ Kothari C R (2004), <i>Research Methodology Methods and Techniques</i> , New Age.			

Semester 1			
Course Code:	BCBT 6386W		
Course Name:	Postgraduate Research		
Credit Value:	30		
Core/Optional	Core Course (M.Sc. Degree Program with course work and a research component)		
Hourly Breakdown	Theory	Practical	Independent Learning
	–	–	3000
Type/Status: ➤ Course Description: This course will provide experience in planning and execution of a research project, surveying literature, critical analysis of literature and data analysis by applying research methodology.			
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to ➤ demonstrate skills to plan and carry out a research project independently according to the scientific method. ➤ Analyze, interpret and report the experimental data.			

<p>Course Content A research project in an area related to Biochemistry</p>			
<p>Teaching /Learning Methods: A combination of literature survey, discussions with the thesis advisor, laboratory and/or fieldwork, data analysis, data interpretation, presentation of research findings and dissertation.</p>			
<p>Assessment Strategy: dissertation and a thesis defense.</p>			
<p>Continuous Assessment50.....%</p>		<p>Final Assessment50.....%</p>	
<p>Details: quizzes %, mid-term %, other % (lab notebook) %%100.....%</p>	<p>Theory (%)</p>	<p>Practical (%)</p>	<p>Other (%) (Thesis defence)100.....</p>
<p>References/Reading Materials: ➤ Reference material such as books, published peer-reviewed research articles and review articles relevant to each research project.</p>			