



University of Ruhuna  
Faculty of Science  
Matara, Sri Lanka

Student Handbook - 2020

Bachelor of Science  
And  
Bachelor of Computer Science  
(General and Honours) Degree  
Programmes

2019/2020



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University of Ruhuna  
Faculty of Science  
Student Handbook 2020

## **Vision of the University**

To be the  
prime intellectual  
thrust of the  
nation.

## **Mission of the University**

To advance  
knowledge and skills  
through  
teaching, research and services  
to serve the society.

# Contents

<b>1</b>	<b>University of Ruhuna</b>	<b>1</b>
1.1	Introduction . . . . .	1
1.2	Location of the University . . . . .	1
1.3	Officers of the University . . . . .	2
1.4	Organizational Structure . . . . .	4
1.5	Contact Information of the University . . . . .	5
1.5.1	Postal Addresses . . . . .	5
1.5.2	Telephone and Fax Numbers of the University . . . . .	5
1.5.3	Electronic Mail/Web . . . . .	5
1.6	Internal Telephone Numbers . . . . .	6
<b>2</b>	<b>Faculty of Science</b>	<b>7</b>
2.1	Introduction . . . . .	7
2.2	Aims of the Faculty . . . . .	7
2.3	Staff and Contact Information of the Faculty Office . . . . .	8
2.4	Degree Programmes . . . . .	8
2.5	Specifications of the Degree Programmes . . . . .	8
2.5.1	Sri Lanka Qualifications Framework (SLQF) . . . . .	8
2.5.2	Accreditation . . . . .	9
<b>3</b>	<b>Academic Regulations and Procedures</b>	<b>10</b>
3.1	Admission Requirements . . . . .	10
3.2	Registration as a New Student . . . . .	10
3.3	Academic Calendar . . . . .	10
3.4	Orientation Programme . . . . .	10
3.5	Course Structure . . . . .	10
3.5.1	Course Units . . . . .	11
3.6	Credit Framework Policy . . . . .	11
3.7	Selection of Course Units . . . . .	12
3.7.1	Biological Science Stream . . . . .	12
3.7.2	Physical Science Stream . . . . .	13
3.8	Identification of Course Units . . . . .	13
3.9	Honours Degree Programme . . . . .	13
3.9.1	Criteria for Selection to a Honours Degree programme . . . . .	14
3.10	Course Unit Combinations - Biological Science Stream . . . . .	14
3.11	Course Unit Combinations - Physical Science Stream . . . . .	16
3.12	Attendance Requirement . . . . .	19
3.12.1	Medical Certificates . . . . .	19
3.13	By law of the Faculty . . . . .	19
<b>4</b>	<b>Faculty of Science Management Information System - (FOSMIS)</b>	<b>20</b>
4.1	Registration for the Subject Combinations . . . . .	20
4.2	Registration for Course Units . . . . .	20
4.3	Registration Process . . . . .	20
4.4	Registration for Examinations . . . . .	21
4.5	Results of Examinations . . . . .	21
4.6	Notices . . . . .	21
4.7	Honours Degree Applications . . . . .	21

4.8	Applications for Demonstrator/Tutor positions . . . . .	21
4.9	Hostel Facilities and Policy . . . . .	21
4.10	Financial Assistance . . . . .	22
4.10.1	Mahapola Higher Education Scholarships . . . . .	22
4.10.2	Bursaries . . . . .	22
4.10.3	Ruhuna Science Faculty Scholarship Fund (RSFSF) . . . . .	23
4.10.4	Other Scholarships . . . . .	23
<b>5</b>	<b>Department of Botany</b>	<b>24</b>
5.1	Research Areas . . . . .	24
5.2	Head of the Department . . . . .	25
5.3	Members of the Academic Staff . . . . .	25
5.4	Course Units in Botany for B.Sc. (General) Degree . . . . .	26
5.5	Course Units for B.Sc. (Honours) Degree in Botany . . . . .	32
<b>6</b>	<b>Department of Chemistry</b>	<b>40</b>
6.1	Research Areas . . . . .	40
6.2	Head of the Department . . . . .	41
6.3	Members of the Academic Staff . . . . .	41
6.4	Course Units in Chemistry for B.Sc. (General) Degree . . . . .	42
6.5	Course Units in Chemistry for B.Sc. (Honours) Degree . . . . .	47
<b>7</b>	<b>Department of Computer Science</b>	<b>53</b>
7.1	Research Areas . . . . .	53
7.2	Head of the Department . . . . .	54
7.3	Members of Academic Staff . . . . .	54
7.4	Members of the Academic Support Staff . . . . .	55
7.5	Course Units in Computer Science for B.Sc. (General) Degree . . . . .	55
7.6	ICT Course units of Bachelor of Science (General) Degree . . . . .	59
7.7	Bachelor of Computer Science (General) Degree . . . . .	59
7.7.1	Course units for Bachelor of Computer Science (General) Degree (BCS)	60
7.8	Bachelor of Computer Science (Honours) Degree . . . . .	66
7.8.1	Criteria for Selection to the BCS (Honours) Degree Programme . . . .	66
7.8.2	Course Units of BCS (Honours) Degree Programme . . . . .	67
7.9	Examinations - BCS Degree Programmes . . . . .	69
7.9.1	Attendance . . . . .	70
7.9.2	Examination Criteria . . . . .	70
7.9.3	Bachelor of Computer Science (General) Degree Requirements . . . .	71
7.9.4	Minimum Requirement for the Completion of the Bachelor of Com- puter Science (Honours) Degree . . . . .	72
7.9.5	Option of reverting to BCS General Degree . . . . .	73
7.10	Other Services to the University Community . . . . .	73
<b>8</b>	<b>Department of Mathematics</b>	<b>74</b>
8.1	Introduction . . . . .	74
8.2	Research Areas . . . . .	74
8.3	Head of the Department . . . . .	75
8.4	Members of the Academic Staff . . . . .	75
8.5	Course Units offered for B.Sc. (General) Degree . . . . .	76
8.6	B.Sc (Honours) Degree Programmes in Mathematics . . . . .	90

8.6.1	Course Units offered for B.Sc.(Honours) Degree in Mathematics - Level I	90
8.6.2	Detailed Syllabus for B.Sc. Honours Degree in Mathematics - Level I	91
8.6.3	Course Units offered for B.Sc.(Honours) Degree in Mathematics - Level II	94
8.6.4	Detailed Syllabus for B.Sc. Honours Degree in Mathematics - Level II	95
<b>9</b>	<b>Department of Physics</b>	<b>100</b>
9.1	Research Areas	100
9.2	Facilities in the Department	101
9.3	Link Programmes	101
9.4	Head of the Department	101
9.5	Members of the Academic Staff	101
9.6	Course Units in Physics for B.Sc. (General) Degree	102
9.7	Course Units in Physics for B.Sc. (Honours) Degree	106
<b>10</b>	<b>Department of Zoology</b>	<b>110</b>
10.1	Research Areas	110
10.2	Head of the Department	110
10.3	Members of Academic Staff	110
10.4	Course Units in Zoology for B.Sc. (General) Degree	111
10.5	Course Units in Zoology for B.Sc. (Honours) Degree	118
10.6	Credit Values	122
10.6.1	B.Sc. General Degree	122
10.6.2	B.Sc. Honours Degree	122
<b>11</b>	<b>Optional Course Units (or FSCs) offered by the Faculty</b>	<b>124</b>
11.1	Optional Course Units offered in Semester I	124
11.2	Optional Course Units offered in Semester II	130
<b>12</b>	<b>Learning Resources</b>	<b>136</b>
12.1	Library Facilities	136
12.1.1	Introduction	136
12.1.2	Staff of the Library	136
12.1.3	Library Opening Hours	137
12.1.4	Library Collections	137
12.1.5	Library Resource Classification	139
12.1.6	Library Catalogue	139
12.1.7	Library Services	139
12.1.8	Library Membership	140
12.1.9	Use of the Library	141
12.1.10	Contact information	141
12.2	Department of English Language Teaching (DELT)	142
12.2.1	Staff of DELT - Faculty of Science	142
12.2.2	English Courses offered by DELT	142
12.3	Department of Physical Education	153
<b>13</b>	<b>Sports and Recreation</b>	<b>154</b>

<b>14 Examinations</b>	<b>156</b>
14.1 Bachelor of Science Degree Programmes . . . . .	156
14.1.1 The Bachelor of Science (General) Degree . . . . .	156
14.1.2 The Bachelor of Science (Honours) Degree . . . . .	156
14.1.3 Attendance . . . . .	156
14.2 Examination Criteria . . . . .	157
14.2.1 Grades allocated for Course Units . . . . .	157
14.2.2 Evaluation Criteria for course units of BSc/BCS General and Honours degrees . . . . .	157
14.2.3 Pass in a Course Unit . . . . .	158
14.2.4 Examination Criteria on Mathematical Computing Course Units (IMT1b1 $\beta$ , IMT2b2 $\beta$ and IMT3b1 $\beta$ ) in Industrial Mathematics . . . . .	159
14.2.5 Verification of Marks . . . . .	159
14.2.6 Bachelor of Science (General) Degree Examinations . . . . .	159
14.2.7 Award of Classes for B.Sc. (General) Degree . . . . .	160
14.2.8 Bachelor of Science (Honours) Degree Examinations . . . . .	160
14.2.9 Award of Classes for B.Sc. (Honours) Degree . . . . .	161
14.2.10 Option of reverting to B.Sc. General Degree . . . . .	161
14.3 Other requirements for the completion of a Degree . . . . .	162
14.3.1 Attendance at Practical Course Units: . . . . .	162
14.3.2 Release of Final Results . . . . .	162
14.4 Fees . . . . .	162
14.4.1 Fees Levied for Registration for a Degree Programme . . . . .	162
14.4.2 Examination Fees . . . . .	163
<b>15 Gold Medals and Awards</b>	<b>164</b>
15.1 Gold Medals . . . . .	164
15.2 Annual Student Awards . . . . .	165
15.2.1 Dean's Awards and Dean's List for Overall Performance . . . . .	165
15.2.2 The Vice Chancellor's Awards and Vice Chancellor's List for Overall Performance . . . . .	165
15.2.3 Application procedure . . . . .	166
15.2.4 Eligibility requirements . . . . .	166
15.2.5 Selection Criteria . . . . .	166
<b>16 Student Service Facilities</b>	<b>169</b>
16.1 Counselling Service Centre . . . . .	169
16.2 Career Guidance Unit . . . . .	170
16.2.1 Introduction . . . . .	170
16.2.2 Staff of Career Guidance Unit . . . . .	170
16.2.3 Activities of the Career Guidance Unit . . . . .	172
16.3 University Medical Facilities . . . . .	172
16.3.1 Illness During Examination Period . . . . .	172
16.4 Miscellaneous Facilities . . . . .	172
<b>17 Student Unions and Societies</b>	<b>174</b>
17.1 Science Faculty Students' Union . . . . .	174
17.2 Student Societies . . . . .	174



**18 Other Information** **175**

18.1 The Cultural Centre . . . . . 175

18.2 Resource Centre for Modern Languages . . . . . 175

18.3 Employment opportunities for graduates . . . . . 175

18.3.1 Temporary Demonstrator . . . . . 175

18.3.2 Research Assistantships . . . . . 175

**19 Appendix - Administrative Officers of the University** **176**

# 1 University of Ruhuna

## 1.1 Introduction

University of Ruhuna was established on 1st September 1978, as Ruhuna University College by a Special Presidential Decree. Currently, University of Ruhuna constitutes ten faculties, namely Agriculture, Engineering, Fisheries and Marine Sciences & Technology, Humanities and Social Sciences, Management & Finance, Medicine, Science, Technology, Allied Health Sciences and Graduate Studies.

The central administration unit of the University is located at the Wallamadama University complex. Faculties of Humanities and Social Sciences, Fisheries and Marine Sciences & Technology, Management & Finance, Science and Graduate Studies are also located at the main University premises at Wallamadama (Matara). Faculties of Agriculture, Engineering, Medicine, Allied Health Sciences & Faculty of Technology are located in Mapalana (Kamburupitiya), Hapugala (Galle), Karapitiya (Galle), Godakanda (Galle) and Karagoda-Uyangoda (Kamburupitiya), respectively.

The University offers Bachelor, Master and PhD degrees in their respective disciplines. In addition, Diploma and Certificate courses are conducted in various disciplines.

At the first enrolment of the University of Ruhuna for the Bachelors degree programmes in 1978, a total of 272 students were admitted. In the year 2019, undergraduate population of the nine faculties of University of Ruhuna was 8336 (Table 1).

Table 1: Distribution of students among the nine faculties (as at 31.12.2019).

<b>Name of the Faculty</b>	<b>No. of Students</b>
Agriculture	784
Engineering	915
Fisheries and Marine Sciences & Technology	238
Humanities and Social Sciences	2025
Management and Finance	1298
Medicine	1226
Science	1085
Allied Health Sciences	340
Technology	425
<b>Total undergraduate student population of the University</b>	<b>8336</b>

## 1.2 Location of the University

University of Ruhuna main campus is located 4 km away from Matara along the Colombo Hambantota (A2) main road. Matara (originally Mahathota) is a city on the southern coast of Sri Lanka, 160 km from Colombo. Matara historically belonged to the area called Ruhuna, one of the three kingdoms in Sri Lanka. First Indians who arrived to the island country according to the Mahawansa settled in the area, along the banks of Nilwala River.

Traveling from Colombo to Matara can be made either by train or buses. There are only a limited number of trains but buses are available every half an hour through the normal route or expressway. The journey through normal route takes about four hours from Colombo while one and half hours through Southern Expressway.

### 1.3 Officers of the University

<b>Chancellor</b>	<i>Venerable Akuratiye Nanda Nayaka Thero</i>
<b>Vice-Chancellor</b>	<i>Senior Professor T.S.D. Amarasena MBBS (Ruhuna), DCH(Col.) MD(Paed-Col.), DCH(Syd.)</i>
<b>Deputy Vice-Chancellor</b>	<i>Prof. E.P. Saman Chandana B.Sc. (Ruhuna, SL), M.Phil (Ruhuna, SL), PhD (Kyoto, Japan)</i>
<b>Registrar</b>	<i>Mrs. P.S. Kalugama BA (Jpura), MA (London), MBA(Ruh)</i>
<b>Dean, Faculty of Agriculture</b>	<i>Prof. Sudas D. Wanniarachchi BSc Agric (Ruhuna), MSc (Guelph, Canada), PhD (Guelph, Canada)</i>
<b>Dean, Faculty of Allied Health Sciences</b>	<i>Prof. Imendra Kotapola BDS (Peradeniya), PhD (Nagasaki, Japan)</i>
<b>Dean, Faculty of Engineering</b>	<i>Dr. H.P. Sooriyaarachchi B.Sc. Eng, (Hons), M.Eng.(Tokyo), PhD (Sheffield), MIE (SL), MSSE(SL)</i>
<b>Dean, Faculty of Graduate Studies</b>	<i>Senior Professor L. P. Jayatissa B.Sc. (Ruhuna, SL), Ph.D. (Stirling, UK)</i>
<b>Dean, Faculty of Humanities and Social Sciences</b>	<i>Prof. Upali pannilage B.A., M.Phil, PhD(Ruhuna) PG Dip.(Colombo)</i>
<b>Dean, Faculty of Management &amp; Finance</b>	<i>Prof. P.A.P. Samantha Kumara BBA (Ruh, SL),MBA (Col, SL) PhD (Wuhan , China)</i>
<b>Dean, Faculty of Medicine</b>	<i>Prof. Vasantha Devasiri MBBS (Ruhuna), DCH(Paed-Col.), MD(Col.)</i>
<b>Dean, Faculty of Science</b>	<i>Prof. P.A. Jayantha B.Sc. (Kelaniya, Sri Lanka), M.Sc. (JPura, SL), Ph.D.(QUT, Australia)</i>
<b>Dean, Faculty of Technology</b>	<i>Dr. K.G.S. Harshadewa Gunawardana B.Sc. (Pera, SL), PhD (Oklahoma, USA)</i>

**Dean, Faculty of Fisheries and Marine  
Sciences & Technology**

*Dr. (Mrs.) H.B. Asanthi  
B.Sc. (Ruhuna),  
PhD (University of Montpellier, France)*

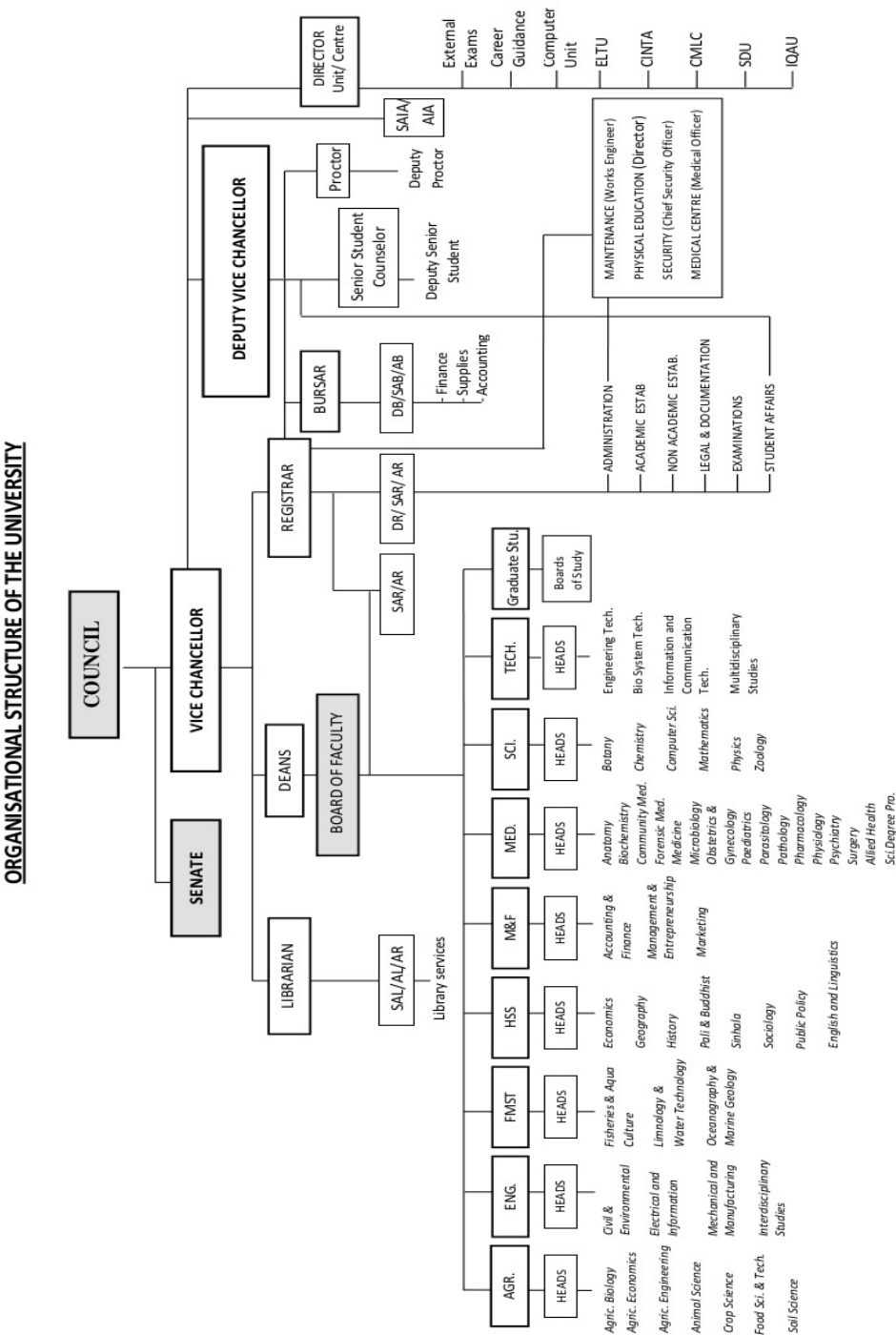
**Acting Librarian**

*Mr. Nimal Hettiarachchi  
B.Sc. (Honours) (Ruhuna, S.L.),  
MSSc.(Kelaniya,S.L)*

**Bursar**

*Mr. K.A.R.S. Jayakody  
CBA, MAAT, BBA (Sp.) Hons*

# 1.4 Organizational Structure



## 1.5 Contact Information of the University

### 1.5.1 Postal Addresses

Main administration block of the University is located in Wellamadama. Also, Faculty of Fisheries & Marine Sciences & Technology, Faculty of Humanities & Social Sciences, Faculty of Management & Finance, Faculty of Science, Faculty of Graduate Studies are located in the Wellamadama.

University of Ruhuna,  
Wellamadama,  
Matara,  
81000,  
Sri Lanka.

Addresses of the other four campuses are as follows;

Postal Addresses of other four Faculties of the University of Ruhuna	
Faculty of Agriculture University of Ruhuna Mapalana, Kamburupitiya, 81100, Sri Lanka.	Faculty of Engineering University of Ruhuna Hapugala, Galle, 80000, Sri Lanka.
Faculty of Medicine University of Ruhuna Karapitiya, Galle. 80000, Sri Lanka.	Faculty of Technology University of Ruhuna Karagoda-Uyangoda, Kamburupitiya 81100, Sri Lanka.

### 1.5.2 Telephone and Fax Numbers of the University

	Telephone	Fax
<b>Wellamadama Complex</b>	+94(0)41222681-2 +94(0)412227001-4	+94(0)412222683
<b>Faculty of Agriculture</b>	+94(0)41229220	+94(0)412292384
<b>Faculty of Engineering</b>	+94(0)912245765	+94(0)912245762
<b>Faculty of Fisheries and Marine Science &amp; Technology</b>	+94(0)412227026	+94(0)412227026
<b>Faculty of Humanities and Social Sciences</b>	+94(0)412227010	+94(0)412227010
<b>Faculty of Management &amp; Finance</b>	+94(0)412227015	+94(0)412227015
<b>Faculty of Medicine</b>	+94(0)912234730	+94(0)912222314
<b>Faculty of Science</b>	+94(0)412222701	+94(0)412222701

### 1.5.3 Electronic Mail/Web

The university can be reached by electronic mail from anywhere in the world. The mail domain is *ruh.ac.lk* . The e-mail addresses of the academic staff and other offices are available in the University Web site: <http://www.ruh.ac.lk>

## 1.6 Internal Telephone Numbers

Vice Chancellor	2000
Office	2101
Deputy Vice Chancellor	2001
Office	2137
Registrar	2110
Office	2109
Dean, Faculty of Fisheries and Marine Sciences & Technology	5101
Senior Assistant Registrar	5102
Dean, Faculty of Science	4101
Assistant Registrar	4102
Dean, Faculty of Humanities and Social Sciences	3101
Assistant Registrar	3102
Dean, Faculty of Management & Finance	3901
Assistant Registrar	3902
Dean, Faculty of Technology	4501
Assistant Registrar	4502
Dean, Faculty of Graduate Studies	2147
Assistant Registrar	2160
Librarian	2210
Bursar	2150
Senior Assistant Bursar (Finance)	2108
Assistant Bursar (Finance)	2103
Assistant Bursar (Supplies)	2115
Deputy Registrar (General Administration)	2120
Deputy Registrar (Examinations)	2130
Assistant Registrar (Student Affairs)	2135
Senior Assistant Registrar (Academic Establishment)	2144
Senior Assistant Registrar (Non-Academic Establishment)	2140
Engineer	2145
Director, Physical Education	2223
Medical Officer	2121
Carrier Guidance Unit	2132
Chief Security Officer	2126
	2127

## 2 Faculty of Science

### 2.1 Introduction

The Faculty of Science consists of the Departments of Botany, Chemistry, Computer Science, Mathematics, Physics and Zoology. In addition, there is a Computer Unit, which caters to the needs of the faculty, and the University in general.

The Faculty offers primarily undergraduate courses viz. the Bachelor of Science (B.Sc.) and Bachelor of Computer Science (B.C.S) General Degrees of three-year duration and B.Sc. and B.C.S. Honours Degrees of four-year duration. The undergraduate programme comprises of a large number of course units offered by individual departments. The Faculty offers postgraduate degree programmes leading to the M.Sc., M.Phil. and Ph.D. All the departments possess well-equipped laboratories and other infrastructure facilities for teaching and research work. At present, the Faculty admits 130 students for Biological Science, 210 students for the Physical Science and 50 students for Computer Science streams annually. The selection of students for undergraduate courses is done by the University Grants Commission of Sri Lanka, based on the performance of students in the relevant General Certificate Examination (Advanced Level).

#### **Vision Statement - Faculty of Science**

*“To be the outstanding internationally-respected academic center of excellence which proudly affirms its Sri Lankan identity and which is committed to rigorous scholarship, academic freedom, sound moral values and social responsibility”*

#### **Mission Statement - Faculty of Science**

*“To produce outstanding internationally accredited graduates who are innovative, analytical, articulate, balanced and adaptable, with lifelong interest of learning; and to strive, through quality teaching, research and community service, to contribute to the advancement of scholarship and the enrichment of the education, cultural, economic and natural environments of the people we serve”*

### 2.2 Aims of the Faculty

The main objective of the faculty is to produce high quality Science graduates in both biological and physical sciences to cater in diverse fields of science in the country itself and outside.

The degree programmes offered by the faculty have been designed to develop following attributes in each student:

- Sound knowledge in subject matter
- Effective communication
- Work in a team to achieve a set target
- Use computers for specific purposes
- Managing a team to fulfill a particular target effectively and efficiently
- Responsibilities towards the fellow community



In order to achieve the above aims the students are free to select well designed course units that provide:

- A sound knowledge in basic scientific concepts in various subjects
- A basic understanding of principles of scientific method and their application
- Apply the knowledge to solve real world problems
- Learn effective and efficient communication methods through report writing, presentations, brainstorming sessions etc...
- Participate in various extra-curricular and outreach activities

The Ruhuna Science graduate has secured a place in the society as an innovator and inventor, researcher, scholar, manager and creative and global thinker.

## 2.3 Staff and Contact Information of the Faculty Office

<b>Dean</b> <i>Professor P. A. Jayantha</i> <i>B.Sc. (Kelaniya),</i> <i>M.Sc. in Industrial Mathematics (SJP),</i> <i>Ph.D. (QUT, Australia)</i>	+94(0)412222701	jayantha@maths.ruh.ac.lk	4101
<b>Assistant Registrar</b> <i>Ms. K.D.De.S Jayasekara</i> <i>B.Sc. (Colombo)</i> <i>M.Sc. in Natural</i> <i>Resource Management</i>	+94(0)412222701	office@sci.ruh.ac.lk	4102

Mrs. N.D.I. Samaranayake(Stenograp)	Senior Staff Assistant/Stenographer
Mrs. S.A. Ramyawathie	Senior Staff Assistant/Clerical
Mrs. D.C.B.M. Kumari	Staff Assistant/Clerical
Mr. N.R.G. Munasinghearachchi	Clerk/Dta Entry Operator(II SEG)
Mr. B.A.D. Wanigarathna	Clerk(Grade II)
Mrs. S. Palliyaguru	Typist(Grade II)
Mrs. U.P.K. Heshani	CAA(Grade III)
Mrs. D.I. Rathnayake	Labourer(Grade I)
Mr. H.L.D.S. Chandana	Labourer(Grade II)
Mr. R.G.J. Chaminda	Labourer(Grade III)
Mr. C.P. De Silva	Driver

## 2.4 Degree Programmes

Currently the Faculty of Science offers B. Sc. General (3 year) and B.Sc. Honours (4 year) Degrees in biological and physical science streams and Bachelor of Computer Science (BCS) General and Honours Degree programmes. These are full time courses consist of a number of course units organised as two semesters per academic year. The General Degree Programmes run through six semesters while the Honours Degree Programmes run through eight semesters. Examinations and evaluations are held throughout each semester.

## 2.5 Specifications of the Degree Programmes

### 2.5.1 Sri Lanka Qualifications Framework (SLQF)

The Sri Lanka Qualifications Framework (SLQF) is a nationally consistent framework for all higher education qualifications offered in Sri Lanka. It recognizes the volume of learning

of students and identifies the learning outcomes that are to be achieved by the holders of respective qualifications. SLQF comprises of ten levels and the descriptors of each of these levels are stated in a comprehensive manner. Since the volume of learning is considered in the SLQF, the number of credits that should be earned by students of each qualification is also given. The minimum number of credits a student must earn to complete a B.Sc. General Degree and a B.Sc. Honours Degree and a BCS General Degree and a BCS Honours Degree with the corresponding SLQF Level is given in the following Table.

Degree Programme	Minimum number of credits	SLQF level
B.Sc. General Degree	90	5
B.Sc. Honours Degree	120	6
BCS General Degree	90	5
BCS Honours Degree	120	6

### **2.5.2 Accreditation**

B.Sc. and BCS General/Honours Degrees are recognised globally. Thus, our science graduates have equal chances as for those graduates from other universities to apply for employment opportunities and to win scholarships/placements in other local and foreign institutions or universities for higher education.

## 3 Academic Regulations and Procedures

### 3.1 Admission Requirements

All applicants for the admission to Bachelors Degree programmes in the Faculty of Science must satisfy the general university admission requirements for the faculties of science as laid down by the University Grants Commission. Applicants with equivalent qualifications gained from foreign universities and transfer students referred by the University Grants Commission for admission to this faculty shall be admitted only with the consent of the Faculty Board.

### 3.2 Registration as a New Student

Students admitted to the faculty register as fulltime students after fulfilling the requirements for registration laid down by the University Grants Commission and the University. He/She is required to maintain his/her registration during the total period of study in the faculty.

### 3.3 Academic Calendar

The general academic calendar consists of levels (academic years) and semesters. Each level comprises of two semesters. The General Degree Programme will be of three levels (six semesters) while the Honours Degree Programme is of four levels (eight semesters). The faculty will notify commencement of the academic years and semesters, with prior approval from the Faculty Board. A typical academic year will be as shown in the following table.

<b>General academic calendar of the Faculty of Science</b>			
First semester	Weeks	Second semester	Weeks
1st half	8	1st half	8
Mid semester recess	1	Mid semester recess	1
2nd half	7	2nd half	7
Study leave period	1	Study leave period	1
Examination period	3	Examination period	4
Vacation periods and Holidays			11
Total			52

### 3.4 Orientation Programme

The orientation programme is designed mainly to conduct an English Course (Intensive Course) to prepare students to follow lectures and practical classes in English medium. The English classes will be conducted by the English Unit of the University during the morning hours of all working days in this period. Afternoon hours will be allocated for students to get familiarise with the facilities available in the University, register for course units through FOSMIS (Faculty of Science Management Information System), attend Special lectures/activities organized by the Career Guidance Unit of the University and the Faculty. The period of the programme depends on the time available between the registration of students by UGC and the commencement of the academic programme of the Faculty.

### 3.5 Course Structure

In the faculty of science there are two main streams of study as given in the Table 2 on the following page. In addition to the Course Units under subject areas given in the table,

Table 2: Main streams of Courses offered by the faculty

Main streams of Courses conducted by the Faculty of Science		
Stream	Subjects	Prefix
Biological Sciences	Botany	BOT
	Chemistry	CHE
	Physics	PHY
	Zoology	ZOO
Physical Sciences	Chemistry	CHE
	Computer Science	COM
	Mathematics	MAT
	Applied Mathematics	AMT
	Industrial Mathematics*	IMT
	Physics	PHY
*Industrial Mathematics is not offered together with Applied Mathematics or Computer Science.		

several other Course Units from different disciplines are also available as Optional Course Units. The prefixes of such Course Units begin with FSC.

For a degree programme, each student should select Course Units from the relevant stream. Mathematics is a compulsory subject for the degrees offered under physical science streams. Students who follow Biological Science stream are strongly advised to follow Chemistry as a subject.

### 3.5.1 Course Units

A Course Unit is a selectively organized section of a subject. Course Units are of two types, that are Core Course Units and Optional Course Units. Core Course Units are designed by including basic and essential subject matter. Optional Course Units contain specific areas, which would provide a diverse knowledge on a particular subject. Theory Course Units consist of lectures, assignments and tutorials. Practical Course Units are either laboratory based or field based studies of a particular subject. In addition, there are Course Units which consist of project work and Combined Course Units consist of both theory and practical components. Course Units are organized at three Levels, namely, I, II and III for the General Degree. On the performance at the examinations of Level I and Level II and on application by the students, a student shall be selected to follow a Honours Degree in a particular subject area. The duration of a Honours Degree program is four years in total. Honours degree program is considered as Level IV which consists of two academic years, namely Honours Degree Level I and Level II.

## 3.6 Credit Framework Policy

Course Units have Credit Values. A credit is a time based quantitative measure used to determine the weightage of a particular Course Unit as shown below.

Different types of Course Units and Credit Values		
Description		Credit Value
<b>Theory Course Units:</b> e.g.	15 contact hours	01
	30 hour Course Unit	02
	45 hour Course Unit	03
Practical Course Units:	30-45 hour Course Unit	01
	60-90 hour Course Unit	02
Projects:	30-45 hour Project	01
<b>Combined Course Units:</b> e.g.		
30 theory hours and 45	practical hours together	03
15 theory hours and 45	practical hours	02
30 theory hours and 22.5	practical hours	02.5

### 3.7 Selection of Course Units

Students are required to select their subject combinations four weeks prior to the commencement of their academic programmes. Any change of subject combinations should be made within 2 weeks from the commencement of the academic programme. Students should register for Core Course Units and Optional Course Units within one week from the commencement of academic work at the beginning of the respective semester.

Registration for course units is compulsory. A student may change the selected optional course unit within a week from the commencement of the semester. Only those who have registered are allowed to sit for the examination of that course unit. When the number of applicants for a particular course unit exceeds the available capacity, students will be chosen on a selection procedure specified by the respective department.

All information regarding above is made available at the office of the Dean and the students are requested to contact the Assistant Registrar of the Faculty for further information. There are several options for selection of course units. Available options will be announced at the commencement of the semester. The Course Unit pathways have been designed to ensure a significant degree of diversification within the degree programme. Core Course Units are the compulsory units, which should be followed by all students in accordance with the streams selected. Optional Course Units can be selected at the discretion of the student, according to the selection criteria prescribed by the Faculty/Department. Students are not allowed to register for more than 6 credits of FSC course units for the B.Sc. (General) Degree which requires course units of 90 credits with a maximum of 95 credits. Any student may register for any number of course units as non degree course units.

#### 3.7.1 Biological Science Stream

During the first two academic years, students in Biological Science Stream must obtain Core Course Units offered by any three departments out of the Department of Chemistry, Zoology, Botany and Physics. Biological science students may choose to follow the optional course units offered by the Department of Physics in Level II of their degree programme. The Department of Physics offer Core Course Units in the Semester I of Level III, and students should follow these Core Course Units if they have selected Physics as a subject area. All Course Units offered by the Department of Botany, Chemistry and Zoology in Level III are optional, and therefore students are free to select Course Units according to their choice depending on the availability of a place in the class. The Course Unit offered by the Department of Chemistry and Physics in the Semester II of Level III are also optional, and as a result students have more choices during this Semester. Different combinations of subject areas available for Biological Science students in the General Degree program are given in

Section 3.10. Students who follow Chemistry, Zoology and/or Botany as a subject should select course units of at least four credits from Level III to fulfil the subject certification requirement.

### 3.7.2 Physical Science Stream

Physical Science students have the choice to select Core Course Units offered by three departments out of the Departments of Chemistry, Computer Science, Mathematics and Physics. Mathematics Department offers three subject areas namely Mathematics, Applied Mathematics and Industrial Mathematics. Physical Science students must follow Core Course Units within three subject areas of their choice including mathematics during the first two academic years and the Semester I of Level III. Students may choose to follow the optional course units offered by the Department of Physics during Level II of their degree programme. During semester II of Level III they have freedom to select Course Units from among Optional Course Units available for Physical Science students. Course units available for different streams in Physical Science are given in the Section 3.11.

Interdisciplinary Course Units (Unit codes starting with FSC) are also available as Optional Course Units for both Biological science and Physical Science streams.

## 3.8 Identification of Course Units

An alphanumeric code is used to identify a unit. The code consists of four digits prefixed by a set of three letters denoting the subject/Course Unit as described by the example given below:

Eg. ZOO3162		General Options
	ZOOLOGY	BOT: Botany, CHE: Chemistry, COM: Computer Science, PHY: Physics, MAT: Mathematics, AMT: Applied Mathematics, IMT: Industrial Mathematics, ZOO: Zoology, FSC: Supplementary Course Units
3	Level 3	1: Level I, 2: Level II, 3: Level III, 4: Honours Degree
1	Semester I	1: Semester I, 2: Semester II, b: Offered during two Semesters
6	A number assigned by the relevant department	
2	Credit Value is 2	1, $\delta$ : 1.25, $\alpha$ : 1.5, 2, $\beta$ : 2.5, 3, 4, ....

Character(s)	Representation	Examples
First three characters	Subject	MAT- Mathematics, PHY - Physics
Fourth character	Level	2 - Level II, 1 - Level I
Fifth character:	Semester of the year	2 - Second Semester
Sixth character:	Number given by the department	b - Both Semesters
Seventh character:	Credit value	4 - Fourth course unit
		3 - Three credits, $\beta$ - 2.5 credits

## 3.9 Honours Degree Programme

Honours Degree Programmes are offered in Botany, Chemistry, Computer Science, Mathematics, Physics and Zoology. Students will be selected for these programmes based on their academic performance. Each Department of study will decide on the number of students to be enrolled into Honours Degree Programme depending on its requirements, available

facilities and student performances. All Honours Degree Programmes shall be of four-year duration.

### 3.9.1 Criteria for Selection to a Honours Degree programme

1. Honours Degree programmes are offered Botany, Chemistry, Computer Science, Mathematics, Physics and Zoology. At the beginning of the Semester II of every academic year, each Department of Study will announce the number of students to be enrolled into Honours Degree programme depending on its requirements and available facilities and human resources. Students will be selected for these Honours degree programmes based on their academic performances of the subject to be specialized.
2. A student shall be eligible to apply at the completion of the Level II of the General Degree, if he/she has
  - (a) followed course units aggregating to a minimum of 60 credits,
  - (b) obtained grades of C or better from theory aggregating to a minimum of 60% credits from Core Course Units (CCUs) of each subject,
  - (c) obtained grades of C or better in all practical course units of the subject to be Specialised,
  - (d) obtained grades of C- or better in all other practical course units,
  - (e) obtained grades of C or better for
    - i. English proficiency Level I (ENG1b10),
    - ii. Mathematics for Biology (MAT1142) by biological science students,
    - iii. Computer Literacy Course (ICT1b13) by students who do not follow computer science as a subject,
  - (f) earned a GPA of 2.00 or more from all the course units followed, (The GPA is calculated using the formula in section 14.2.6), and
  - (g) earned a GPA of 3.00 or more from the subject to be specialised (*Note: For Honours degree in Mathematics, students must fulfill this requirement from two subjects-Mathematics and Applied/Industrial Mathematics*).
3. The selection of a student shall be determined by the respective department of study in an interview and shall be based on the following:
  - (a) performance of the student in the selected subject of specialization at Level I and Level II of the General Degree Examination,
  - (b) performance in the other subjects offered at the examinations referred to (a) above and
  - (c) the general aptitude and application of the student.

### 3.10 Course Unit Combinations - Biological Science Stream

Pathways available for Biological Science Streams (BS1, BS2, BS3 and BS4) are shown in the following Tables.

Pathways available for Biological Science Stream for B.Sc. Level I & II											
B.Sc. Level I						B.Sc. Level II					
Course Unit	BS1	BS2	BS3	BS4	Th/Pr	Course Unit	BS1	BS2	BS3	BS4	Th/Pr
CHE1112	C	C	C		Th	CHE2112	C	C	C		Th
CHE1122	C	C	C		Th	CHE2122	C	C	C		Th
CHE1032	C	C	C		Pr	CHE2131	C	C	C		Pr
CHE1212	C	C	C		Th	CHE2212	C	C	C	C	Th
CHE1222	C	C	C		Th	CHE2222	C	C	C	C	Th
						CHE2231	C	C	C	C	Pr
BOT1112	C		C		Th	BOT2112	C		C	C	Th
BOT1121	C		C	C	Th	BOT2121	C		C	C	Th
BOT1131	C		C	C	Th	BOT2131	C		C	C	Th
BOT1141	C		C	C	Pr	BOT2141	C		C	C	Pr
BOT1212	C		C	C	Th	BOT2212	C		C	C	Th
BOT1221	C		C	C	Th	BOT2221	C		C	C	Th
BOT1231	C		C	C	Th	BOT2231	C		C	C	Th
BOT1241	C		C	C	Pr	BOT2241	C		C	C	Pr

Pathways available for Biological Science Stream for B.Sc. Level I & II											
B.Sc. Level I						B.Sc. Level II					
Course Unit	BS1	BS2	BS3	BS4	Th/Pr	Course Unit	BS1	BS2	BS3	BS4	Th/Pr
ZOO1102	C	C		C	Th	ZOO2102	C	C		C	Th
ZOO1112	C	C		C	Th	ZOO2112	C	C		C	Th
ZOO1121	C	C		C	Pr	ZOO2121	C	C		C	Pr
ZOO1202	C	C		C	Th	ZOO2202	C	C		C	Th
ZOO1212	C	C		C	Th	ZOO2212	C	C		C	Th
ZOO1221	C	C		C	Pr	ZOO2221	C	C		C	Pr
PHY1114		C	C	C	Th	PHY2114		C	C	C	Th
PHY1214		C	C	C	Th	PHY2b22		C	C	C	Pr
PHY1b22		C	C	C	Pr	PHY2214		C	C	C	Th
ICT1b13	C	C	C	C	Th+Pr	FSC215 $\alpha$	O	O	O	O	Pr
MAT1142	C	C	C	C	Th	FSC224 $\alpha$	O	O	O	O	Th+Pr
O: Optional Course Units C: Compulsory Course Units						PHY2112	O	O	O	O	Th
						PHY2222	O	O	O	O	Pr
						ZOO2232	O	O	O	O	Th+Pr
						ZOO2142	O	O	O	O	Th+Pr
						ZOO2152	O	O	O	O	Th+Pr
						ZOO2262	O	O	O	O	Th+Pr
						ICT2b13	O	O	O	O	Th+Pr
ICT2b13 (CCIT) - For students who passed ICT1b13 (CLC) exam											

Pathways available for Biological Science Stream for B.Sc. Level III							
	Semester - I						Semester - II
Subjects	Course Unit	BS1	BS2	BS3	BS4	Th/Pr	Optional Course Units
Chemistry	CHE3112	O	O	O		Th+Pr	CHE3212,
	CHE3122	O	O	O		Th+Pr	CHE3222,
	CHE3132	O	O	O		Th+Pr	CHE3232



Pathways available for Biological Science Stream for B.Sc. Level III							
	Semester - I						Semester - II
Subjects	Course Unit	BS1	BS2	BS3	BS4	Th/Pr	Optional Course Units
Physics	PHY3114 PHY3121		C C	C C	C C	Th Pr	PHY3232, PHY3242, PHY3252, PHY3262, PHY3272,PHY3282
Botany	BOT3112, BOT3122, BOT3132, BOT3151, BOT3162, BOT3172, BOT3182, BOT3191, BOT3142.						BOT3212, BOT3222, BOT3232,BOT3242, BOT3251, BOT3261, BOT3271, BOT3282, BOT3292.
Zoology	ZOO3112, ZOO3122, ZOO3133, ZOO3152, ZOO3162, ZOO3172, ZOO3182, ZOO3192.						ZOO3202, ZOO3211, ZOO3223, ZOO3232, ZOO3252, ZOO3272, ZOO3292.
Mathematics							MAT324 $\beta$ , MAT325 $\beta$ , MAT326 $\beta$ , IMT323 $\beta$ , IMT324 $\beta$ , AMT324 $\beta$
Computer Science	COM3b52						COM3252, COM323 $\alpha$ ; COM324 $\alpha$
FSC Course	FSC3112, FSC3122						FSC3212, FSC3222, FSC3232
Units (Optional)	FSC3132, FSC3bP2						
Any other Course Unit that may be approved by the faculty							

### 3.11 Course Unit Combinations - Physical Science Stream

Possible pathways available for Physical Science Streams (PS1, PS2, PS3, PS4, PS5, PS6 and PS7) are shown in the following Tables.

Pathways available for Physical Science Stream for B.Sc. Level I									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
MAT111 $\beta$	C	C	C	C	C	C	C	C	Th
MAT112 $\delta$	C	C	C	C	C	C	C	C	Th
MAT113 $\delta$	C	C	C	C	C	C	C	C	Th
MAT121 $\beta$	C	C	C	C	C	C	C	C	Th
MAT122 $\beta$	C	C	C	C	C	C	C	C	Th
IMT111 $\beta$	C	C							Th
IMT121 $\beta$	C	C							Th
IMT122 $\beta$	C	C							Th
IMT1b2 $\beta$	C	C							Project
AMT111 $\beta$				C	C	C			Th
AMT112 $\beta$				C	C	C			Th
AMT121 $\beta$				C	C	C			Th
AMT122 $\beta$				C	C	C			Th
CHE1112	C		C	C				C	Th
CHE1122	C		C	C				C	Th
CHE1032	C		C	C				C	Pr
CHE1212	C		C	C				C	Th
CHE1222	C		C	C				C	Th
PHY1114		C	C		C		C		Th
PHY1b22		C	C		C		C		Pr
PHY1214		C	C		C		C		Th

Pathways available for Physical Science Stream for B.Sc. Level I									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
COM1111						C	C	C	Th
COM112 $\beta$						C	C	C	Pr
COM113 $\alpha$						C	C	C	Th
COM121 $\beta$						C	C	C	Th
COM122 $\beta$						C	C	C	Pr
ICT1b13 (CLC)	C	C	C	C	C				Th

Pathways available for Physical Science Stream for B.Sc. Level II									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
MAT211 $\beta$	C	C	C	C	C	C	C	C	Th
MAT212 $\beta$	C	C	C	C	C	C	C	C	Th
MAT221 $\beta$ MAT225 $\beta$	One of these options must be taken (C)								Th Th Th
MAT222 $\delta$ MAT224 $\delta$	C C	C C	C C	C C	C C	C C	C C	C C	Th Th
IMT211 $\beta$ IMT2b2 $\beta$ IMT221 $\beta$	C C C	C C C							Th Project Th
IMT223 $\beta$ IMT224 $\beta$	One of these options must be taken (C)								Th Th Th

Pathways available for Physical Science Stream for B.Sc. Level II									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
AMT211 $\beta$				C	C	C			Th
AMT212 $\beta$				C	C	C			Th
AMT221 $\beta$				C	C	C			Th
AMT223 $\beta$ AMT224 $\beta$				One of these options must be taken (C)					Th Th Th
CHE2112	C		C	C				C	Th
CHE2122	C		C	C				C	Th
CHE2131	C		C	C				C	Pr
CHE2212	C		C	C				C	Th
CHE2222	C		C	C				C	Th
CHE2231	C		C	C				C	Pr
PHY2114 PHY2b22 PHY2214		C C C	C C C		C C C		C C C		Th Pr Th
COM212 $\beta$ COM213 $\alpha$ COM2141 COM221 $\beta$ COM222 $\beta$						C C C C C	C C C C C	C C C C C	Pr Th Th Pr Th
FSC215 $\alpha$ - Optional FSC224 $\alpha$ - Optional PHY2112 - Optional PHY2222 - Optional									Pr Th+Pr Th Pr

Pathways available for Physical Science Stream Level III - Semester I									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Th/Pr
MAT311 $\beta$	C	C	C	C	C	C	C	C	Th
MAT312 $\beta$ MAT313 $\beta$	One of these options must be taken(C)								Th Th
IMT3b1 $\beta$	C	C							Project
IMT312 $\beta$ IMT313 $\beta$	One of these options must be taken(C)								Th Th
AMT311 $\beta$ AMT313 $\beta$			Only one of these options can be taken(C)						Th Th
AMT312 $\beta$ AMT314 $\beta$			One of these options must be taken(C)						Th Th
COM311 $\beta$ COM312 $\beta$ COM3b3 $\beta$ COM3b52						C O C	C O C	C O C	Th Th+Pr Pr Th+Pr
CHE3112 CHE3122 CHE3132	O O O		O O O	O O O				O O O	Th+Pr Th+Pr Th+Pr
PHY3114 PHY3121		C C	C C		C C		C C		Th Pr
FSC Course Units (Optional)									FSC3112 FSC3122 FSC3132 FSC3bP2
Any other Course Unit that may be approved by the Faculty									
O: Optional, C: Compulsory									

Pathways available for Physical Science Stream Level III - Semester II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Th/Pr
MAT321 $\beta$ MAT322 $\beta$ MAT323 $\beta$ MAT324 $\beta$ MAT325 $\beta$ MAT326 $\beta$	O O O O O O	O O O O O O	O O O O O O	O O O O O O	O O O O O O	O O O O O O	O O O O O O	O O O O O O	Th Th Th Th Th Th
IMT321 $\beta^*$ IMT322 $\beta$ IMT323 $\beta$ IMT324 $\beta$	O O O O	O O O O	O O O O	O O O O	O O O O	O O O O	O O O O	O O O O	Th Th Th Th
AMT321 $\beta$ AMT322 $\beta$ AMT323 $\beta$ AMT324 $\beta$	O O O O	O O O O	O O O O	O O O O	O O O O	O O O O	O O O O	O O O O	Th Th Th Th
COM3252 COM3212 COM323 $\alpha$ COM324 $\alpha$ COM326 $\beta$	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	O O O O O	Th Th Th+Pr Th+Pr Th+Pr

Pathways available for Physical Science Stream Level III - Semester II									
PHY3232	O	O	O	O	O	O	O	O	Th
PHY3242	O	O				O	O	O	Th+Pr
PHY3272	O	O				O	O	O	Th+Pr
PHY3252		O	O		O		O		Th
PHY3262	O	O	O	O	O	O	O	O	Th
PHY3282	O	O	O	O	O	O	O	O	Th+Pr
CHE3212	O		O	O				O	Th+Pr
CHE3222	O		O	O				O	Th+Pr
CHE3232	O	O	O	O	O	O	O	O	Th
FSC Course Units (Optional)									FSC3212 FSC3222 FSC3232
Any other Course Unit that may be approved by the Faculty									

### 3.12 Attendance Requirement

Students' attendance for course units they registered can be viewed in FOSMIS. It contains daily attendance, number of medical submissions and current attendance percentage for the course units. A student must maintain an 80% attendance for classes in order to be eligible to sit for the examination of a course unit.

#### 3.12.1 Medical Certificates

If a student is unable to attend lectures and/or practical classes due to an illness he/she should inform the university medical officer within a week. If a student wishes he/she can get medical assistance from a government or a private doctor. However, the University medical officer should approve the medical certificates issued by them.

### 3.13 By law of the Faculty

By law of the faculty consists of all the academic related information, regulation and activities. The by law document is distributed among all the students during their enrollment process. All the students should aware of and refer the by law of the faculty to continue their studies during the academic period.

## **4 Faculty of Science Management Information System - (FOSMIS)**

The FOSMIS is meant to assist management of the information system of Faculty of Science. Its present version has been designed after a careful assessment of the requirements of the users of the system. The users are Students, Dean, Assistant Registrar, Heads of Departments, Lecturers, Academic Supportive Staff and Non-academic Staff.

Users of the FOSMIS can perform various different tasks. Every user is assigned a user name and a password to log-in to the system. However, for security reasons all user accounts are created by the Dean of the Faculty of Science. Students must change the given temporary password at the first time they login to the system.

All students must use FOSMIS to register for course units and examinations. There are many facilities for students in FOSMIS, such as, view own course units they registered, attendance of classes, eligibility for examinations, results/GPA and notices etc. Changes in registrations are allowed within the specified time limit at the beginning of the semester. All students must complete and update their personal information page.

### **4.1 Registration for the Subject Combinations**

New students are advised to register subject combinations first. The date and time period will be announced by the Deans Office. The Deans Office will confirm subject combinations just after the registration except for Computer Science and Industrial Mathematics. Those subjects will be confirmed after selecting students based on their Z scores or by a selection test. Students who registered but not selected for these two subjects will be given an additional time to register for another subject after the deadline without any penalty. Students are not allowed to change subject combinations after the deadline.

### **4.2 Registration for Course Units**

The students will be informed to register for course units before the beginning of a new semester. The date and time duration for registration will be announced by the Deans Office. After the deadline students are not allowed to change course units they registered. Students who did not register for course units during the given period are not allowed to register for examinations of those course units. However, they can register for the examination in the following year as repeat students. It is the responsibility of the student to register for course units on time.

### **4.3 Registration Process**

1. Start Registration: The relevant time periods will be announced by the Deans Office for students to register/drop course units.
2. Close the registration: The system will be closed for students after the given time period and student will not be allowed to register through the FOSMIS after the closing dates.
3. Change of registration: After the closing date of registration, students are allowed to modify course units registered through the Dean's office within a given period, generally two weeks from the beginning of the Semester.

4. Confirmation: Registration for course units will be confirmed by the Deans office and the confirmation of each course unit can be seen in the system. This confirmation indicates that the registration is successful. If any course unit is not confirmed, the students are advised to contact SAR/Science at the Deans Office.

#### **4.4 Registration for Examinations**

All students are advised to register for examinations before the dead line as the dates are announced by the Deans office. Students can register for examinations of registered course units only. A student who registered to repeat an examination should submit the relevant paying voucher to the Deans Office to obtain the confirmation.

After the registration for examinations is completed the eligibility for each course unit, which depends on the percentage of attendance (80%), will be displayed in the system. It is the responsibility of the student to register for examinations.

#### **4.5 Results of Examinations**

The released results of course units will be posted on the system. The students can view the results of a given course unit or all results of past examinations after log in to their accounts.

#### **4.6 Notices**

The notices relevant to students will be posted on FOSMIS. It is the responsibility of students to see the notices.

#### **4.7 Honours Degree Applications**

Students shall submit applications for Honours degree programmes through FOSMIS when advertised.

#### **4.8 Applications for Demonstrator/Tutor positions**

Final year students shall apply for Demonstrator/Tutor positions through FOSMIS when applications are called.

- Web Address for the FOSMIS: <http://paravi.ruh.ac.lk/fosmis/>

#### **4.9 Hostel Facilities and Policy**

At present, the University supplies hostel facilities only for a limited number of students. However, further expansion of this facility is envisaged. First year and Final year students are given the priority. These hostels are looked after by a team consists of Wardens and Sub-wardens. A few university-own houses and rented houses as well are used as students' hostels. The tables below show details of currently available hostel facilities.

Category	Hostel	Number of Students
Bikshu	Walawwatta	57
Male	Meddawatta	109
	Eliyakadna (old)	65
	Eliyakadna (new)	376
	Pamburana II	80
Female	Wellamadama I	94
	Wellamadama II	382
	Wellamadama III	416
	Eliyakadna (old)	111
	Eliyakadna (new)	396
	Paburana 02	40

Accommodation facilities are given according to the student ratio in the Faculties. A year rent Rs.600/= (First & Final) is charged from each student for hostels.

## 4.10 Financial Assistance

There are several financial assistance programmes to help students finance their education when their own family resources are inadequate. At present, students are offered the following financial assistance for their University education:

- Mahapola Higher Education Scholarships
- Student Bursaries
- Endowed Scholarships operated by UGC or University
- Other scholarships

### 4.10.1 Mahapola Higher Education Scholarships

The University Grants Commission sends application forms to all University entrees to apply for this scholarship. The student should send the completed forms to the University Grants Commission. The student's parents income, the number of siblings studying under 18 years of age, the distance from his/her home to the university and the student's rank at district level are considered when granting the scholarship. A merit scholarship is also granted according to student's merits. Amount of money paid for these two scholarships is given in the table below:

Merit scholarship	Rs. 5050.00	Per instalment
General scholarship	Rs. 5000.00	Per instalment

Recipients are entitled to maximum 10 instalments per academic year for both Mahapola and Bursary scheme .

### 4.10.2 Bursaries

The students who are not granted Mahapola scholarships are able to apply for bursaries offered by the University. The University calls applications for student loans from University entrees. Family income, the number of siblings studying under 18 years of age and the distance from his/her home to the University are considered when granting the bursaries.

Full student bursary	Rs. 4000/=	Per instalment
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#### 4.10.3 Ruhuna Science Faculty Scholarship Fund (RSFSF)

Faculty of Science has establish a scholarship fund to provide few scholarships to students with financial difficulties. Students could apply when the applications are called by the Faculty of Science.

#### 4.10.4 Other Scholarships

The University calls applications for the following scholarships from the students who do not receive Mahapola or student bursaries:

- **Martin Wickramasinghe Memorial Scholarship:** The two students who obtain highest marks in the Bachelor of Science General Degree Part I Examination, one each from the Biological and the Physical Science streams are awarded this scholarship.
- **Chandrapala Weerakoon Scholarship** The scholarship will be awarded to economically deprived students after they are successful in their first examination.
- **K.G.K. Wedahitha Scholarship** The scholarship will be awarded to economically deprived students who have sat their A/L examination at Walgama Maha Vidyalaya,Matara and/or Sujatha Balika Vidyalaya,Matara.
- **Ensina Wickramasekara Scholarship** The scholarship will be awarded to economically deprived students whose annual family income is less than 144,000.00 and successful in their first examination.
- **Prof. Ranmuthu Wijenayaka Scholarship** The scholarship will be awarded to an internal student of Faculty of Science Who obtains highest aggregate for Chemistry at the BSc.(General) Degree level I and level II examinations.



## 5 Department of Botany

The Department of Botany conducts courses in all major fields of Botany for undergraduate students registered for B.Sc. General Degree and B.Sc. Honours Degree programmes. In addition to this, research facilities are offered to those students seeking postgraduate qualifications such as M. Sc., M.Phil. and Ph.D. Degrees in Botany and related fields.

The Department has the following infrastructure facilities: two large elementary laboratories to cater up to 130 undergraduate students, two well equipped research laboratories, one taxonomy laboratory with the Departmental herbarium, one well equipped molecular biology laboratory, two green houses, one lecture theater, a seminar room.

### 5.1 Research Areas

Current research topics handled by the members of the Department of Botany are related to the fields of:

- Propagation techniques of medicinal plants.
- Taxonomy of marine algae and Toxic algae.
- Biological control of plant pathogens including soil borne plant diseases such as Panama wilt of banana, collar rots of bean, chilli and tomato, Trichoderma-based biopesticides and biofertilizers.
- Screening of natural compounds from plants for pharmaceutical purposes.
- Organic agriculture and composting.
- Molecular detection and phylogenetics of phytoplasmas.
- Genetic diversity of plants (Cinnamom and Salacia) and algae.
- Molecular biology and Molecular plant systematics.
- Mangrove ecology and Plant ecology.
- Biological monitoring of water bodies.
- Bioremediation.
- Phytoremediation.
- Hydroponic and horticulture practice.
- Determination of the quality of cinnamon quills.
- Effects of herbicides on soil microbes.
- Nutrient content of mangrove propagules.
- Serpentine soil patches in Southern region in Sri Lanka.
- Gene expression of signal transduction of mangroves.
- Effect of plant alleochemicals on weeds.
- Conservation of mangroves.

- Seed germination and storage behavior of some common weeds in Sri Lanka.
- Variety selection/Parental selection in Plant Breeding.
- Identification of hybrid progenies through conventional and molecular methods.
- Control strategies for freshwater cyanobacterial blooms.
- Molecular characterization of cyanobacteria.

## 5.2 Head of the Department

### Senior Professor L. P. Jayatissa

B.Sc. (Ruhuna, SL), Ph.D. (Stirling, UK) (until 2020-07-)

### Dr. (Mrs.) K. K. G. U. Hemamali

B.Sc. (Ruhuna, SL), M.Sc., Ph.D. (Kyushu, Japan) (from 2020-07- up to date)

## 5.3 Members of the Academic Staff

Designation	Name	Specialization
<b>Professors</b>	Senior Prof. L. P. Jayatissa B.Sc. (Ruhuna, SL) Ph.D. (Stirling, UK)	Toxic Cyanobacteria Ecotoxicology Coastal ecology
	Senior Prof. S. Abeysinghe B.Sc. (Ruhuna, SL) M.Sc. (Wageningen, Netherlands) Ph.D. (Brussels, Belgium)	Molecular biology Crop protection
	Prof. (Mrs.) P. D. Abeysinghe B.Sc. (Ruhuna, SL) M.Sc., Ph.D. (Brussels, Belgium)	Molecular biology Plant Systematics
	Prof. K. Masakorala B.Sc. (Ruhuna, SL) M.Sc. (Plymouth, UK) Ph.D. (USTB, Beijing, China)	Environmental Science Environmental Toxicology Bioremediation
<b>Senior Lecturers</b>	Dr. (Mrs.) N. P. Dissanayaka B.Sc. (Peradeniya, SL) Ph.D. (Reading, UK)	Plant Physiology Weed Biology
	Dr. T. G. Dayananda B.Sc. (Ruhuna, SL) M.Sc., Ph.D. (Kyushu, Japan)	Molecular Phylogeny Population Genetics
	Dr. (Mrs.) K. K. G. U. Hemamali B.Sc. (Ruhuna, SL) M.Sc., Ph.D. (Kyushu, Japan)	Molecular Plant Breeding Population Genetics
	Dr. W. G. S. Manel Kumari B.Sc. (Ruhuna, SL), M.Sc. (Peradeniya, SL) M.Sc. (Wageningen, The Netherlands) Ph.D. (Queensland)	Plant Virology Microbiology
	Dr. K.A.S. Kodikara B.Sc. (Ruhuna, SL) M.Sc. (VUB, Belgium) Ph.D. (VUB, Belgium)	Plant Ecology

Designation	Name	Specialization
<b>Lecturers</b>	Mr. R. D. A. Gunasekara B.Sc. (Ruhuna, SL) M.Sc. (Ghent, Belgium) (Reading for Ph.D. (Peradeniya))	Phycology Plant Ecology
	Mrs. Jayani Perera B.Sc. (Ruhuna, SL) M.Sc. (Montpellier, France) (Reading for Ph.D.)	Plant Physiology
	Mr. D. D. N. Sripal B.Sc. (Ruhuna, SL) (Reading for Ph.D.)	Plant Taxonomy
	Ms. S.Y.S.D. De Silva B.Sc. (Colombo, SL)	Plant Taxonomy

## 5.4 Course Units in Botany for B.Sc. (General) Degree

### Level I - Semester I

**BOT1112: Plant Diversity, Unity and Evolution (30 lecture hrs)** Brief introduction to evolution of life on earth, Importance of the knowledge in plant diversity, History of taxonomy, Characteristics of viruses, Six kingdom and Three domain systems of classification, Structure, types, and reproduction of the domain bacteria, Vegetative diversity of Blue Green Bacteria (Cyanobacteria), The domain Archaea; diversity and interested features, The domain Eukarya: Vegetative and reproductive diversity of the algae; Chlorophyceae, Xanthophyceae, Phaeophyceae, Rhodophyceae and Bacillariophyceae, Structural and reproductive diversity in fungi, General characters, thallus organization, nutrition, and reproduction of Lichens. Vegetative and reproductive diversity in Bryophyta, Structure, life cycle and biological importance of Pteridophyta; Psilopsida, Lycopsida, Sphenopsida, and Pteropsida, with particular emphasis on representative examples. Gymnospermae; classification and specific features with special reference to structure and life history of Cycas, and Pinus and their affinities, Angiospermae: Introduction, and distinguishing features, specific morphological and anatomical features of different groups; reproduction and life cycles in typical forms; evolutionary trends among the different groups.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT1121: Scientific Approach and Biometrics (15 lecture hrs)** Scientific method, Limitations of science, Pure science vs. applied science, Introduction to biometrics, Terminology, Descriptive statistics and inferential statistics, Sampling, processing and presenting data, Measures of central tendency, Measures of dispersion, Normal distribution, Binomial distribution, Poisson distribution, The basis of statistical testing, Chi-squared tests, Correlation analysis, Regression analysis, Experimental design, Analysis of variance (ANOVA).

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT1131: Plant Anatomy (15 lecture hrs)** Microscopy, Forms and functions of cells in the plant body, Specialized cells, Glands and Secretory cells, Primary and secondary growth in stems and roots, Anomalous structures, Ecological anatomy, Anatomical identity of higher plants.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT1141: Botany Practicals I (45 hrs)** Laboratory exercises and fieldwork on BOT1112, BOT1121 and BOT1131

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

## **Level I - Semester II**

**BOT1212: Genetics (30 lecture hrs)** Introduction, Mendels Laws of Genetics, Chromosome morphology, Gene linkage, Crossing over and gene mapping, Sex determination and sex linkage, Probability in Mendelian inheritance and pedigree analysis, Mutations (mutagenic agents, chromosome aberration, euploids, aneuploids, autopolyploids and allopolyploids), Viral, bacterial and fungal genetics, Extra nuclear inheritance, Population Genetics and Hardy Weinberg equilibrium.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT1221: Plant Systematics (15 lecture hrs)** Historical background, General definitions and descriptions, nomenclature, identification, classification, taxonomic hierarchy, species concept, Different classification systems, ICBN and phylocode system, Angiosperm Phylogeny Group (APG), Taxonomic data from different sources, importance of plant systematics, Flora in Sri Lanka.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT1231: Plant Ecology (15 lecture hrs)** Introduction: Ecology vs. Environmental Science. Fundamentals of Plant Ecology (Terminology, Organizational levels from Individual to Biome & Biosphere. Different aspects of Plant Ecology: Autecology & Synecology, Phytosociology, Paleoecology, Cytoecology, Ecosystem Ecology, Conservation ecology or Resource ecology, Habitat Ecology, Population Ecology, Production Ecology, Comparative Ecology, Descriptive Ecology, Physical and biological space, Niche and Habitat, Ecological footprint). Structure and Functions of an Ecosystem (Biotic and abiotic interactions, Materials and energy flow, Modes of nutrition in plants). Classification, form and functions of Biomes. Climatic map and Soil map of Sri Lanka. Extent, distribution, features, floral diversity of different ecosystems in Sri Lanka. Invasive flora in Sri Lanka & related environmental issues. Main threats on biodiversity, Conservation of biodiversity.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT1241: Botany Practicals II (45 hrs)** Laboratory exercises and fieldwork on BOT1212, BOT1221 and BOT1231

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

## **Level II - Semester I**

**BOT2112: General Microbiology (30 lecture hrs)** A brief history on microbiology, Microbes in our life, Branches of microbiology, Observing microorganisms through micro-

scope, Structure of prokaryotic cell, Classification of microorganisms, Microbial growth, Microbial metabolism, Control of microorganisms, Genome and Microbial genetics, Microorganisms and diseases, Environmental microbiology, Microbes used in industries.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT2121: Plant Pathology (15 lecture hrs)** History of plant pathology, Types of pathogens and diseases, Infection and pathogenesis, Disease diagnosis, Koch's postulates, Plant disease resistance, Effects of diseases on plants, Postharvest diseases, Plant disease epidemiology, Important plant diseases of major crops in Sri Lanka, Plant disease control and management

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT2131: Molecular Biology (15 lecture hrs)** History of Molecular biology, Chemical basis of hereditary materials, Structures and properties of nucleic acids, Fine structure of genes, gene expression and control of gene expression, Protein synthesis, Replication, Isolation of DNA, Quality and quantity assessments.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT2141: Botany Practicals III (45 hrs)** Laboratory exercises on BOT2112, BOT2121 and BOT2131

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

## **Level II - Semester II**

**BOT2212: Plant Physiology and Biochemistry (30 lecture hrs)** Plant & water; essentiality of water, cell water relations, Soil water relations, Water absorption and transport, Stomatal physiology, Mineral nutrition, Phloem translocation, Energy relations in cells and plants; enzymes, respiration, photosynthesis, nitrogen metabolism, fatty acid metabolism, Plant growth and development; plant growth and growth measurements, plant growth hormones and their applications, Photoperiodism and Vernalization.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT2221: Environmental Science (15 lecture hrs)** Fundamentals of environmental science, Natural resources & threats on natural resources, Environmental pollution and contamination, Major forms of pollution sources, impacts and control, Eutrophication, Special environmental problems in Sri Lanka, Global environmental issues (global warming, acid rain, ozone depletion) with special reference to Sri Lanka, Introduction to waste water treatment methods giving special reference to biological methods.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT2231: Soil- Plant Relationships (15 lecture hrs)** Physical and chemical characteristics of soil, Soil classification, Macro- and micro- nutrients in soil, Toxic elements in soil, Introduction to minerals, Factors affecting availability and uptake of nutrients, Soil

organic matter and its dynamics (interactions between plants & microorganisms in the rhizosphere), hydrophobic soils, Analysis of nutrients in the soil and in plants, Major soil types of Sri Lanka, Soil Conservation and sustainable management of soil.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT2241: Botany Practicals IV (45 hrs)** Laboratory exercises and field visits on BOT2212, BOT2221 and BOT2231

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

### **Level III - Semester I**

**BOT3112: Advanced Plant Ecology (20 lecture hrs + 21 practical hrs)** *Op.*

*Prerequisite: Botany core courses*

History of development of ecology, Introduction to quantitative plant Ecology, Sampling methods and data collection, Quantitative measures and descriptive analysis, Multivariate analysis, Principal component analysis, Complex-model based analysis. Interpretation of results, Ecosystem valuation and environmental accounting, Indigenous knowledge on Plant Ecology in Sri Lanka.

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3122: Horticulture, Floriculture and Landscaping (20 lecture hrs+21 practical hrs)** *Op. for Biology students*

Divisions of horticulture, Advantageous and disadvantages of horticulture, Classification of horticultural plants, Plant propagation methods, Cultivation of horticultural plants, Plant Nurseries, Hydroponics and Aquaponics, Floriculture, Landscaping: designing, installing and maintenance, Post-planting immediate care, Pruning and training of plants.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT3132: Advanced Microbiology (20 lecture hrs+21 practical hrs)** *Op. Prerequisite: Botany core courses*

Instrumentation in Microbiology: microscopes, spectrophotometry, centrifugation, electrophoresis, sterilizers etc. Classification of microorganisms: the prokaryotes - domains bacteria and archaea, protobacteria, fusobacteria, diversity of Archaea, methods of classifying and identifying microorganisms, other types-viroid, prions. Microbial genetics: structure and functions of the genetic material, the regulation of bacterial gene expression, mutation, genetic transfer and recombination, gene and evolution, techniques of genetic modification. Microbial mechanisms of pathogenicity and defence: Portal of entry, penetrate host defences, damage host cells, nonspecific defences of the host, specific defences of the host. Microbial ecology: extremophiles, soil microbiology, agricultural microbiology, applications (biopesticides). Environmental microbiology: wastes as a resource. Industrial Microbiology: industrial microorganisms, fermentation media and systems, downstream processing, product development, regulations and safety

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3142: Advanced Plant Pathology (15 lecture hrs + 30 practical hrs)** *Op. for Biology students*

Molecular plant pathology - Genetics of host-pathogen interactions (gene for gene interaction, recognition and triggering resistance), Hypersensitive Reaction (HR), Induced resistance in plants (local and systemic), Putative signal transduction pathways towards systemic resistance, Biotechnology in plant protection (Diagnosis, detection, transgenics etc.) Ecological plant pathology Epidemiology, Disease forecasting, Plant disease management (chemical, cultural, biological control, etc. and integrated approaches)

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3162: Forestry (20 lecture hrs+15 practical hrs)** Introduction to forestry, History of forestry, Classification of forests in Sri Lanka, Forest policies & laws in Sri Lanka, Forest mensuration and inventory, Silviculture & different silvicultural systems, Forest protection, Agroforestry & Social forestry, Forest based industries.

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3172: Food Technology (20 lecture hrs + 21 practical hrs)** *Optional for Biology students* History of food science & technology, Food spoilage, Food poisoning, Preservation methods of food, Postharvest technology, Food packaging and labelling, Genetically modified/engineered food, Food safety.

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3182: Advanced Molecular Biology (20 lecture hrs + 21 practical hrs)** *Op. Prerequisites: BOT2131*

Genome organization of prokaryotes and eukaryotes, Chromosome structure and function, Organelle gene organization, Recombination, DNA repair, Gene expression, Gene regulation, Post-transcriptional modifications, Mechanism of protein synthesis and protein structures, Transposons and their practical applications.

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3191: Weed Biology (12 lecture hrs + 06 practical hrs)** *Op. for Biology students*

Characteristics of weeds, Classification of weeds, Weed spread and evolution, Impact of weeds, Usefulness of weeds, preventive methods, mechanical & chemical weed control, Herbicides (application, mechanisms of action, transformations in plants, persistence and behaviour in soil), Invasive weed species, Allelopathic effect of weeds, Paddy field and aquatic weeds

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

### **Level III - Semester II**

**BOT3212: Wood Science (20 lecture hrs+21 practical hrs)** *Op. for Biology students*

Terminology, Structure of wood, Physical properties of wood, Mechanical properties of wood, Grading of woods/timber, Common and specific uses of woods, Wood seasoning, Wood

preservation

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3222: Plant Tissue Culture (20 lecture hrs + 21 practical hrs) *Op. for Biology students***

Cell theory/totipotency, History of plant tissue culture, In vitro methods in plant tissue culture (sterilization techniques, media preparation etc.), Steps involved in micro-propagation, Initiation and maintenance of callus, Suspension culture and in-vitro production of secondary metabolites, Different types of culture techniques, Somaclonal variation, Applications of tissue culture in Sri Lanka, Conservation, Cryopreservation, Structure of a plant tissue culture laboratory.

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3232: Advanced Plant Physiology (25 lecture hrs+15 practical hrs) *Op. Prerequisite: Botany core courses***

Crop establishment and seedling growth, Crop photosynthesis and yield, Metabolic and structural factors influencing photosynthetic rate, Light distribution and canopy structure Limitations of crop yield by weather and climate, Partitioning and remobilization of photosynthetic assimilates, Translocation and source sink relationship, Biochemical adaptations of plants to the environment, Biochemistry of C3 C4 intermediate species.

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3242: Advanced Environmental Science (20 lecture hrs+21 practical hrs) *Op. Prerequisite: Botany core courses***

The global environment (population growth, decline of vital life support ecosystem, global atmospheric changes, loss of biodiversity), Strategic and integrative themes for sustainable future, Biogeochemical cycles, Solid waste management, Integrated solid waste management, Municipal Solid Waste (MSW), Mismanagement and side effects, Environmental monitoring, Bioindicators, Biomarkers, Biosensors, Bioindicators and biomonitoring, Bioremediation Techniques, Environmental impact assessment (EIA).

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

**BOT3251: Plant Virology (15 lecture hrs) *Op. for Biology students***

History of viruses and plant virology, properties of viruses, virus architecture, virus genome, plant virus infection process, plant virus disease symptoms, transmission of plant viruses, plant virus disease control and diseases caused by viroids.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT3261: Economic Botany 23(15 lecture hrs) *Op. for Biology students***

Concepts of economics, Economic aspects of different categories of plants including Mangroves, Medicinal plants, etc. Plantation crops in Sri Lanka, Fruits and vegetables, Fibre and Timber, Spices, oils, gums etc., Algae, Microorganisms. Plant based industries and entrepreneurship



**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT3271: Genetic Engineering and Biotechnology (15 lecture hrs) *Op. for Biology students***

Introduction to genetic engineering, concept of reverse genetics, techniques in recombinant DNA technology (enzymes, vectors, cloning, library preparation, sequencing and transformation), genetic engineering for transgenic plants and microorganisms, ethics in genetic engineering and biotechnology.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT3282: Plant breeding (25 lecture hrs+ 15 practical hrs) *Op. for Biology students***

History of plant breeding, Conventional breeding methods (mass selection, pure line selection, hybridization, single seed descent, backcross breeding, Recurrent selection methods, synthetic varieties), Modern plant breeding methods, Protoplast culture and anther culture techniques.

**Evaluation methods: End semester examination : 70%, Continuous assessments and field visit report : 30%**

**BOT3292: Plant Ecophysiology (25 lecture hrs+ 15 practical hrs) *Op. for Biology students***

Plant cell and its environment, Plant growth and plant growth analysis, Interactions between functions of plants and environmental parameters, Life and environmental parameters, Light environment of plants and measurements, Water status and water stress, Methods of assessing water status and water stress, Dendroclimatology, Stable carbon isotopes in plant ecophysiology studies

**Evaluation methods: End semester examination : 70%, Continuous assessments and practical records : 30%**

## 5.5 Course Units for B.Sc. (Honours) Degree in Botany

Course Unit	Lectures	Practicals	Credits
BOT4012: Quantitative Plant Ecology	25	15	2
BOT4022: Horticulture, Floriculture and Landscaping	25	15	2
BOT4032: Microbial Ecology	25	15	2
BOT4042: Applied Microbiology	30		2
BOT4052: Advanced Plant Pathology	20	21	2
BOT4062: Advanced Molecular Biology	25	15	2
BOT4072: Economic Botany & Entrepreneurship	30		2
BOT4082: Forestry & Forest Management	30	30	2
BOT4092: Food Technology	25	15	2
BOT4102: Plant Cell and Tissue Culture	25	15	2
BOT4112: Weed Biology and Management	25	15	2
BOT4122: Genetic Engineering & Biotechnology	30		2
BOT4132: Advanced Plant Physiology	25	15	2
BOT4142: Advanced Environmental Science	25	15	2
BOT4152: Advanced Plant Virology	25	15	2
BOT4162: Wood Science & Technology	25	15	2
BOT4172: Techniques in Plant Breeding	25	15	2

Course Unit	Lectures	Practicals	Credits
BOT4192: Advanced Plant Systematics	25	15	2
BOT4202: Ecotoxicology	25	15	2
BOT4212: Biostatistics	30	30	2
BOT4222: Molecular Evolution and Phylogenetics	25	15	2
BOT4232: Plant Ecophysiology	25	15	2
BOT4242: Seed Physiology and Technology	20	21	2
BOT4282: Bioinformatics	20	21	2
Total Theory Credits			48
(Practical, Soft skills & Research)			
BOT4182: Practical skills in Botany I	75 hrs		2
BOT4252: Practical skills in Botany II	75 hrs		2
BOT4292: Practical skills in Botany III	75 hrs		2
BOT4262: Scientific Report Writing, Seminars & Industrial Training			2
BOT4276: Research Project			6
Total Practical Credits			10
Total Botany Credits			62
Total Required Credits from Honours Degree Course			60

**BOT4012: Quantitative Plant Ecology (25 lecture hrs + 15 practical hrs)** Quantitative description of vegetation, Sampling, Association between species, Plant communities, Classification, Ordination, Pattern, Habitats and ecosystems of Sri Lanka  
**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4022: Horticulture, Floriculture and Landscaping (25 lecture hrs + 15 practical hrs)** Divisions of horticulture, Advantages and disadvantages of horticulture, Classification of horticultural plants, Plant propagation methods, Cultivation of horticultural plants, Plant Nurseries, Hydroponics and Aquaponics, Floriculture, Landscaping: Designing, Installing and Maintenance, Site selection, Selection of plants (Trees, Shrubs, Herbaceous, and Grasses etc.), Post-planting immediate care, Pruning and training of plants, Art of Bonsai, Wildlife gardening, Plant growth structures.  
**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4032: Microbial ecology (25 lecture hrs + 15 practical hrs)** Plant-microbe interactions (rhizosphere, phyllosphere, role in disease resistance), Ecology of soil and aquatic microorganisms (interactions with environment, role in biogeochemical cycles), Microbiology of air, Unusual environments, Case studies  
**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4042: Applied Microbiology (30 lecture hrs)** Principles of industrial microbiology (Properties of the ideal strain, fermentation media and systems, bioreactor designs, downstream processing, product development), Microbes as living factories: Biocatalysis of useful products, Organic synthesis, synthesis of optically pure drugs, antibiotics, polysaccharides and polyesters, microbial biomass, food additives etc., Microbial Enzymes (production and application), Food and beverage fermentation, Microbes and Energy, Biomass to fuels (ethanol, methane), Bacterial batteries, Environmental Applications (Biodegradation and bioremediation, sewage and wastewater treatment, mineral recovery, bio-deterioration),

Medical microbiology.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT4052: Advanced Plant Pathology (20 lecture hrs + 21 practical hrs)** Molecular plant pathology- Genetics of host-pathogen interactions (gene for gene interaction, recognition and triggering resistance), Hypersensitive reaction (oxidative burst, cell death), Induced resistance in plants (local and systemic), Putative signal transduction pathways towards systemic resistance, Biotechnology in plant protection (Diagnosis, transgenics etc.), Diseases caused by proteins, Molecular tools used in plant pathology Ecological plant pathology - Disease assessment, Epidemiology, Disease forecasting, Plant disease management (chemical, cultural, biological control, etc. and integrated approaches)

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4062: Advanced Molecular Biology (25 lecture hrs + 15 practical hrs)** Genome organization, Chromosome structure and function, Organelle gene organization and extra nuclear inheritance , recombination, DNA repair, Gene expression in prokaryotes and eukaryotes, Gene regulation at different stages, Post-transcriptional modifications, Protein synthesis, structures and trafficking, Transposons and their practical applications, Human genome project, Seminars in molecular biology.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4072: Economic Botany and Entrepreneurship (30 lecture hrs)** Concepts of economics, Economic aspects of different plant categories including Mangroves, and Medicinal plants, Plantation crops in Sri Lanka, Fruits and vegetables, Fibre and Timber, Spices, oils, gums etc., Algae, Microorganisms, Plant based industries and concepts of entrepreneurship, Excursions.

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT4082: Forestry and Forest Management (25 lecture hrs + 15 practical hrs)** Introduction to forestry, History of forestry, Biomes & forest classification in Sri Lanka, Forest policies & laws in Sri Lanka, Forest mensuration and inventory, Silviculture & different silvicultural systems, Agroforestry & social forestry, Use of remote sensing and GIS in forestry, Forest management, Carbon stock & sequestration, REDD+ program.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4092: Food Technology (25 lecture hrs +15 practical hrs)** History of food science & technology, Food spoilage, Food poisoning, Food preservation methods, Postharvest technology, Food packaging and labelling, Genetically modified/engineered food, Food nutrition, Food processing, Food analysis, Fruit ripening, Microbes in food industry.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4102: Plant Cell and Tissue Culture (25 lecture hrs + 15 practical hrs)** In vitro methods in plant tissue culture (sterilization techniques and media preparation

etc.), Micropropagation, Callus and suspension cultures, Organ cultures, Organogenesis, Embryogenesis, Haploid cultures, Protoplast cultures and their applications, Somaclonal variation and applications, In vitro production of secondary metabolites, Virus free plants and rejuvenation, Somatic embryogenesis and artificial seeds, Applications of tissue culture in Sri Lanka, Conservation, Cryopreservation, Structure of a plant tissue culture laboratory, Seminars in current topics in tissue culture.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4112: Weed Biology and Management (25 lecture hrs + 15 practical hrs)**

Introduction, Characteristics of weeds, Weed spread and evolution, Problems and Losses Caused by Weeds, Preventive, Mechanical & chemical weed control: Herbicides (application, mechanisms of action, transformations in plants, persistence and behaviour in soil, Environmental Fate of Herbicides, Herbicide Behaviour in Plants, Herbicide Formulations, Herbicide Families and Characteristics, Developing a Weed Management Program, Herbicide Resistance), Organic Weed Management, Weed Management in Selected Crops, Vegetables, and Turf, Invasive species, Allelopathic effect of weeds, Paddy field and aquatic weeds

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4122: Genetic Engineering and Biotechnology (30 lecture hrs)**

Introduction to genetic engineering, concept of reverse genetics, techniques in recombinant DNA technology (enzymes, vectors, cloning, library preparation, sequencing and transformation), methods of gene modification, genetic engineering of microorganisms and plants, popular genetically modified organisms in research, industry (food and pharmaceutical), agriculture, DNA fingerprinting, Disease diagnosis, Gene therapy and forensics, Ethics in genetic engineering and biotechnology

**Evaluation methods: End semester examination : 70% and Continuous assessments : 30%**

**BOT4132: Advanced Plant Physiology (25 lecture hrs + 15 practical hrs)**

Crop photosynthesis and yield, Metabolic and structural factors influencing photosynthetic rate, Light distribution and canopy structure, Limitations of crop yield by weather and climate, Partitioning and re-mobilization of photosynthetic assimilates, Translocation and source sink relationship, Effects of water relations, mineral nutrition and plant growth regulators in crop production, Biochemical adaptations of plants to the environment, Biochemistry of C3 C4 intermediate species, Calcium in plants and its role of controlling stomatal function, Stress plant physiology. (types of stress, responses of plant to environmental stress), Antioxidant, Free radical and membrane stability under stress condition.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4142: Advanced Environmental Science (25 lecture hrs + 15 practical hrs)**

*Op. for students following Honours Degree in Botany*

The global environment (population growth, decline of vital life support ecosystems, global atmospheric changes, loss of biodiversity), Sustainability, Solid waste management, Anaerobic digestion technology, Agriculture related environmental problems, Environmental monitoring, Bioindicators and bio-monitoring, Bioremediation, Bioremediation techniques, Phytoremediation, Uses of plants in air quality monitoring & urban greening, Principles of

Environmental Impact Assessment (EIA), Legal aspects of EIA, Challenges of EIA, Legal aspects of environmental pollution in Sri Lanka, Some applications of environmental biotechnology.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4152: Advanced Plant Virology (20 lecture hrs + 21 practical hrs)** History of viruses and plant virology, properties of viruses, virus architecture, virus taxonomy, virus genome, virus genome replication, virus genome translation strategies, plant virus infection process, translocation of viruses in plants, plant virus disease symptoms, defense and counter defense mechanisms, transmission of plant viruses, plant virus disease control, plant virus disease diagnostics, and diseases caused by viroids.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4162: Wood Science and Technology (25 lecture hrs + 15 practical hrs)**

Wood anatomy and structure of wood, Structure of wood, Physical properties of wood, Mechanical properties of wood, Identification of wood species, Defects of woods, Grading of woods/timber, Common and specific uses of wood, Wood seasoning, Wood preservation, Wood based industries.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4172: Techniques in Plant breeding (25 lecture hrs + 15 practical hrs)**

History of plant breeding, Conventional breeding methods (mass selection, pure line selection, hybridization, single seed descent, backcross breeding, recurrent selection methods, synthetic varieties), Modern plant breeding methods (molecular markers, quantitative trait loci, gene mapping, selectable marker genes, Protoplast culture techniques, anther culture),

**Evaluation methods: End semester examination : 70%, Continuous assessments and Field visit reports : 30%**

**BOT4182: Practical Skills in Botany I (75 practical hrs)**

Plant Anatomy: Identification of different cell types, Simple and complex tissues in monocotyledon and dicotyledonous plants, Identification of plant type (monocot or dicot) by doing anatomical study by using given specimen, Check the anomalous growth in given plants, Plant histology protocols and their application, Taxonomic identity of plants and its uses, Plant Diversity, Unity and Evolution: Characterization of morphological and reproductive diversity of Cyanobacteria, Algae, Bryophytes, Pteridophytes and seed plants, Herbarium Techniques: Proper use of herbarium collection, Collecting herbarium specimens (terrestrial and aquatic plants), Techniques in preparation of herbarium sheets and Techniques in herbarium preservation.

**Evaluation methods: End semester practical examination : 50%, Hands-on skills : 10%, practical/field/industrial visit reports and Continuous assessments : 40%**

**BOT4192: Advanced Plant Systematics (25 lecture hrs + 15 practical hrs)**

Species concept and speciation, Phenotypic plasticity, Nucleotide diversity and polymorphism, Plant systematics and molecular evolution, Forces of evolution, Botanical gardens, regulations and getting permission in plant collection, Preservation of plant materials and field techniques, applications of herbaria, Taxonomic evidence to classify and group plants,

Molecular systematics, Analysis of data gathered from different sources, Population Genetics, Red list and conservation, IUCN, Seminars in related topics in Plant Systematics.

**Evaluation methods: End semester examination : 70%, Continuous assessments and Seminar presentations : 30%**

**BOT4202: Ecotoxicology (25 lecture hrs + 15 practical hrs)** *Op. for students following Honours Degree in Botany*

History, basic concepts and terminology, Toxicology and its branches, Classification of toxins/ toxicants, Use classes and exposure classes of toxicants, Toxicity and toxicity testing, Dose response relationship, Probit analysis, Factors affecting the toxicity, Toxicity of mixtures of toxicants, Toxicokinetics & toxicodynamics of toxicants, Ecological assessments, Phytotoxicity assessments, Cytotoxicity and genotoxicity, Environmental fate of toxicants, Biotic and abiotic degradation, Bioaccumulation, Biomagnification, Bioindicators and biomarkers, Biotoxins with special reference to algal and cyanobacterial toxins.

**Evaluation methods: End semester examination : 70%, Practical examination and Continuous assessments : 30%**

**BOT4212: Biostatistics (25 lecture hrs + 21 practical hrs)** Fundamental concepts in probability, Random variables, Means, Variance and Expected values, Classification and description of sample data, Sampling distributions, Estimations, Hypothesis testing, Regression analysis, Analysis of variance, Scientific applications, Exercises with applications of computer software for data analysis (10 exercises).

**Evaluation methods: End semester examination : 70%, Practical examination and Continuous assessments : 30%**

**BOT4222: Molecular Evolution and Phylogenetics (25 lecture hrs + 15 practical hrs)** Molecular evolution, Gene substitution, Gene fixation, Multiple hits, Nucleotide Polymorphisms and Nucleotide diversity, DNA sequence alignment, Sequence analysis, Tajima's D statistics, Molecular clock, Molecular phylogeny, Phylogenetic trees, Species tree VS gene tree, Methods of tree building (Distance, Parsimony and Likelihood); UPGMA, NJ, ML, MP trees, Bootstrap analysis, Use of computer software for sequence alignment, editing and analysis, Genbank searching

**Evaluation methods: End semester examination : 70%, Practical examination and Continuous assessments : 30%**

**BOT4232: Plant Ecophysiology (25 lecture hrs + 15 practical hrs)** *Op. for students following Honours Degree in Botany*

Plant cell and its environment, Plant growth and plant growth analysis, Interactions between functions of plants and environmental parameters, Light environment of plants and measurements, Water status and water stress, Methods of assessing water status and water stress, Dendroclimatology, Stable carbon isotopes in plant ecophysiology studies, Dendroclimatology

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4242: Seed Physiology and Technology (20 lecture hrs + 21 practical hrs)**

Seed morphology, Seed development, Orthodox and recalcitrant seeds, Planting value of seeds, Seed quality, Physical biochemical, performance and Stress tests for seed vigour, Soil health, Soil seed bank, Seed longevity, Seed processing, Seed treatment, Seed packaging & marketing

,Seed deterioration, Storage of seeds,Seed dormancy

**Evaluation methods: End semester examination : 70%, Continuous assessments and Practical records : 30%**

**BOT4252: Practical skills in Botany II (75 practical hrs)** Microbiology: Isolation, enumeration and characterization of bacteria, actinomycetes, fungi, mycorrhizae and bacteriophage from soil and water, Microbial activities in soil, Effect of antimicrobial compounds and antibiotics on microbial growth, Plant Pathology: Scientific approach in disease diagnosis, Isolation and identification of important plant pathogens, Mechanisms of antagonism, physiological responses of plants to biotic elicitors, Plant Systematics: Analysis of molecular data for taxonomic verification, Genetics: Gene linkage, Crossing over and mapping, Pedigree analysis in fungal genetics, Tetrad analysis in fungal genetics.

**Evaluation methods: End semester practical examination 50%, Hands-on skills 10%, Practical/field/industrial visit reports and Continuous assessments : 40%**

**BOT4262: Scientific Writing Seminars and Industrial Training** Principles of effective writing, Understanding the writing process, structure & format of a research paper. Planning, writing, and editing a research paper, Title and abstract. Peer review process, Ethical Issues in scientific writing (plagiarism, authorship, reproducible research, Predatory publications). Understanding how scientific journal and publication works. Writing for general audiences. Conducting seminars on given topics, Attending and writing reports on, industrial training

**Evaluation methods: Continuous assessments : 70%, Evaluations of seminar presentations/industrial training report : 30%**

**BOT4276: Research Project** Each student will be required to conduct a research project related to his/her field of specialization during the fourth year. The project should be approved by the Department. Students are expected to complete the research during the last semester. The candidate must submit the results as a dissertation and present a seminar.

**Evaluation methods: Defend the research proposal : 15%, Seminar presentations : 25%, Thesis : 60%**

**BOT4282: Bioinformatics (20 lecture hrs + 21 practical hrs)** Introduction to Bioinformatics, Genome and proteome databases, Sequence alignment (pairwise alignment, database similarity search, multiple sequence alignment, Hidden Markov Model, domain prediction), Phylogenetic tree, High throughput sequencing methods and data analysis, Genomics (genome/transcriptome mapping, assembly and annotation), Proteomics (protein structure, prediction and expression analysis), Applications of bioinformatics (functional genomics, metagenomics, genome editing).

**Evaluation methods: End semester examination : 70% and continuous assessments : 30%**

**BOT4292: Practical skills in Botany III (75 practical hrs)** Plant Physiology and Biochemistry: Water transportation in plants and stomatal physiology, Allelochemicals in plants, Enzyme catalyzed reactions in plant cells, Plant responses to changing environment (physiological and anatomical responses and biochemical responses (different allelochemical profiles in plants), Properties of major organic compounds in plants, Application of plant

hormones in agriculture, Environmental Science: Physicochemical and biological characterization of contaminated matrices; soil and water, biomonitoring methods (Palmer pollution index and atmospheric air pollution tolerance index), Toxicity characterization and risk assessment, Plant Ecology: Quantitative characters in the ecosystem and data collection methods, Importance of statistical packages in research/experimental data, Basic concepts in biodiversity and different calculation methods of biodiversity in ecosystems, Importance of world biomes, ecozones and ecoregions, Effects of biodiversity, Conservation methods of biodiversity and ecosystem valuation and environmental accounting, Indigenous knowledge on plant ecology in Sri Lanka (case studies), Biostatistics: Hypothesis testing and ANOVA, Graphical presentation of data, Construction of correlation matrix, Multivariate techniques; Principle component analysis and Factor analysis, Statistical packages.

**Evaluation methods: End semester practical examination : 50%, Hands-on skills : 10%, Practical/field/industrial visit reports and Continuous assessments : 40%**



## 6 Department of Chemistry

The vision of the department is to produce graduates with a sound knowledge in chemistry having international recognition and the ability to fulfill chemistry based current needs of the country. Our academic programmes provide high quality B.Sc. General and Honours Degrees and challenging learning opportunities in fundamental, advance, practical and applied Chemistry. Research facilities are also offered to students who are seeking postgraduate qualifications such as M.Phil. and Ph.D. Degrees in Chemistry. The department is equipped with five elementary (teaching) laboratories with a total capacity of 240 to 300 undergraduates and two advanced laboratories for students reading for B.Sc. Honours Degree and for postgraduate degrees in Chemistry. In addition to the above the department has a well-equipped Special equipment room and also a computer room with Internet and E-mail facilities. Computer facility is being used for computer assisted learning in Chemistry. The department offers several optional course units with an objective to enhance the employment opportunities of graduates of University of Ruhuna.

### 6.1 Research Areas

Research activities in the following areas are carried out in the Department of Chemistry:

- Synthetic Medicinal chemistry
- Natural Product Chemistry
- Study of the metal-metal interaction of covalently linked transition metals and their photochemical activity
- Environmental chemistry
- Photochemistry
- Chemical sensing
- Reactive oxygen species of atmospheric interests
- Development of new spectrophotometric methods for the determination of various ions at trace level
- Production of coconut shell based charcoal and enhancement of its adsorptive properties
- Development of a new force field for computational chemistry using Kirkwood-Buff theory for solutions.
- Study of the colligative properties at higher concentration
- Stability of bio-molecules in solvent co-solvent media
- Interaction of Ca(II), Mg(II) and Sr (II) with metallo-chromic indicators in binary solvent systems
- Dynamics and Magnetic properties of transition metal clusters
- Use of rice hulls for the production of pure silicon
- Desalination of seawater for drinking and cleaning purposes

- Structural modelling of macromolecules
- Differential thermal analysis of soils and minerals
- Wood adhesives chemistry and technology
- Green corrosion inhibitors
- Colouration of ornamental fish with pigments of natural products
- Purification of waste water by advanced oxidation processes
- Mechano-chemical treatments for organic wastes
- Homogeneous chemical kinetics
- Determination of calorific values of food
- Isolation and characterization of photosensitive natural pigments
- Food adhesives, chemistry and Technology
- Homogeneous catalysis

## 6.2 Head of the Department

**Dr. Chinthaka Sanath Gangabadage**

B.Sc. (Ruhuna, SL), Ph.D. (NL)

## 6.3 Members of the Academic Staff

Designation	Name	Specialization
<b>Senior Professor &amp; Chair</b>	Prof. (Ms.) H. M. K. K. Pathirana B.Sc. (University of Sri Lanka, Vidyodaya) Ph.D. (Aston in B'ham, U.K.)	Inorganic Chemistry Organometallic Chemistry Environmental Chemistry Green Chemistry
<b>Professors</b>	Prof. (Mrs.) Vajira P. Bulughapitiya B.Sc. (Ruhuna, SL) Ph.D.(Fribourg, Switzerland)	Synthetic Organic Chemistry Natural Product Chemistry
	Prof. Jinasena W. Hewage B.Sc. (Ruhuna, SL), Ph.D. (Maine, USA)	Theoretical Chemistry Material Science
<b>Associate Professors</b>	Prof. L. A. Panamgama B.Sc. (P'deniya, SL), Ph.D. (WITS, RSA)	Industrial Polymers Natural & Synthetic Wood Adhesives
<b>Senior Lecturers</b>	Dr. (Mrs.) M. Edussuriya M.Sc., Ph.D. (Moscow, Russia)	Surface Chemistry Heterogeneous Catalysis
	Dr. Chinthaka Sanath Gangabadage B.Sc. (Ruhuna, SL), Ph.D. (Netherlands)	Biophysical Chemistry NMR spectroscopy
	Dr. (Mrs.) W. S. Hemalika B.Sc.(Ruhuna, SL), Ph.D. (USA)	Organic Supramolecular Chemistry, Material Chemistry
	Dr. S. Wanniarachchi B.Sc.(Ruhuna, SL), Ph.D.(USA)	Inorganic Supramolecular Chemistry, Material Chemistry

Designation	Name	Specialization
<b>Senior Lecturer</b>	Dr. A. S. Ranaweera B.Sc. (USJP, SL), Ph.D. (USA)	Inorganic synthesis Chemical Engineering
	Dr. (Mrs.) Harshi Manawadu B.Sc. (Colombo, SL), Ph.D. (USA)	Organic Chemistry
	Dr. Nishantha K. Kalutharage B.Sc. (Ruhuna, SL), Ph.D. (USA)	Inorganic Chemistry Homogeneous Catalysis Organometallic Chemistry
	Dr. Jeewantha S. Hewage B.Sc. (Ruhuna, SL), Ph.D. (USA)	Inorganic Chemistry
	Dr. (Mrs.) H. D. Jayasekera B.Sc. (Ruhuna, SL), Ph.D. (USA)	Organic Chemistry, Photochemistry
	Dr. Y. M. A. L. W. Yapa B.Sc. (Ruhuna, SL), Ph.D. (USA)	Synthetic Organic Chemistry Green Chemistry
	Dr. K. B. Jayasundera B.Sc. (P'deniya, SL), Ph.D. (USA)	Analytical Chemistry
	Dr. M. S. Kodikara B.Sc. (Ruhuna, SL), Ph.D. (ANU, Australia)	Physical Chemistry, Computational Chemistry
	Dr. C.N. Ratnaweera B.Sc. (Colombo, SL), Ph.D. (MSU, USA)	Physical Chemistry, Computational Chemistry
	Dr. (Mrs.) W.K.K.D. Siriwardana B.Sc. (Colombo, SL), Ph.D. (MSU, USA)	Analytical Chemistry Nanochemistry
<b>Probationary Lecturer</b>	Mr. Sujeewa Lamahewage	
	Mr. Yohan Sudusinghe	

## 6.4 Course Units in Chemistry for B.Sc. (General) Degree

### Level I

Semester	Course Unit	No of Hours	Credits	Theory(T)/ Practical(P)
Semester I	<b>CHE1112:</b> General Chemistry and Basic Concepts in Analytical Chemistry	30	02	T
	<b>CHE1122:</b> Fundamentals in Organic Chemistry	30	02	T
	<b>CHE1032:</b> Practical Inorganic and Organic Chemistry-I	90 (Sem I & Sem II)	02	P
Semester II	<b>CHE1212:</b> Descriptive Inorganic Chemistry I	30	02	T
	<b>CHE1222:</b> Physical Chemistry I	30	02	T

## Level II

Semester	Course Unit	No of Hours	Credits	Theory(T)/ Practical(P)
Semester I	<b>CHE2112:</b> Descriptive Organic Chemistry and Spectroscopy	30	02	T
	<b>CHE2122:</b> Physical Chemistry II	30	02	T
	<b>CHE2131:</b> Practical Inorganic and Organic Chemistry II	45	01	P
Semester II	<b>CHE2212:</b> Descriptive Inorganic Chemistry II	30	02	T
	<b>CHE2222:</b> Physical and Analytical Chemistry	30	02	T
	<b>CHE2231:</b> Practical Physical Chemistry and Spectroscopy	45	01	P

## Level III : OPTIONAL COURSES

Semester	Course Unit	Credits	No of Hours	
			Theory	Practical
Semester I	<b>CHE3112:</b> Industrial Chemistry I	2	20	21
	<b>CHE3122:</b> Analytical Chemistry	2	20	21
	<b>CHE 3132:</b> Biochemistry	2	20	21
Semester II	<b>CHE3212:</b> Environmental Chemistry	2	20	21
	<b>CHE CHE3222:</b> Industrial Polymer Chemistry	2	20	21
	<b>CHE CHE3232:</b> Pharmaceutical Chemistry	2	20	21

**NOTE :** Students are required to earn 24 credits to claim the Chemistry subject. Continuous assessments are compulsory in all theory and practical course units, otherwise zero marks shall be carried on to the final marks.

**For Optional Courses :** Minimum number of students is 30.

*(In Special circumstances, Department will decide the minimum number.)*

## Level I - Semester I

### **CHE1112 : General Chemistry and Basic Concepts in Analytical Chemistry**

**General Chemistry:** atomic structure and subatomic particles, atomic properties, nuclear stability and nuclear reactions, chemical bonding, VSEPR theory and molecular orbital theory.

**Analytical chemistry:** significant figures, statistical analysis of chemical data, solubility and solubility product, gravimetry, titrimetry (acid/base, redox, complexometric and precipitation).

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination : 70%**

**CHE1122: Fundamentals in Organic Chemistry** Basic concepts in organic chemistry, IUPAC nomenclature of organic compounds, stereoisomerism conformational analysis, reactive intermediates, reactions of aliphatic compounds, aromaticity and reactions of aromatic compounds.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination : 70%**

**CHE1032: Practical Inorganic and Organic Chemistry-I** **Practical Inorganic Chemistry:** Safe laboratory practices, basic laboratory techniques; Qualitative semi-micro analysis of inorganic samples/inorganic mixtures for basic cations and anions acid base titrations, permanganometry, iodometry, dichromate titrations.

**Practical Organic Chemistry:** Qualitative analysis; Elemental analysis, Functional groups analysis, Preparation of derivatives and recrystallization, Determination physical constants, Identification and separation of binary organic mixtures.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination : 70%**

## Level I - Semester II

**CHE1212: Descriptive Inorganic Chemistry I** Chemistry of s and p block elements; Oxides, Sulphates, Nitrates, Carbonates, Allotropes, Three-centred bonding, Silicones, Chemistry of transition elements: General properties, oxidation states, Colour, Magnetic properties, chemistry of some selected transition elements, extraction, reactions and applications, Coordination Chemistry: Isomerism, Classification of ligands and coordination number, IUPAC nomenclature, Chelate effect, Valence Bond Theory and Crystal Field Theory, Jahn-Teller effect.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination :70%**

**CHE1222 : Physical Chemistry I** State of matter: Macroscopic and microscopic approach to physical chemistry; Perfect gases; Kinetic molecular theory of gases, collision frequency, Real gases and non-ideal behavior. Raoult's law and ideal mixtures. Chemical Thermodynamics and colligative properties: thermodynamics and path properties, first law of thermodynamics, Carnot cycle, second law of thermodynamics, statistical basis of entropy, free energy functions. Chemical Kinetics: rate and rate law of reactions, differential and integrated rate laws, half-life of reactions, simple collision theory of gas phase reactions, factors affecting the rate of reactions, reaction coordinates and activation energy, Arrhenius equation, reaction mechanism and steady state approximation, theory of unimolecular reactions.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination :70%**

## Level II - Semester I

**CHE2112 : Descriptive Organic Chemistry and Spectroscopy** Organic Synthesis; Retro-synthetic Analysis, Synthesis of Organic Compounds. Introductory Natural Product Chemistry; Chemistry of Alkaloids, Terpenoids and Steroids, Extraction and Phytochemical screening of Natural Products. UV-Vis, Infrared, Nuclear Magnetic Resonance ( $^1\text{H}$ -,  $^{13}\text{C}$ -,  $^{31}\text{P}$ -,  $^{19}\text{F}$ -) and Mass Spectroscopy; Interpretation of the Spectra of Organic Compounds, Electron Spin Resonance.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination :70%**

**CHE2122: Physical Chemistry II** **Quantum Chemistry:** Failure of classical physics and emergence of quantum mechanics for microscopic systems; Quantization and zero-point energy; Exact solutions and particle in a zero potential box.

**Surface Chemistry:** Surface phenomena and different surfaces and interfaces, thermodynamics of surfaces and properties of colloids.

**Molecular Spectroscopy:** Electromagnetic radiation, different components in molecular spectroscopy of diatomic molecules, vibrational spectra of polyatomic molecules and Raman spectroscopy.

**Photochemistry:** Principles of Photochemistry, Singlet states and triplet states, Franck-Condon Principle, Jablonski diagrams, photochemical reactions and photosensitization.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination :70%**

**CHE2131: Practical Inorganic and Organic Chemistry II** Laboratory techniques; use of analytical balance for accurate measurements, preparation of standard solutions, EDTA titrations, direct titrations, back titration, use of masking and demasking agents, metal ion indicators, synthesis and analysis of transition metal complexes, gravimetric determinations Organic synthesis, Thin Layer and Paper Chromatography, Distillation Methods, Sublimation, Extraction of Natural products.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination :70%**

## Level II - Semester II

**CHE2212:Descriptive Inorganic Chemistry II** Chemistry of lanthanides and actinides;. Organometallic Chemistry; classification, 18-electron rule, bonding and basic chemistry of metal carbonyls, alkenes and cyclopentadienyl complexes. Inorganic Reaction Mechanisms; ligand substitution reactions in octahedral and square planar complexes, trans effect. Molecular symmetry and Point groups; symmetry elements and operations, determination of point groups. Electronic Spectra of Transition Metal Complexes; Russel Saunders couplings, Interpretation of electronic spectra of simple coordination complexes.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination :70%**

**CHE2222: Physical and Analytical Chemistry** Electrolyte solutions; activities of ions in solution and significance of the mean ionic activity coefficient. Redox reactions and standard reduction potential; Conductometry, strong and weak electrolytes and ionic mobility. Phases, components, degrees of freedom and the phase rule; Cooling curves, one, two, and three component systems and lever rule, solubility of components; distillation of mixtures. **Analytical Chemistry:** Instrumental Analysis; Atomic absorption spectroscopy, Flame Photometry and Colorimetry. Solvent Extraction, Chromatography, A brief Introduction to Electroanalytical techniques.

**Evaluation methods: Continuous Assessment : 30% , Semester End Examination :70%**

**CHE2231: Practical Physical Chemistry and Spectroscopy** Experiments in Chemical Kinetics, Thermodynamics, Spectrophotometry, Surface Chemistry and Electrochemistry, and viscometry. Interpretation of  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, MS, FTIR and UV spectra of simple organic compounds.

**Evaluation Method: In course Assessment in Physical Chemistry: 20%, Semester End Examination in Spectroscopy : 30%, Semester End Examination in Practical Physical Chemistry : 50%**

### Level III - Semester I

**CHE3112: Industrial Chemistry I** Theoretical interpretation of industrial process. Quality Management; Food Chemistry and Technology; Chemistry related to food harvesting, storing, packaging, spoilage, deterioration, processing and preservation; dairy industry. Practical(s): Case studies in industrial concepts, Food technology and analysis.

**Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%**

**CHE3122: Analytical Chemistry** Sampling methods, Chemometrics, Instrument performance characteristics. Atomic absorption, emission and inductively coupled plasma spectroscopy, Fluorescence spectroscopy. Electroanalytical Chemistry, Potentiometric methods, Electrogravimetric methods, Coulometry, Voltammetry. **Practical:** Electroanalytical techniques.

**Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%**

**CHE3132: Biochemistry** Amino acids, Peptides and proteins, Carbohydrates, Lipids, Nucleotides and Nucleic acids, Enzymes, Coenzymes. Enzyme kinetics and inhibition, Bioinorganic chemistry; structure and function of proteins. **Practical:** Isolation, purification, quantitative and qualitative identification of biomolecules, Identify reducing sugars, polysaccharides, lipids, amino acids and proteins using diagnostic reagents.

**Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%**

### Level III - Semester II

**CHE3212: Environmental Chemistry** Atmospheric, aquatic and soil chemistry, water quality parameters, treatment of water to produce potable water. Treatment methods for industrial waste, case studies, air quality analysis, industrial pollution, agrochemicals, clinical waste, e-waste, nuclear waste, air pollution, soil analysis, solid waste treatment and practical related to above.

**Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%**

**CHE3222: Industrial Polymer Chemistry** Industrial Polymers, and polymer structures, mechanisms and kinetics of polymerization; molecular weight distributions; methodologies of polymer synthesis; physical and mechanical properties of polymers, Chemistry of Rubber & Related Industries, Chemistry and technology of Wood Adhesives. **Practical:** Synthesis of polymers and adhesives; testing of viscosity, mechanical and non-mechanical properties.

**Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%**

**CHE3232: Pharmaceutical Chemistry** Drug categories, , main process of drug in the body; administration, absorption, transportation, action and metabolism. Prodrugs, drug specificity, Bioassay methods and natural product based leading compounds, inorganic pharmaceuticals and drug storage and drug deterioration. Drug safety, quality assurance, standardization related herbal drugs, selected topics of drugs. Laboratory course on analysis of drugs preparation of electrolytes, purification methods of drugs and test for purity, drug

synthesis and preparation of drug monograph.

**Evaluation methods:** Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%

## 6.5 Course Units in Chemistry for B.Sc. (Honours) Degree

Note: Depending on the resources available, certain alterations in the syllabus will have to be made and those alterations will be informed from time to time.

Summarized Course Unit Details -B.Sc. (Honours) Degree Level - I			
	Duration(hours)		Credits
	Theory	Practical	
Semester I			
CHE 4114 Advanced Inorganic Chemistry-I	60		4
CHE 4123 Reactive Intermediates & Advanced Organic Reaction Mechanisms	45		3
CHE 4132 Quantum Chemistry & Molecular Spectroscopy	30		2
CHE 4142 Laboratory and Quality Management	30		2
CHE 4152 Laboratory Inorganic Chemistry		90	2
CHE 4162 Laboratory Physical Chemistry		90	2
Semester II			
CHE 4213 Advanced Organic Chemistry -I	45		3
CHE 4223 Topics in Advanced Physical Chemistry	45		3
CHE 4233 Advanced Analytical Chemistry-I	45		3
CHE 4242 Advanced Analytical Chemistry II	30		2
CHE 4252 Environmental Chemistry	30		2
CHE 4262 Laboratory Organic Chemistry		90	2
CHE 4272 Laboratory Analytical Chemistry		90	2
Total			32

**CHE 4114 :Advanced Inorganic Chemistry-I (60L)** Molecular Symmetry and Group Theory(10L), Molecular Orbital Theory(10L), Advanced Coordination Chemistry(10L), Advanced Organometallic Chemistry-I (10L), Advanced Inorganic Reaction Mechanisms (10L), Electronic Spectra of Transition metal Complexes (10L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4123:Reactive Intermediates & Advanced Organic Reaction Mechanisms (45L)** Reactive Intermediates (8L), Advanced Organic Reaction Mechanisms (10L), Physical Organic Chemistry(10L),Organic Photochemistry (9L), Pericyclic Reactions (8L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4132 : Quantum Chemistry and Molecular Spectroscopy (30L)** Quantum Chemistry (12L), Molecular Spectroscopy (10 L), Photochemistry (08L)

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4142: Laboratory and Quality Management (30L)** Chemometry (10 L), Quality Control & Quality Assurance (10L), Laboratory and Quality Management (10L)

*Evaluation method: Continuous Assessments and /or End Semester Examination*



**CHE 4152: Laboratory Inorganic Chemistry (90 hrs)** Semimicro qualitative analysis, Gravimetric analysis, Chromatography, Titrametric analysis.

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4162: Laboratory Physical Chemistry (90 hrs)** Phase Equilibria (two and three component systems), Constant Pressure and constant volume Calorimetry, Chemical kinetics, Thermodynamics and Colligative properties, Refractometry, Spectrophotometry, Thermal differential analysis, Chemical equilibria, Potentiometry, Potentiodynamic and Potentiostatic techniques

*Evaluation method: Continuous Assessments 20%, Presentaion 5%, Report 5% and End Semester Examination 70%*

**CHE 4213: Advanced Organic Chemistry I (45L)** Structure determination of organic molecules using spectroscopy (20L), Natural Products Chemistry (25L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4223: Topics in Advanced Physical Chemistry (45L)** Advanced Thermodynamics (11L), Statistical Thermodynamics (12 L), Advanced Kinetics (12L), Advanced Electrochemistry (10L )

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4233 : Advanced Analytical Chemistry-I(45L)** Principles of Instrumentation (10L ), Electroanalytical Chemistry (20L), Chromatography (15L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4242 : Advanced Analytical Chemistry II (30L)** Solvent Extraction , Distillation (08L), Molecular Absorption and Emission Spectroscopy ( 07L), FTIR, CD Spectroscopy (08L), Atomic Absorption Spectroscopy (07L) .

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4252 : Environmental Chemistry (30L)** Chemical Concepts pertaining to Environmental Processes (02L), Aquatic Chemistry (08L), Atmospheric Chemistry (10L), Soil Chemistry (10L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4262 : Laboratory Organic Chemistry (90hrs)** Purification of organic mixtures using different methods (Crystallization and Distillation), Synthesis of Organic compounds, Monitoring of organic synthesis using chromatography. Extraction and Phytochemical analysis of Natural Products. Purification of Natural Products extracts using Chromatography and characterization of Natural products. Structure elucidation of organic molecules using Spectroscopy (UV, IR, Mass and NMR). Drug synthesis and Drug analysis, Extraction Oleoresin and analysis.

*Evaluation method: Continuous Assessments 30% and End Semester Examination 70%*

**CHE 4272: Laboratory Analytical Chemistry (90 hrs)** Titrimetric & photometric analysis of synthesized inorganic complexes, Laboratory environmental chemistry, Laboratory in industrial based analysis.

*Evaluation method: Continuous Assessments and /or End Semester Examination*

Summarized Course Unit Details - B.Sc. (Honours) Degree Level - II			
	Duration(hours)		Credits
	Theory	Practical	
Semester I			
CHE 4314 Advanced Inorganic Chemistry - II	60		4
CHE 4323 Advanced Organic Chemistry - II	45		3
CHE 4333 Solid State and Surface Chemistry	45		3
CHE 4342 Advanced Biochemistry	30		2
CHE 4352 Computational Chemistry	23	15	2
CHE 4362 Industrial Chemistry & Technology	30		2
CHE 4371 Laboratory Biochemistry		45	1
Semester II			
CHE 4411 Current Topics in Chemistry	Self study		1
CHE 4422 Essay & Seminar	Self study		2
CHE 4436 Research Project			6
Special Topics (CHE4442, CHE4452, CHE 4462, CHE4472, CHE4482)	30		2
Total			28
Industrial placement (4-6 weeks): This is a requirement for the completion of the degree			

**CHE 4314: Advanced Inorganic chemistry-II (60L)** Physical methods in Inorganic Chemistry (IR, NMR, MASS, MOSSBUAR, EPR, Diffraction Techniques) (15L), Bioinorganic Chemistry (10L), Selected Topics in Inorganic Chemistry (17L), Advanced Organometallic Chemistry II (08L), Supramolecular Chemistry (10L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE4323 : Advanced Organic Chemistry II( 45L)** Advanced Stereochemistry (08L), Organic Synthesis (20L), Advanced Heterocyclic Chemistry ( 08L), Carbohydrate Chemistry (09L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4333: Solid State and Surface Chemistry (45L)** Solid State Chemistry(10L), Surface Chemistry (12L), Heterogeneous Catalysis (08L), Intermolecular Forces and Magnetic Properties (08L), Nanochemistry (07L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4342: Advanced Biochemistry (30 L)** Peptides, Proteins, Nucleic acids (15L), Metabolisms of Biomolecules (08L), Enzymology, Mechanism of enzyme action (07L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4352:Computational Chemistry (23L + 15P)** Comparative Introduction to Classical and Quantum simulation methods, Classical Simulation, Quantum simulations (23L) and relevant Laboratory (15Hr)

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4362: Industrial Chemistry & Technology (30L)** Concepts in Chemical Engineering & Industrial Chemistry (12L), Polymer Science and Technology (08L), Industrial Pollution, Waste Treatment (05L), Mineral resources in Sri Lanka Chemistry and Industrial Applications (05L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4371: Laboratory Biochemistry (45hrs)** Practical Biochemistry and Practical Food chemistry

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4411: Current Topics in Chemistry** Self study on the current topic provided by the staff.

*Evaluation method: End Semester Written Examination*

**CHE 4422: Essay & Seminar** Essay: Self study of a given essay topic to each student and writing an essay.

*Assessment method: Evaluation of Essay report + Essay Presentation and viva-voce*

Seminar: Self study and presentation on review articles given by the staff (02 articles in Level-II: 01 article per student per semester)

*Assessment method: Evaluation of the presentation and viva-voce*

**CHE 4436: Research project** Research topic is given to each student at the beginning of Honours Level-II. Conducting research, Submission of Dissertation and Presentation.

*Assessment method: Evaluation of the Dissertation, Presentation and viva voce at the end of semester-II*

### **Special Topics in Chemistry**

**CHE 4442: Forest Products and Textile Industry (30L)** Wood Adhesion and Adhesives (15L ), Textile Chemistry (15 L)

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4452: Biomolecular NMR (30L)** Instrumentation, Applications of NMR spectroscopy, NMR Sample preparations of biomolecules, Isotopic labeling, Spin-echo experiment, Pulse field NMR, Homonuclear and Heteronuclear correlation experiments, NMR observables, How to use NMR restraints to structure calculation, Structure validation, Difficulties.

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4462: Medicinal Chemistry and Drug Development (30L)** Introduction to Medicinal Chemistry, Biopharmaceutical properties of drug substances, Pharmacologic activity of drugs, Pathological state of various diseases and role of drugs in such diseases. Anti-cancer drugs, Antibiotics, Anti HIV drugs etc. Introduction to computer aided drug design.

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE 4472 :Biological Chemistry (30L)** Biophysical Chemistry (08 L), Reactive species in Biology (07L), Food Chemistry and Technology (08L ), Pharmaceutical Chemistry(07L).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

**CHE4482: Selected Topics in Industrial Chemistry (30L)** Cleaner Production and Green Chemistry (10L), Cleansing Agents (05L ), Rubber Chemistry & Technology (10L ), Surface Coatings (05L ).

*Evaluation method: Continuous Assessments and /or End Semester Examination*

## BSc (General) Degree-Evaluation Criteria & Examination regulation of Chemistry Course Units in the Revised Syllabus, implemented from 2017/2018 academic year

*Implemented since 2019*

Subjective to the By-laws of the Faculty of Science, these regulations shall be effective from the commencement of the academic year 2017/2018.

As per the new syllabus, evaluation method of each course unit is as follows:

Continuous assessments: 30%

Final examination : 70%

### **Continuous assessment: Procedure**

Required 30% from continuous assessments of each course unit shall be obtained by holding **one** or **two** examination(s) during the semester with two weeks of prior announcements.

Paper-based examinations for a **theory course unit** cover the material discussed in the classroom up to the last date prior to the examination; all the questions in the **one hour** paper is compulsory and will be one of the following formats:

- Multiple Choice Questions (MCQ, *five responses per question*) OR
- Structured Essay Questions (SEQ) OR
- Combination of both, MCQ and SEQ

Practical examinations for a **practical course unit** cover the practical classes completed up to the last date prior to the examination and **one/two- hour** paper will be one of the following formats:

- OSPE ( *Objective Structured Practical Examination*) OR
- Combination of MCQ/SEQ and OSPE

**Final Examination : Procedure** The final examination of a **theory course unit** is an essay type and the duration of the paper depends on the credit value of the course unit as follows:

- Two hours (2hrs) for a 2 credit course unit.
- Three hours (3 hrs) for a 3 credit course unit.

The final examination of a **practical course unit** is as following;

- Three hours (3 hrs) for a 2 credit course unit
- Two hours (2hrs) for a 1 credit course unit

### **Guidelines to be considered in the case of student is present/absent for continuous assessment(s)**

- If a student sits for the examinations of the continuous assessment, 30% of the total marks of the continuous assessments shall be considered for the final grade of the course unit along with 70% of the final examination marks.

- If a student fails the course unit after sitting for the continuous assessments and the final examination, the student shall repeat the final examination. The marks of the continuous assessments shall be carried forward and will be considered for the final grade.
- If a student is absent for a continuous assessment, he/she shall obtain “ zero ” marks for the particular continuous assessment. However, student shall sit for the final examination.

## 7 Department of Computer Science

The Department of Computer Science of the University of Ruhuna was established in 1997 fulfilling a long-standing need of the University. The department presently offers course units of 30 credits (1/3 of the B.Sc. General Degree programme) in Computer Science for the B.Sc. General Degree programme for 120 students per batch.

The Department of Computer Science commenced Bachelor of Computer Science (BCS) Degree in 2010. The main aim of the degree programme is to prepare the undergraduates for a career in Computer Science and Information Technology, which is one of the major driving forces of the economic development of Sri Lanka. This degree programme will cover all aspects of Computer Science including modern computer languages and systems.

### 7.1 Research Areas

- Text Mining and Text Classification Data Mining, Rule Extraction and Knowledge Representation Applications of Machine Learning Techniques
- Parallel computing: developing dynamic load balancing algorithms on homogeneous and heterogeneous clusters of workstations
- Intelligent Information Retrieval: Pattern Recognition, Fuzzy clustering, Data Mining/ Web Mining, Conceptual Indexing and Similarity Search in text data, Context Based Clustering
- Conceptual Modelling, Process Modelling and Process Patterns, Formal Specification of Processes, e-Commerce Standardization, Service Oriented Computing, Business Rule Modeling
- Network Monitoring and Acquiring and Managing Information
- E-commerce information systems development, Model-drivers design, Goal, Business & service Modelling
- Computational Geometry, Computer Graphics programming, Design and Analysis of Algorithms, Graph Theory
- Computational Systems Biology, Bioinformatics, Modelling and Simulation, Neural Computing, stochastic modelling
- Embedded Systems, reconfigurable computing, Bioinformatics
- Knowledge Representation, Ontology, Semantic Web, Ontology Engineering, Mobile Applications

## 7.2 Head of the Department

**Dr. W.A. Indika**

B.Sc. (Kelaniya, S.L.), M.Sc. (Kelaniya, S.L.), PhD (UCSC, S.L.)

## 7.3 Members of Academic Staff

Designation	Name	Specialization
<b>Senior Lecturer</b>	Mr. S. A. S. Lorensuhewa B.Sc. (Colombo, SL) M.Sc. (Zhejiang, China)	Computer Applications, Text Mining and Text Classification Data Mining, Rule Extraction and Knowledge Representation, Applications of Machine Learning Techniques
	Dr. W. A. Indika B.Sc. (Kelaniya, S.L.) M.Sc. (Kelaniya, S.L.) PhD (UCSC, S.L)	Knowledge Representation, Ontology, Semantic Web, Ontology Engineering, Mobile Applications
	Dr. J. A. Jeewanie B.Sc. (Kelaniya, SL) M.Sc. (Keele, UK) Ph.D (Tilburg, Netherland)	Conceptual Modelling, Process Mining, Service-oriented Computing, Value Oriented Service Identification, Model driven Business-IT alignment methods
	Dr. Tharaka Ilayperuma B.Sc. (Kelaniya, SL) Ph.L (Sweden) Ph.D. (Sweden)	Business Modelling, Goal Modelling and Service Modelling for the purpose of Information systems development
	Dr. Thusangi Wannige B.Sc.(Colombo, SL) MPhil (Colombo, SL) Ph.D (Lincoln, New Zealand)	Computational Systems Biology, Bioinformatics, Modelling and simulation, computer vision
	Ms. T.D. Gilmini Geethika B.Sc.(Hons)(Peradeniya, SL) MSc (UCSC, SL) M.Phil (USJP, SL)	Knowledge Engineering, Business Process Modeling and Ontology Business Rule Modeling with Application to Problems in Healthcare Domain
	Dr. S. M. Vidanagamachchi B.Sc. in Comp. Sci. (UCSC, SL) Ph.D. in Comp. Eng. (P'deniya, S.L.)	Embedded Systems, Reconfigurable Computing, Machine Learning, Bioinformatics
	Dr. P.N. Hameed B.Sc. (Hons) in Comp. Sci. (P'deniya, S.L.) Ph.D. (Melbourne, Australia)	Bioinformatics, Data mining and Machine Learning, Biomedical Informatics, Image processing, Computer Vision
	Dr. M. K. S. Madushika B.Sc. in Engineering (Peradeniya, S.L.) Ph.D. (QUT, Australia)	Artificial Intelligence, Deep Learning, Computer Vision, Neural Networks, Image Processing
	Mr. K.R. Wijeweera B.Sc. (P'deniya, SL) M.Phil. (P'deniya, SL)	Computational Geometry
<b>Lecturer</b>	Ms. M. A. L. Kalyani B.Sc. (Colombo, SL) Ph.L. (Uppsala, Sweden)	Static and dynamic Load Balancing algorithms MPI implementations, Grid Computing

Designation	Name	Specialization
<b>Lecturer</b>     <b>Probationary Lecturer</b>	Dr. W. A. Mohotti B.Sc. IT (Moratuwa, SL) M.Sc. in IT (Moratuwa, SL) Ph.D. (QUT, Australia)	Data Mining and Machine Learning, Text Clustering, Outlier Detection, and Cluster Evolution, Social Media Analytics
	Dr. D. W. C. P. Kumari B. Sc. in Comp. Sci. (UCSC, SL) M.Phil. (UCSC, SL) PhD (QUT, Australia) (On Leave) Mr. K. D. C. G. Kapugama BCS (Ruhuna, SL) Reading for PhD (Monash, Australia) (On Leave)	Information Security, Process Analytics, Mathematical Modelling, Event log analysis Data Structure & Algorithms Evolutionary Algorithms Data Mining, Text Mining
	Mr. P. D. T. Chathuranga BCS (Ruhuna, SL)	Natural Language Processing, Sentiment Analysis, Text Mining, Machine Learning
	Mr. L.L. Gihan Chathuranga B.Sc (Sabaragamuwa, S.L)	Machine Learning, Artificial Neural Networks, Artificial Intelligence, Data mining
	Ms. H.D. Supuni Shashikala B.Sc. (UWU, S.L.), Reading for M.Sc. (Peradeniya, S.L.)	Machine Learning, Feature Extraction, Deep Learning

## 7.4 Members of the Academic Support Staff

Academic Supportive Staff Members	
Designation	Name
<b>Programmer Cum Systems Analyst</b>	Mr. H. G. U. Harankahadeniya
	Mr. B. H. Saranapala
	Mr. A. P. Luwishewa
<b>Instructor in Computer Technology</b>	Ms. P. B. N. K. De Silva
	Mr. U. V. Malawara Arachchi
	Ms. W.P. Priyanthi
	Mr. R. Wickramaratne
	Mr. C.L. Wimalaratne
	Ms. G.K. Mabula
	Mr. L.W. Wellakkage
	Mr. G.M.T. Ranjana
	Mrs. W. K. Shajith
	Miss. H. G. S. Priyangani

## 7.5 Course Units in Computer Science for B.Sc. (General) Degree Level I - Semester I

**COM1111: Basic Concepts of Information Technology (15 lecture hrs.)** Overview of Computer System, Function of Computer System, Input/Output Peripherals, Computer Storages, Systems Software, Data type and Data representation, Computer Arithmetic, Application software, Computer and Communication, The Internet, Computer security and Maintenances, Ethical use of computer

**Evaluation Method : End Semester Examination**



**COM112β: Programming Techniques (30 lecture hrs. & 22.5 practical hrs.)** Introduction to programming Languages, Statements, Expressions, Keywords and Comments, Variables, Constant and Data types, Operators, Selective Statements, Iterative Statements, Jump Statements, Arrays, Introduction to Java, Streams Practical using Java/C

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**COM113α: Internet Services and Web Development (15 lecture hrs. & 22.5 practical hrs.)** Introduction to the Internet, Communication over Internet, The World Wide Web, HTML & XHTML, Cascading Style Sheets, Client Side Scripting Java Script Practical oriented

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

## Level I - Semester II

**COM121β: Data Structures and Algorithms (30 lecture hrs. & 22.5 practical hrs.)** Introduction to Data Structures, Stacks, Queues and Lists, Trees, Graphs, Running Time of an Algorithm, Sorting Algorithms, Searching Algorithms. Practical using Java/C

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**COM122β: File organization & DBMS (30 lecture hrs. & 22.5 practical hrs.)**

**File Organization:** Introduction to file organization, Storage devices, Record structure and design, Data transferring times, Traditional file organizations (File, Sequential, Indexed, Indexed-sequential and Hashed Files), Accessing the physical files, Need for a database approach and its objectives. **Database Management Systems:** Motivation for database management systems, History of data models, DBMS architecture, ER model concepts, Relational model concepts, ER-to-relational mapping, Functional dependencies and normalization process, Relational algebra, Relational calculus, Data manipulation using SQL, Data views and security, Introduction to data administration and database administration, Introduction to new concepts an database system. Practical using Oracle or MS Access

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

## Level II - Semester I

**COM212β: Object Oriented System Development (30 lecture hrs. & 22.5 practical hrs.)** Introduction to System Development environment, The Object paradigm, Objectory S/W development process, Object Oriented Modelling using UML, Use case diagrams, Class diagram, Interaction diagram, Class declaration, Method implementation, Information hiding and Access modifiers, Class Hierarchy (inheritance), Polymorphism, Packages and Data abstraction. Practical using Rational Rose and OO Programming using Java/C++

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and the 30% from the practical paper)**

**COM213 $\alpha$ : Operating Systems (15 lecture hrs. & 22.5 practical hrs.)** Introduction, Process Management, CPU Scheduling, Deadlocks, Memory Management, File-System Implementation, I/O Systems. Practical oriented

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**COM2141: Computer Architecture (15 lecture hrs.)** Number Systems, Boolean Algebra & K'maps, Logic Gates, Circuits Design, Memory Architecture, CPU Architecture, Instruction Cycle, Instruction set.

**Evaluation Method: End Semester Examination**

## **Level II - Semester II**

**COM221 $\beta$ : Data Communications and Computer Networks (30 lecture hrs. & 22.5 practical hrs.)** Introduction, Data Communication, Reference Model, Local Area Network, Wide Area Network with Internetworking, Binding Protocol Address, Routing, Digital telephony, Domain Name Service, IP Telephony, Dynamic Host Configuration Protocol, Introduction to Network Security, Wireless Communication, Future of Network

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**COM222 $\beta$ : Multimedia Technologies (30 lecture hrs. & 22.5 practical hrs.)** Introduction to Multimedia and Hypermedia Technology, Multimedia Basics, What is Digital Media, Multimedia Hardware and Software, Multimedia Data types (Building Blocks) and File types, Animations Basics, Audio and Video Basics, Multimedia Compression Techniques and Standards, Multimedia Authoring Environments, Multimedia System Design Overview, Multimedia on the Internet, Multimedia Communication Systems, Multimedia Operating Systems, Multimedia Storage, Multimedia Databases and Retrieval, Issues of Multimedia and Future Development.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

## **Level III - Semester I**

**COM311 $\beta$ : Internet Programming and Web Technologies (30 lecture hrs. & 22.5 practical hrs.)** Introduction to the Internet, Web servers, Web designing and designing issues, Delivering Multimedia over web pages, Client Side Programming, Client-server side Programming, Server Side Programming, Databases and the web, Extensible markup Language, Web Security.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**COM312 $\beta$ : System and Network Administration (30 lecture hrs. & 22.5 practical hrs.)** Overview of Linux System, Linux shell commands and environment, Basic Unix shell programming, Disks and Other storage media, Overview of the directory tree, Booting and shutting down, Rootly power, Essential tasks of the system administrator, User Account

Management, File Protection, Managing Packages, X windows system, Backup and Restore, Performance Analysis, Setting up printer server, Monitoring and Managing Networks, Setting up File Servers, Electronic Mail system

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**COM3b3 $\beta$ : Computer Project (15 lecture hrs. & 60 practical hrs.)** Students are assigned one large project or number of smaller projects to work on. These software projects are evaluated at a presentation and by a project report

**Evaluation Method: Product demonstration, Project presentation, Individual contribution, Report writing, Quiz, Attendance**

**COM3b52: PC Hardware and Networking (15 lecture hrs. & 45 practical hrs.)**

*Op for students who have passed the ICT2b13 (CCIT) examination;* PC Hardware architecture, Clocked digital logic, Motherboards, CPUs, Memory Technologies, Disk Storage, Expansion Cards, Resolutions and system requirements, Monitor size, dot pitch and refresh rates, Maintenance/Cleaning/ Repairing Hardware Tools, Preventive Maintenance & Computer Safety, Cleaning A PC externally and internally, Assemble PC system, Diagnosing & Troubleshooting, Introduction to Computer Network, Components of Computer Network, Network Connectivity Devices, Network topologies, LAN, MAN, WAN, Intranets, Extranets, Setting Up a Computer Network System and Network Administrator, Internetworking

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

### **Level III - Semester II**

**COM3252: E-Commerce and Professional Practices in IT (30 lecture hrs.)** *Op for all students;* Introduction and Brief history, Overview of eCommerce components, Ecommerce models and concepts, E-Business Strategies, Impact of electronic commerce on business strategy, Social Impact of Computing, Professional and ethical responsibilities, Intellectual property rights, Ethics and Codes of Professional Conduct, Other Issues

**Evaluation Method: End Semester Examination**

**COM3212: Advanced Software Engineering Concepts (30 lecture hrs.)** *Target Group: Student following computer science as a subject (Optional Unit);* Need for Software Engineering, problems of software development, Software Process: The need for a software process. The waterfall model, prototyping approach, spiral model, evolutionary development model, rapid application development model, incremental development, Requirement analysis and specification: Requirement engineering, analysis.

**Evaluation Method: End Semester Examination**

**COM323 $\alpha$ : Visual Programming (15 lecture hrs. & 22.5 practical hrs.)** *Op for all students* Introduction: Application development environments, command line environments, Graphical user environments. Integrated Development tools, Visual tools, Object Based / Object oriented / Event-driven programming and programming in the Windows environment at design time, run time and break time, User Interfaces: SDI, MDI Applications, Introduction to DLL s, Active X and other technologies, predefined object methods

& functions, Menus and toolbars, Common Dialog Controls etc., Data Types, Programming control Structures, data structures and sub programs: Debugging, Error and exception handling, Database programming, Building Web applications  
**Evaluation Method: End Semester Examination**

**COM326β: Internet Services and Protocols (30 Lecture hrs. & 22.5 practical hrs.)** *Target Group: Student following computer science as a subject (Optional Unit)*  
Introduction, the Internet, Internet protocols and Application services, Transport Protocols (TCP, UDP), Client Server computing, Packet and Protocol level Analysis, Email Service, SMTP, POP3, INAP protocols, Email server and User Agent Configuration, World Wide Web, HTTP protocol and Web Server Configuration, Web caching, Proxy Servers and Cookies, Load Balancing and Proxy Server Configuration, Telnet, SSH and File Transfer Protocol, FTP server configuration, Voice over IP communication VOIP server configuration, Domain Name Service, DNS configuration, Server Performance and Tuning.  
**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

## 7.6 ICT Course units of Bachelor of Science (General) Degree

The department conducts a Computer Literacy Course (ICT1b13/CLC) for all the students, in the B.Sc. degree programme, who do not follow Computer Science as a subject.

Based on their performance of the ICT1b13 course unit, a limited number of students are selected to follow an advanced course in Information Technology (ICT2b13/CCIT). The students who pass ICT1b13 and ICT2b13 course units are awarded certificates by the department.

**ICT1b13: Computer Literacy Course (CLC) (30 Lecture hours & 60 practical hours)** Basic concepts of software and hardware, Windows operating system, Computer Programming: Programming using C, Word Processing, Spreadsheet Applications, Database management, Presentaion Applications.

**Note:** According to the examination criteria stated in this handbook, students who do not follow computer science as one of the subjects for their degree programme must pass the examinations of Computer Literacy Course (ICT1b13) in order to release the final results of the B.Sc. Degree.

**Evaluation Method: End Semester Examination**

**ICT2b13: Certificate Course in Information Technology (CCIT) (30 Lecture hours & 60 practical hours)** Windows based rapid application development, Database management, Linux Operating System and X-Windows, Networked Computing Systems, Internet Services and Web Development.

**Evaluation Method: End Semester Examination**

## 7.7 Bachelor of Computer Science (General) Degree

The Bachelor of Computer Science (BCS) degree program is an outcome of an enormous effort of the staff of the Department of Computer Science. One of the prime objectives of this degree programme is to prepare the undergraduates for a career in Computer Science and Information Technology, which is one of the major driving forces of the economic development of Sri Lanka. Students admitted to the program will pursue a full-scale Computer

Science programme of three years leading to the degree of Bachelor of Computer Science (General). Based on the performance, a limited number of students will be selected to study an extra year leading to the degree of Bachelor of Computer Science (Honours). One of the prime objectives of the Honours degree is to offer in-depth knowledge in selected areas of computer science for those who wish to pursue an academic and/or research careers.

### **7.7.1 Course units for Bachelor of Computer Science (General) Degree (BCS)**

Each student admitted to BCS degree program is expected to follow the following course units during their first second and third years (six semesters). The curriculum of BCS degree consists of compulsory course units as well as elective /optional course units. All courses offered during the first three semesters in level I and level II are compulsory part of the BCS curriculum. Latter part of level II and both semesters of level III in BCS degree curriculum are mainly consist of optional courses. In addition to the elective optional courses, a limited number of compulsory courses are offered during this period. The availability of the optional course units will be announced at the beginning of the each semester.

#### **Level I - Semester I**

**CSC1122: Computer Systems I (30 lecture hrs) (core)** Overview of Computer Systems, Evolution of Computers, Input and Output, Storage, Expansion Cards, System Interfaces, Instruction Sets, Addressing modes, Central Processing Unit, Instruction Cycle, Assembly Language

**Evaluation Method: End Semester Examination**

**CSC1113: Programming Techniques (30 lecture hrs & 45 practical hrs) (core)** Basic Programming concepts, Simple C program structure, Keywords, Data types, Variables & operators (arithmetic, relational, assessment and conditional), I/O statements, Arrays, Passing variables, Multi-dimensional arrays, Functions, Function prototypes, Recursion, Control structures, Looping ( while, do while, for), pointers, strings, Advanced data types, structures, pointers to structures, File I/O

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC113α Internet Services and Web Development (15 lecture hrs. & 22.5 practical hrs.) (core)** Introduction to the Internet, Communication over Internet, The World Wide Web, HTML & XHTML, Cascading Style Sheets, Client Side Scripting - Java Script.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC1142: System Analysis and Design (30 lecture hrs.) (core)** Introduction to Information System Environment. System Development Life Cycle. Introduction to Project management. Fact Finding Techniques. Requirements Analysis. System Modeling with Data Flow Diagrams.

**Evaluation Method: End Semester Examination**

**CSC1153: Laboratory Assignments (15 lecture hrs. & 90 practical hrs.) (core)**  
Common System utilities of Linux , Advanced System utilities of Linux , Office Applications in Windows, Office Applications in Linux, Word Processing using Latex, System utilities of Windows, Internet and Social Networking, Special Linux Tools, Computer Maintenance Tools, Assembling a Computer, Windows OS Installation & Applications, Linux Installation, Shell Scripting

**Evaluation Method: Practical Examination 30% and/or End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**AMT112 $\beta$ : Mathematical Foundation of CS (30 lecture hrs & 15 tutorial hrs) (core)** - refer Course unit details under Department of Mathematics

**MAT112 $\delta$  Differential Equations (15 lecture hrs & 7 tutorial hrs) (core)** - refer Course unit details under Department of Mathematics

**MAT113 $\delta$ : Introductory Statistics (15 lecture hrs & 8 tutorial hrs) (core)** - refer Course unit details under Department of Mathematics

## Level I - Semester II

**CSC1213: Database Management Systems (30 lecture hrs. & 45 practical hrs.)**  
Introduction to DBMS, History of Data Models, Database System Concepts and Architecture, Database Design Process, The Entity-Relationship (ER) Model, Database Design - Mapping ERD to Relational, Logical Database Design-Normalization, Extended Entity Relationship Modeling, Logical Database Design-Mapping EERD to Relational, Data Manipulation using Relational Algebra & Relational calculus, Managing databases using SQL, Data views and security, Introduction to data administration and database administration. Practical using MS Access and Oracle.

**Evaluation Method : Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC1223: Data Structures and Algorithms (30 lecture hrs. & 45 practical hrs.) (core)** Introduction to Data Structures, Stacks, Queues and Lists, Trees, Graphs, Running Time of an Algorithm, Sorting Algorithms, Searching Algorithms.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC1233: Software Engineering (45 lecture hrs.) (core)** Introduction, Generic Framework Activities, Umbrella Activities, Layered Technology, CMMI, Process Assessment, Software Process Models Waterfall Model, Increment, Evolutionary, Specialized process models, SW Reuse , Unified Process UP workflows and work products, Predictive versus adaptive approaches to the SDLC, Existing Agile Methods, Requirement Analysis and Specification, Software Design, Principles of Design, Designing for reusability, adaptability and maintainability, design quality, Testing, Testing Methods, Test Strategies, static and dynamic testing,  $\alpha$  testing,  $\beta$  Testing, Acceptance Testing, Use of CASE tools in SW

Development, Software Matrices, Software Maintenance/ Social and ethical Issues.

**Evaluation Method: End Semester Examination**

**CSC1242: Object Oriented System Development (30 lecture hrs.) (core)** Introduction to Object-Oriented Paradigm. Basic Principles and Important Concepts in Object-orientation. Introduction to Unified Modeling Language (UML). Object-Oriented Systems Development with Unified Process (UP).

**Evaluation Method: End Semester Examination**

**CSC1251: Computer Laboratory (45 practical hrs.) (core)** 15 Practical sessions on Special topics in Computer Science

**Evaluation Method: Practical Examination 30% and/or End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**MAT121 $\beta$ : Algebra (30 lecture hrs & 15 tutorial hrs) (core)** - refer Course unit details under Department of Mathematics

**MAT122 $\beta$ : Calculus (30 lecture hrs & 15 tutorial hrs) (core)** - refer Course unit details under Department of Mathematics

## **Level II - Semester I**

**CSC2113: Data Communication and Computer Networks (30 lecture hrs. & 45 practical hrs.) (core)** Introduction, Data Communication, Reference Model, Local Area Network, Wide Area Network with Internetworking, Binding Protocol Address, Routing, Digital telephony, Domain Name Service, IP Telephony, Dynamic Host Configuration Protocol, Introduction to Network Security, Wireless Communication, Future of Network.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC2123: Object Oriented Programming (30 lecture hrs. & 45 practical hrs.) (core)** Fundamental of Object-oriented design, Encapsulation, polymorphism, classes and objects, information hiding, operator overloading, inheritance, overriding, delegation; Analyze problems: determine objects that are necessary to model the system, determine what attributes the objects need to have, determine what behaviors the objects need to exhibit, develop conceptual models, Modeling with UML, generate designs from the models, and implement the models.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC2133: Operating Systems (30 lecture hrs. & 45 practical hrs.) (core)** Operating-System Structures, Processes, Threads, CPU Scheduling, Process Synchronization, Deadlocks, Memory Management (Contiguous Allocation, Paging, segmentation, Virtual Memory), File System Implementation (Access Methods, Protection, Disk structure, Scheduling, Management and reliability), I/O Systems, Mass-Storage Systems, Security (Goals, Principles, Access Matrix, Threads)

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC2143: Computer Graphics and Image Processing (30 lecture hrs. & 45 practical hrs.) (core)** Introduction, Applications, , Graphics terminologies, Graphics I/O devices, Scan conversion : Scan converting lines, Line Drawing Algorithms, Scan converting circles, Mid Point Circle Algorithm, Scan Line Polygon filling Algorithm, Boundary & Flood Fill Algorithm, 2D Transformation Geometric Transformations, Coordinate Transformations, Composite Transformations, Homogeneous Coordinates, 2D Viewing & Clipping Window-to-viewport Mapping , point clipping, Line clipping, Introduction to Digital Image Processing, examples of image processing; Brief review of 2D linear system theory, probability and random variables, Color fundamentals, color models; Image Enhancement: Gray-level transform, histogram processing, arithmetic/logic operation, Spatial filtering, 2D Fourier transform, Frequency domain smoothing, sharpening, Image degradation model, Noise models, restoration using spatial filtering with noise only degradation, Morphological image processing, point, line and edge detection.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**AMT212 $\beta$ : Computational Mathematics (30 lecture hrs & 15 tutorial hrs) (core)**  
- refer Course unit details under Department of Mathematics

**MAT211 $\beta$ : Linear Algebra I (30 lecture hrs & 15 tutorial hrs) (core) (core)** -  
refer Course unit details under Department of Mathematics

**PHY2112: Electronics (30 lecture hrs) (core)** - refer Course unit details under Department of Physics

## **Level II - Semester II**

**CSC2213: Rapid Application Development (30 lecture hrs. & 45 practical hrs.) (core)** Introduction to Rapid Application Development (RAD), Core issues in RAD, Estimation, Scheduling Teamwork, Best practices in RAD, Introduction to Software Design with Patterns, Gang of four Catalog Creational Design Patterns, Structural Design Patterns, Behavioral Design Patterns, Content Management Systems (CMS)

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC2233: Internet Programming (30 lecture hrs. & 45 practical hrs.) (core)** Introduction, Server side scripting introduction, variables, control structures, operations, Arrays: 1D, 2D, Indexed, Associative, PHP Functions, String Manipulation, Forms and Databases, Sessions and Cookies, Web Designing Process, XML, AJAX and JQuery, Object Oriented Programming in PHP.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**



**CSC2242: Advanced Database Management (30 lecture hrs.) (core)** Introductory knowledge in advanced database concepts, Storage and file structures, Index, Query processing and optimization, access control for secure databases, transaction management and serializability, Concurrency control, Interaction of transaction management with storage: especially buffering, Database efficiency and tuning, writing constraints, stored procedures and triggers in SQL.

**Evaluation Method: Continuous Assessment and/or End Semester Examination**

**CSC2252: Project Management (30 lecture hrs.) (core)** Introduction to Project Management, Project Management Process for a Project, Project Scope management, Project Time management, Project Cost management, Project Quality management, Project Communication management, Project Risk management, Group Assignment Evaluation, Project HR management, Project Procurement management, Project Integration management.

**Evaluation Method: End Semester Examination**

**CSC2263: Multimedia and Video Production (30 lecture hrs. & 45 practical hrs.) (Optional)** Multimedia Basics, Key Multimedia Elements, Images, Video, Audio, Animation, Multimedia Databases and Retrieval, Multimedia Authoring, Multimedia Compression Techniques and Standards.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC2222: Computer System II (30 lecture hrs.) (core)** A top-level view of computer function and interconnection, Cache memory, Internal memory and External memory technology, Operating system support, Computer Arithmetic, Instruction sets, Processor structure and Functions, RISC Architecture, Parallel Processing, Multicore computers.

**Evaluation Method: Continuous Assessment and/or End Semester Examination**

**CSC2272: Data and Network Security (30 lecture hrs.) (Optional)** This course provides comprehensive knowledge in security requirements and cryptographic solutions in computer applications & networks.

**Evaluation Method: End Semester Examination**

**MAT225 $\beta$ : Mathematical Statistics I (core)** - refer course unit details under Department of Mathematics

**PHY2222: Electronics (optional)** - refer course unit details under Department of Physics.

**FSC224 $\alpha$ : Physical Fitness and Health Management (optional)** refer Course unit details under FSC course units.

### **Level III - Semester I**

**CSC3113: Group Projects (120 practical hrs.)(core)** The objective of this course is to design and implement a system using programming and other skills acquired. The students will carry out group project and submit a dissertation. The students will also make a presentation of the project and face for a viva.

**Evaluation Method: Product demonstration, Project presentation, Individual contribution, Report writing, Attendance**

**CSC3122: e-Commerce and Professional Practice (30 lecture hrs.) (Optional)**

Introduction to E-Commerce and E-Business. E-Commerce Business Models. Business Strategies. Business and IT Alignment. Value-Oriented E-Business Modeling. Building e-Commerce Systems. Ethical Issues.

**Evaluation Method: End Semester Examination**

**CSC3132: Data Warehousing and Data mining (30 lecture hrs.) (Optional)**

Concept of data mining, concept of data warehousing with special emphasis on architecture and design, Data Pre-processing, classification and prediction, clustering, association rules, decision trees.

**Evaluation Method: Continuous Assessment and/or End Semester Examination**

**CSC3133: Network and System Administration (30 lecture hrs. & 45 practical hrs.) (Optional)**

Overview of Linux System, Linux shell commands and environment, Basic Unix shell programming, Disks and Other storage media, Overview of the directory tree, Booting and shutting down, Rootly power, Essential tasks of the system administrator, User Account Management, File Protection, Managing Packages, X windows system, Backup and Restore, Performance Analysis, Setting up printer server, Monitoring and Managing Networks, Setting up File Servers, Electronic Mail system.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC3142: Internet Services and Protocols (15 lecture hrs. & 45 practical hrs.) (Optional)**

Introduction, the Internet, Internet protocols and Application services, Transport Protocols (TCP, UDP), Client Server computing, Packet and Protocol level Analysis, Email Service, SMTP, POP3, IMAP protocols, Email server and User Agent Configuration, World Wide Web, HTTP protocol and Web Server Configuration, Web caching, Proxy Servers and Cookies, Load Balancing and Proxy Server Configuration, Telnet, SSH and File Transfer Protocol, FTP server configuration, Voice over IP communication VOIP server configuration, Domain Name Service, DNS configuration, Server Performance and Tuning

**Evaluation Method: End Semester Examination**

**CSC3152: Geographic Information Systems (15 lecture hrs. & 45 practical hrs.) (Optional)**

Introduction to GIS, GIS Data, Data Quality Issues, Basic GIS Operations, Spatial Modeling and Analysis, GIS Modeling, GIS Organization and Management, GIS Applications.

**Evaluation Method: Practical Examination 30% and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and 30% from the practical paper)**

**CSC3162: Research Methods (30 lecture hrs.) (Optional)** This course aims to teach the fundamentals of Scientific Writing.

**Evaluation Method: End Semester Examination**

**CSC3172 Distributed Systems (30 lecture hrs.) (Optional)** Introduction, Communication and Synchronization in distributed systems, Processes and processors in Distributed systems, Distributed file systems, Distributed shared memory(DSM), Peer-Peer systems, security, Distributed systems in Practice, Cloud computing.

**Evaluation Method: End Semester Examination**

**FSC3122:Accounting(30 lecture hrs) (Optional)** - refer course unit details uner FSC course units.

**FSC3112 Management(30 lecture hrs.) (Optional)** - refer course unit details uner FSC course units.

**MAT313 $\beta$ : Mathematical Statistics II (30 lecture hrs & 15 tutorial hrs) (Optional)** refer course unit details under Department of Mathematics

## Level III - Semester II

**CSC3216: Industrial Training (3 months)(Core)** This training helps the students to get experience on issues related to industry. At the end of the training, the students should make a presentation of their findings and submit a report.

**Evaluation Method: Dairy, Report, Presentation**

## 7.8 Bachelor of Computer Science (Honours) Degree

A limited number of students are selected to follow the Bachelor of Computer Science (Honours) degree programme after completion of three academic years of Bachelor of computer science (General Degree Programme). The selection of students is done according to their academic performance during Level I, Level II and Level III of the BCS (General) degree programme.

### 7.8.1 Criteria for Selection to the BCS (Honours) Degree Programme

1. The Department of Computer Science shall determine the number of students to be admitted each year.
2. A student shall be eligible to apply if he/she has fulfilled the following requirements at the completion of the Level III of the Bachelor of Computer Science (General) Degree:
  - (a) A minimum of 90 credits,
  - (b) grades of B- or better for 80% of Computer Science course units,
  - (c) grades of C or better from theory aggregating to a minimum of 60% credits from Mathematics course units,
  - (d) grade C or better for Industry Based Project/Industry Placement course unit and the Group project
  - (e) Pass English Proficiency Level I & Level II
  - (f) a GPA of 2.5 or more

The Grade point Average (GPA) is calculated as follows:

$$\text{GPA} = \frac{\sum (\text{Grade Point Value for a Course Unit}) \times (\text{Number of credits of that Course Unit})}{\text{Total number of credits}}$$

3. The selection of a student shall be determined by the department of Computer Science in an interview and shall be based on the following:
  - (a) performance of the student in core course units of Bachelor Computer Science (General) Degree Examination and
  - (b) the general aptitude and application of the student.
4. The decision of the Dean of the Faculty shall be final and conclusive.

### 7.8.2 Course Units of BCS (Honours) Degree Programme

#### Semester I

Code	Name of Course Unit	No of Credits	Core/optional
CSC 4112	Research Seminar	2	Core
CSC 4122	Research Methodology	2	Core
CSC 4133	Neural networks	3	Core
CSC 4046	Individual Research project	6	Core
CSC 4152	Enterprise Modeling	2	Core
CSC 4162	Data mining for Business Intelligence	2	Core
CSC 4172	High Performance Computing	2	Core
CSC 4182	Bioinformatics	2	Core
Total Credits for Semester I		21	

#### Semester II

Code	Name of Course Unit	No of Credits	Core/optional
CSC 4212	Compiler Design	2	Core
CSC 4222	Service Oriented Computing	2	Core
CSC 4232	Formal Methods and Software Verification	2	Optional
CSC 4242	Artificial Intelligence	2	Core
CSC 4262	Selected Topics	2	Optional
Total Credits for Semester II		10	

### Bachelor of Computer Science (Honours) Degree - Semester I

**CSC 4112: Research Seminar** Research Seminar introduces the process of academic research and allows the students to open their mind to problem-solving strategies based upon formal inquiry and the detailed research of others. It will also include participating in discussions and giving presentations.

Evaluation Method: Continuous Assessment

**CSC 4122: Research Methodology** This course will provide an opportunity for students to advance their understanding of research through critical exploration of research language, ethics, and approaches.

Introduction, Scientific Research, Reading and recording, Critiquing research papers, Mind mapping and Concept Mapping, Planning and conducting research, The research process, Types of computing research, Computing research methods, Ethics and plagiarism, Research ethics, Minnesota ethics guidelines, Plagiarism, Data collection and analysis, Communicating research findings, Simple Latex for Academic Writing, Citation styles, Citation style guides, Planning and delivering oral presentations, Presentation Tips.

**Evaluation Method: Continuous Assessment**

**CSC 4133: Neural Networks (30 Lecture hours)** Introduction to Artificial Neural Networks, Multi-Layer Perceptrons, Back-Propagation Algorithm, ANNs using Tools, Pre-Processing Techniques, Feature Extraction & Selection algorithms, Naive Bayes Learning and Bayesian Belief Learning Models, Unsupervised Learning Methods, Learning Vector Quantization Methods, Self-Organizing and Neural Gas Algorithms, Hierarchical Learning Models, Combining Multiple Classifier Models, Measuring Classifier Performance.

**Evaluation Method: Continuous Assessment and/or End Semester Examination**

**CSC 4152: Enterprise Modelling (30 lecture hours)** Different Perspectives of Enterprise Modeling: Goal Modeling, Business Rules Modeling, Process Modeling, Business Modeling. Developing Goal Models, Business Rule Models and Business Models. Business work flow Modeling with Event Driven Process Chains (EPC), Work flow analysis with Petri nets. State of the art developments in Enterprise Modeling, Latest Research Trends, and Modeling Approaches.

**Evaluation Method: End Semester Examination**

**CSC 4162 - Data Mining for Business Intelligence (30 lecture hours)** *Prerequisite: CSC3132: Data Warehousing and Data Mining*

Introduction, Introduction to data mining, Introduction to Business Intelligence, The need of Business Intelligence, Business Intelligence Solutions, Data, Quality of Data, Unsupervised and supervised learning, Dimension Reduction, PCA Analysis, Association Rules, Naive Bayes Theorem, K- Nearest Neighbor Algorithm, Regression Analysis, Hierarchical Clustering, Evaluating Classification and Predictive Performance.

**Evaluation Method: Continuous Assessment 30% and End Semester Examination 70%**

**CSC 4172: High Performance Computing (30 Lecture hours)** Introduction to High Performance Computing, Performance Analysis, Serial performance optimization, Parallel Algorithm design methodologies, Parallel Programming Models, Programming with Distributed Memory, MPI, Programming with Shared Memory, OpenMP, Load balancing and Data Partitioning, Grids and Clouds, GPU computing.

**Evaluation Method: End Semester Examination**

**CSC 4182: Bioinformatics (30 Lecture hours)** Introduction to Bioinformatics, Archives and Information Retrieval, Pairwise sequence Alignments: Dot Plots, Simple Alignments. The Needleman and Wunsch Algorithm, BLAST algorithm, FASTA algorithm, Multiple sequence alignments: Introduction to multiple sequence alignments, Greedy approach, Star alignment approach and ClustalW algorithm, Hidden Markov models, Phylogenetic Trees: Introducing distance measures and distance based phylogenetic tree building algorithms UPGMA, NJ, introducing character-based measures and character based phylogenetic tree building algorithms: maximum parsimony and maximum likelihood. Protein and RNA Structure Prediction: Secondary Structure, Tertiary and Quaternary Structure, Tools for Modeling Protein Folding, Introduction to drug discovery and ligand docking algorithms, micro array data analysis.

**Evaluation Method : Continuous Assessment : 30% and End Semester Examination 70%**

**CSC 4046: Individual Research project** This course provides an opportunity for the students to work as an individual to produce a system. The students will carry out an

individual project and submit a dissertation. The students will also make a presentation of the project and face for a viva.

**Evaluation Method: Defend the Project Proposal 10%, Interim progress report 15%, Publication 15%, Final report/presentation 60%**

## **Bachelor of Computer Science (Honours) Degree - Semester II**

**CSC 4212: Compiler Design (30 Lecture hours)** Compiler Design Introduction, Phases of compiler, Lexical Analysis- Deterministic Finite Automata, Regular expressions, Lex & Flex (Lexical analyzer generator), Context Free Grammar- Derivative, Parse trees, Ambiguous grammar, EBNF, Top-Down Parsing - LL(1) parse table, Recursive decent parser, Bottom-up parsing - LR parsing, Yacc, Abstract syntax trees, Semantic Analyser.

**Evaluation Method: End Semester Examination**

**CSC 4222: Service Oriented Computing (30 Lecture hours)** The focus of this course is to understand service orientation of technology. The course will provide a deep understanding of Service Oriented Architecture (SOA) fundamentals from Application as well as Infrastructure perspective. The web Service architectures and standards will be discussed in this course unit. Introduction to Service Oriented Computing, Standards Bodies of SOC, Service Oriented Architecture, Traditional Vs Service Oriented Architecture, Service Classification, Enterprise service Bus, Web Services, Web service stack, Introduction to SOAP, WSDL, Introduction to BPEL4WS, Service management and governance, Introduction to Cloud Computing.

**Evaluation Method: End Semester Examination**

**CSC 4232: Formal Methods and Software Verification (30 Lecture hours)** Review of Sets, Relations, Functions and Related Matters, Review of Propositional Logic, and Logical Arguments, Introduction to Predicate Calculus, Concepts of programming language and Proof of Correctness, Hoare Logic, Formal Methods, Use of Z-Notation for various aspects of Program constructs and Verification.

**Evaluation Method: End Semester Examination**

**CSC 4242: Artificial Intelligence (30 Lecture hours) (Core)** Introduction to AI Techniques, State and State Space, Agents, Search algorithms, Hill Climbing and Genetic algorithms, Heuristic Search Techniques, Resolution and Theorem Proving, First Order logic, Propositional logic, Game playing, Minimax Theorem and Alpha-Beta Pruning, Natural Language Processing, Deep learning and computer vision.

**Evaluation Method: Continuous Assessment and/or End Semester Examination**

**CSC 4262: Selected Topics (30 Lecture hours)** This course provides students with a understanding of different new concepts related to Computer Science. The detailed contents may be changed from year to year depending on the current trends and available expertise.

**Evaluation Method: Continuous Assessment and/or End Semester Examination**

## **7.9 Examinations - BCS Degree Programmes**

### **Bachelor of Computer Science (General) Degree**

The Bachelor of Computer Science (General) Degree will include six semesters during which students will have to follow Compulsory Course Units (CCU) offered by respective depart-

ments and elective or optional Course Units (OCU). The Bachelor of Computer Science (General) Degree Examination will consist of end of semester examinations for theory and practical Course Units.

### **Bachelor of Computer Science (Honours) Degree**

The duration of the Honours degree programme is four academic years (eight semesters) inclusive of Level I, II and III of the BCS (General) degree.

During the four academic years of the degree programme, a student shall complete course units aggregating to 120 credits with at least 30 credits from the fourth academic year of the Bachelor of Computer Science (Honours) Degree courses.

The Honours degree consists of examinations at the end of each semester or at the end of course unit for research project.

#### **7.9.1 Attendance**

To be eligible to sit for an examination of a theory or practical course unit, there should minimum attendance of 80%. If a student fails to meet this requirement for a particular course unit, he or she will be considered to have failed in that course unit (see section 14.3.1 for further details).

#### **7.9.2 Examination Criteria**

##### **Evaluation Methods**

- Theory examination (written/oral)
- Practical examination
- Continuous assessment
- Assignment
- Report
- Presentation

##### **Grading System**

Awarding of grades for course units will be done according to the grading system given in the Table in section 14.2

##### **Pass in a Course Unit**

- A candidate who obtains grade C or better for a Course Unit will be considered to have passed in that Course Unit.
- If a student fails to complete a Course Unit, grade of E will be given unless an acceptable reason is produced. In the event of given reason is accepted by the Senate on the recommendation of the Faculty Board, he/she will be considered as sitting for the first time in a subsequent attempt for that course unit.

- A student who obtains a C- or lower grade in a particular Course Unit, may re-sit the examination in respect of that Course Unit for the purpose of improving its grade within the stipulated period. The highest grade a student can obtain is C, which is in this instance equivalent to GPA 2.0. In the event a student obtains a lower grade, he/she will be entitled to the previous grade. Repeat candidates are not entitled to attend the lectures/practical classes of the Course Unit in which he/she has failed.

## Verification of Marks

See section 14.2.5 for details.

### 7.9.3 Bachelor of Computer Science (General) Degree Requirements

A candidate shall be eligible for the conferment of the Bachelor of Computer Science (General) Degree after the successful completion of all requirements within a maximum period of five academic years from the date of entry to the University of Ruhuna as specified below.

A student shall be deemed to have passed the Bachelor of Computer Science (General) Degree Examination if he/she has obtained

- a minimum of 90 credits
- grades of C or better aggregating to a minimum of 60% credits of Computer Science CCUs
- grades of C or better aggregating to a minimum of 60% credits of Mathematics CCUs
- grades of C or better aggregating to a minimum of 60% credits of OCUs
- a grade C or better for Industry Based Project/Industry Placement course unit
- Grade Point Average (GPA) of 2.00 or more.

GPA will be calculated as follows:

$\text{GPA} = \frac{\sum(\text{Grade Point Value for a Course Unit}) \times (\text{Number of credits of that Course Unit})}{\text{Total number of credits}}$
--

## Award of Honours

A student who has satisfied conditions given above is eligible for an award of an Honours degree if he/she completes the requirements indicated below within three academic years from the date of first registered securing grades of C or better aggregating to a minimum of 75 credits.

### (1) First Class:

First Class Honours will be awarded if he/she obtains

- a minimum Overall Average of 3.70 and
- grades of A in Course Units aggregating to a minimum of 40 credits

### (2) Second Class (Upper Division):

Second Class (Upper Division) Honours will be awarded if he/she obtains

- a minimum Overall Average of 3.30 and



(ii) grades B or better in Course Units aggregating to a minimum of 40 credits.

**(3) Second Class (Lower Division):**

Second Class (Lower Division) Honours will be awarded if he/she obtains

(i) a minimum Overall Average of 3.00 and

(ii) grades of B or better in Course Units aggregating to a minimum of 40 credits.

**Other Requirements**

In addition to the examination criteria stated above, the candidate have to pass in English proficiency Level I and Level II examinations in order to release the final results of the Bachelor of Computer Science degree.

**7.9.4 Minimum Requirement for the Completion of the Bachelor of Computer Science (Honours) Degree**

A student shall be deemed to have passed the Bachelor of Computer Science (Honours) Degree Examination if he/she has obtained following:

- (a) A minimum of 120 credits with at least 30 credits from the fourth academic year of Bachelor of Computer Science (Honours) degree course units,
- (b) An overall minimum Grade Point Average (GPA) of 2.5 for all course units followed throughout the four academic years of the degree programme and
- (c) A grade not inferior to C for the fourth year Individual Research Project.
- (d) Grade of C or better to a minimum of 70% credits from the fourth year course units

**Award of Honours**

A student who has fulfilled all the conditions given above shall be awarded Honours, if he/she fulfills the following additional requirements within four academic years from the date of first registration (it shall be within the power of the Senate to declare for some specified reason that a student is eligible for the award of the Honours at a subsequent occasion) securing grades of C or better aggregating to a minimum of 25 credits from Bachelor of Computer Science (Honours) Degree Course Units.

**(i) First Class Honours**

- (a) A minimum GPA of 3.70 for Honours Degree Course Units,
- (b) A minimum GPA of 3.70 for all course units, and
- (c) Grades of A or better for Honours Degree Course Units aggregating to a minimum of 15 credits

**(ii) Second Class (Upper Division)**

- (a) A minimum GPA of 3.30 for Honours Degree Course Units,
- (b) A minimum GPA of 3.30 for all course units, and
- (c) Grades of A- or better for Honours Degree Course Units aggregating to a minimum of 12 credits

(iii) Second Class (Lower Division)

- (a) A minimum GPA of 3.00 for Honours Degree Course Units, and
- (b) A minimum GPA of 3.00 for all course units

### **7.9.5 Option of reverting to BCS General Degree**

A student reading for a Bachelor of Computer Science (Honours) Degree may request for the award of the Bachelor of Computer Science (General) Degree foregoing the Honours Degree. This request should be made within 14 days after the release of the final results of the Honours Degree programme.

The student shall satisfy the following conditions:

- (a) The results of the Bachelor of Computer Science (General) Degree shall be determined solely on the basis of course units he/she has followed in the first three academic years.
- (b) A student shall be deemed to have passed the Bachelor of Computer Science (General) Degree Examination if he/she has satisfied the requirements of the section 8 of the Bachelor of Computer Science (General) Degree By-Law.
- (c) student shall be eligible for an award of Honours for the Bachelor of Computer Science (General) Degree if he/she has completed the requirements within first three academic years from the date of first registration in accordance with the section 9 of the Bachelor of Computer Science (General) Degree By-Law.

### **7.10 Other Services to the University Community**

The Department of Computer Science offers many Computer and Information Technology related service originally carried out by the computer unit of the faculty of science. The services include maintaining and upgrading University Fiber Optic Backbone, providing Email, Web and other Internet services, designing and handling the department wise Local Area Networks (LAN). Further, the department conducts courses and offers IT related services and consulting to the whole university community and other government and private sector organizations outside the university. The following lists some of the core IT related services/activities carried out by the department.

- Conducting workshops and computer courses for academic and non-academic members of the university community.
- Providing services such as E-mail and Internet access to all faculties.
- Developing and maintaining university information server (Web Server)
- Providing IT related technical supports and consultations for the Ruhuna University community.
- Working with individual students, faculty and staff on computer programmes.
- Controlling and maintaining the Local Area Network at Wellamadama site.
- Operating and maintaining the computer pool and provide free computer access to the staff and the students of the faculty of Science.
- Conducting IT Exhibitions.

## 8 Department of Mathematics

### 8.1 Introduction

The main objectives of the Department are

- to produce graduates with a vigorous and applicable knowledge in pure and applied mathematics mathematical techniques in industries with a Special interest to the Ruhuna (or the Southern part of the country).
- to re-discover the technical and mathematical knowledge used in ancient Sri Lankan and Asian cultures.
- to train and motivate undergraduates on applying mathematical and logical problem solving approaches in industrial and other related areas.

A mathematics education has long been respected as an excellent training of the mind. At the same time it is a vital practical skill if one wishes to be involved in shaping the future of our modern technological society. Advances in computing, decision-making, medicine, pollution control, product design, space travel, telecommunications, weather forecasting and a great many other areas rely on the deep insight that it provides. Those with knowledge of mathematics have many interesting and rewarding avenues to explore and will always be highly valued. With the introduction of the course unit system in 2002, a great flexibility for students is given in choosing various streams available in the degree programmes offered by the department. Presently, the department offers **Mathematics**, **Industrial Mathematics** and **Applied Mathematics** as main subjects for the B.Sc. Degree Programme. In all the above three main subjects, subject matter from Pure Mathematics, Applied Mathematics, Statistics and Mathematics are included. For Industrial Mathematics, a limited number of students are selected based on an aptitude test. The exact number varies from 30-40 subject to the availability of the resources. Examination Criteria for Mathematics/Applied Mathematics and Industrial Mathematics Course Units: method of assessment pertaining to each course unit as well as the detailed syllabus are announced/noticed either in printed form or in the department website at the beginning of the semesters.

### 8.2 Research Areas

Some of the key research areas of the department are given below.

- Applications of partial differential equations
- Probability and Statistics
- Industrial applications of statistics
- Multivariate analysis techniques
- Financial mathematics
- Survival analysis
- Actuarial science
- Mathematical biology
- Mathematical modeling with delay differential equations

- Epidemiological and virus dynamic models
- Operational research
- Complex systems and Networks
- Semigroup theory and their applications in population dynamics
- Quantum computation and information

### 8.3 Head of the Department

Mrs. K.C.N. Shanthidevi, B.Sc. (Sri J'Pura, SL), M.Sc. (Hiroshima, Japan)

### 8.4 Members of the Academic Staff

Designation	Name	Specialization
<b>Senior Professor</b>	Professor L.A.L.W.Jayasekara B.Sc. (Kelaniya, SL) M.Sc. in Information Systems (Kyushu, Japan) Ph.D. in Statistics (Kyushu, Japan)	Information Systems, Statistics, Computer Science
<b>Professor &amp; Chair</b>	Professor P.A. Jayantha B.Sc. (Kelaniya, SL), M.Sc. in Industrial Mathematics (Sri J'Pura, SL) Ph.D. (QUT Australia)	Numerical Methods for Partial Differential Equations, Computer Programming
<b>Senior Lecturer Grade I</b>	Mr. M.P.A.Wijayasiri B.Sc. (Kelaniya, SL) M.Sc. in Computer Sc. (Bradford, UK) M.Phil. (Kelaniya, SL)	Computer Expert Systems, Relativity
	Mrs. K.C.N. Shanthidevi B.Sc. (Sri J'Pura, SL), M.Sc. (Hiroshima, Japan)	Functional Analysis, Semigroup Theory and their Applications in Population Dynamics using Approximation Theory.
	Mrs. S.D.L. Geeganage B.Sc. (Colombo, SL), Dip. in Statistics (Sri J'Pura, SL) M.Phil. in Mathematics (Sri J'Pura, SL)	Parametric estimations of mixtures of probability models, Numerical Techniques
	Dr. M.K. Abeyratne B.Sc. (Kelaniya, SL) Dip. in Statistics (Sri J'Pura, SL) M.Sc. in Industrial Mathematics (Kaiserslautern, Germany) Ph.D. (Kaiserslautern, Germany)	Partial Differential Equations, Numerical Methods in PDEs, BVPs in Elasticity Theory, Finite Element Methods.
	Dr. L.W. Somathilake B.Sc. (Kelaniya, SL), M.Phil. (Ruhuna, SL) Ph.D. (Ruhuna, SL)	Nonlinear PDEs (reaction diffusion systems), Semigroup theory, Computational PDEs, Mathematical & Computational Biology
	Dr. N. Yapage B.Sc. (Ruhuna, SL) Ph.D. (UEC, Tokyo, Japan)	Mathematical Physics, Probability Theory, Stochastic Analysis, Statistical Information Theory & Applications, Quantum Information and Computation, Differential Geometrical Methods in Statistics, Theory of Complex Systems and Networks

Designation	Name	Specialization
<b>Senior Lecturer Grade I</b>	Dr. W.A.R. De Mel BSc. (Kelaniya, SL) M.Phil. (Ruhuna, SL) M.S. (SHSU, USA) M.S. (MST, USA) Ph.D. (MST, USA)	Parametric and Nonparametric Methods in Survival Analysis, Recurrent Events, Applied Stochastic Processes, Financial Mathematics, Financial Time Series and Actuarial Science
	Dr. B.G.S.A Pradeep B.Sc. (Ruhuna, SL) M.Sc. (Peradeniya, SL) Ph.D. (USTB, China)	Mathematical Biology, Delay Differential Equations
<b>Senior Lecturer Grade II</b>	Dr. D. M. Samarathunga B.Sc. (Peradeniya, SL) Ph.D. (Wayne State, USA)	Operations Research, Mathematical Programming.
	Dr. K. D. Prasangika B.Sc. (Ruhuna, SL) M.Phil. (Ruhuna, SL) Ph.D. (CCNU, China)	Statistics, Categorical Data Analysis, Meta Analysis, Time Series Analysis, Bayesian Inference
	Dr. E.J.K.P. Nandani B.Sc. (Ruhuna, SL) M.Phil. (Ruhuna, SL) Ph.D. (WIPM, UCAS, China)	Applied Mathematics Artificial Neural Networks Mathematical Physics
	Dr. M.C.S. Fernando B.Sc. (Ruhuna, Sri Lanka) M.Sc. in Technimathematics (LUT, Lappeenranta, Finland) Ph.D.(TU Kaiserslautern, Germany)	PDE constraint optimal control problems Numerical methods for PDEs Free boundary value problems
<b>Lecturer</b>	Mr. A.W.L. Pubudu Thilan B.Sc. (Ruhuna, SL) BIT (Colombo, SL) M.S. (MST, USA) M.Phil. (Ruhuna, SL) (on study leave)	Reading for Ph.D. in Australia
<b>Probationary Lecturer</b>	Miss. H. L. Jayetileke B.Sc. (Ruhuna, SL) M.Sc. (Colombo, SL) (on study leave)	Reading for Ph.D. in Australia
	Mrs. S.D.M. Dilshani B.Sc. (Ruhuna, SL)	Reading for M.Sc. in SL
	Mr. L.T. Wedage B.Sc.(Ruhuna, SL)	
	Mrs. K.G.P.Hansani B.Sc.(Ruhuna, SL)	Reading for M.Phil. (Ruhuna, SL)

## 8.5 Course Units offered for B.Sc. (General) Degree

### Mathematics

#### Level I - Semester I

**MAT111 $\beta$ : Vector Analysis (30 lecture hrs + 15 tutorial hrs)** - (Credit value 2.5)

**Vector Algebra:** Definition of a Vector, Addition and Subtraction, Components, Physical examples.

**Vector Products:** Scalar and Vector products including a brief introduction to determinants, triple products, Geometrical applications. Differentiation and Integration of a Vector

functions.

**Vector Analysis:** Scalar and Vector fields, grad, div, curl, Manipulation with combinations of these operators acting on combinations of fields.

**Integral transformations:** Line, Surface and Volume integrals, the divergence theorem, conservative and solenoidal fields, Greens theorem, Stokes theorem (3-D) form.

**General Co-ordinates:** Unit vectors in orthogonal curvilinear co-ordinates, elementary arc length and volume, curl, div, grad in curvilinear co-ordinates.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT112δ: Differential Equations (15 lecture hrs + 7 tutorial hrs) - (Credit Value 1.25)**

Introduction, Equations of first order and first degree, Orthogonal trajectories, Clairant's form, Linear equations, Theory of operators, Euler's form, Simultaneous equations.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT113δ: Introductory Statistics (15 lecture hrs + 8 tutorial hrs) - (Credit Value 1.25)**

Definition of Probability, Conditional Probability and the Independence of events, , The Law of Total Probability and Bayes' Rule, Definition of random variables, Cumulative distribution function, Density functions for discrete random variables and continuous random variables, Expectations, Mean, Variance, standard deviation, Expected value of a function of a random variable, Moments, Central Moments, Moment Generating function, Bernoulli and Binomial Distributions, Hypergeometric Distribution, Poisson Distribution, Geometric Distribution, Uniform Distribution, Normal Distribution, Exponential and Gamma Distribution, Approximation: Binomial and Poisson by Normal.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT1142: Mathematics for Biology (30 lecture hrs) Only for students following Biological Science Stream - (Credit Value 2 - Not counted for the Degree)**

Basic Algebra (including Complex Numbers), Logarithms, Trigonometric functions, Limits, The principle of Differentiation, Differentiation of a Product, Quotient and a function of a function, Maxima and Minima, Partial Differentiation, Total Differentiation, Homogeneous Functions and Eulers Theorem on Homogeneous functions, Integration as the converse of Differentiation, Integration by parts, Exact Differential equations, Definite Integral, Vectors, Determinants, Matrices, Introduction to Group Theory, Statistics for Chemistry (permutations, Configurations and Microstates, Molecular Assemblies, The importance of ,  $W = W! / n! \cdot n!$  , The Boltzman Distribution.)

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

## Level I - Semester II

**MAT121β : Algebra (30 lecture hrs + 15 tutorial hrs) - (Credit Value 2.5)**

Elementary set theory, Relations, mappings and functions, theory of polynomial equations in one variable including the statement of the fundamental theory, Newton's relations between roots, solution of cubic and biquadratic equations, determinants, solution of equations using determinants nth roots of unity, factors of  $x^n - a^n$ ,  $x^n + a^n$ ,  $x^{2n} - 2x^n a^n \cos(nx) + a^{2n}$ ,

elementary group theory, rings and fields, complex theory approach through fields.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT122 $\beta$ : Calculus (Real Analysis) (30 lecture hrs + 15 tutorial hrs) - (Credit Value 2.5)**

Classical Logic, Set theory, Field axioms, Real number system as a field, Functions and its properties, Real sequences, Continuity and Limits of functions, Differentiability.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

## **Level II - Semester I**

**MAT211 $\beta$ : Linear Algebra (30 lecture hrs + 15 tutorial hrs) - (Credit Value 2.5)**

Vector Spaces and Subspaces, Linear Transformations, Dual Spaces, Matrices, Operations on Matrices, Rank, Elementary Transformations, Elementary Matrices, Normal Forms, Solving Systems of Linear Equations, eigenvalues, eigenvectors, Characteristic Polynomial, Cayley-Hamilton Theorem and Applications, Minimum Polynomial.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT212 $\beta$ : Real Analysis-I (30 lecture hrs + 15 tutorial hrs) - (Credit Value 2.5)**

**Theory of series:** Lower limits upper limits of sequences, Series, Test for convergence and divergence, Absolute convergence, Rearrangements, Cauchy products, Power series and radius of convergence.

**Riemann Integration:** Upper and Lower sums, Upper and Lower Integral, The Riemann Integral, Properties of Riemann integrals, fundamental Theory of calculus, Improper Integrals, Integration by parts.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

## **Level II - Semester II**

**MAT221 $\beta$ : Number Theory (30 lecture hrs + 15 tutorial hrs) - (Credit Value 2.5)**

**Integers:** Prime and irreducible, division algorithm, Euclid's algorithm, Fundamental Theorem of Arithmetic, Integers mod  $n$ , Chinese Remainder Theorem, Euler's function

**Prime integers:** Sieve of Eratosthenes, perfect numbers, Mersenne numbers, Fermat numbers, infinite number of primes, the prime number theorem. Gaussian integers

**Modular calculations:** Fermat's Little Theorem, Wilson's theorem. Sums of squares, Fermat's Last Theorem, Sums of 4 squares.

**Primitive elements:** Roots of unity, factors of Fermat primes, roots of polynomial equations, the number of  $n^{th}$  roots of unity, the Primitive Element theorem.

**Integer polynomials:** Hensel's Lemma, primitive elements mod  $n$ . Special Topics in Number Theory.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT222 $\delta$ : Real Analysis-II (15 lecture hrs + 7 tutorial hrs) - (Credit Value 1.25)**

Sequences and series of functions, Point-wise convergence of sequence of functions, Uniform convergence of sequence of functions, Convergence and Uniform convergence of series of

functions, Integration and differentiation of series of functions.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT224 $\delta$ : Geometry (15 lecture hrs + 8 tutorial hrs) - (Credit Value 1.25)**

**Plane:** Various forms of the equation of a plane. Straight Line, Various forms of the equation of a line.

**Sphere:** Various forms of the equation of a sphere, Tangent line to a sphere, Tangent plane to a sphere, Condition of Tangency, Intersection of two spheres.

**The Central Conicoids:** Ellipsoid, Hyperboloid of one sheet, Hyperboloid of two sheets, Intersection of a conicoid and a line, Tangent Line to a conicoid, Tangent Plane to a conicoid, Normal to a conicoid, Number of Normals from a given point.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT225 $\beta$  : Mathematical Statistics-I (30 lecture hrs + 15 tutorial hrs) - Prerequisite MAT113 $\delta$  (Credit Value 2.5)**

Joint Density Functions, Joint Cumulative Distribution Function, Conditional Distribution Function, Independence, Covariance and correlation coefficient, Conditional Expectations, Joint Moment Generating Function and Moments, Independence and Expectation, Bivariate Normal Distribution, Expectations of Functions of Random Variables.

**Distribution of Function of Random variables:** Cumulative Distribution Function Technique, Moment Generating Function Technique, Transformation Technique. Population and Samples, Random Sample, Statistic, and Sample Moments, Sample Mean, Law of Large Numbers, Central limit Theorem.

**Sampling from the normal distribution:** Sample mean, chi-square distribution, F distribution, Student t Distribution.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

### Level III - Semester I

**MAT311 $\beta$ : Group Theory (30 lecture hrs + 15 tutorial hrs) - (Credit Value 2.5)**

**Groups and subgroups:** Groups, subgroups/normal subgroups, quotient groups, cyclic groups, Cayley diagrams.

**Permutations, cosets and direct products:** groups of permutation, orbits, cycles and alternating groups, cosets and the theorem of Lagrange, direct product, finite groups.

**Homomorphism and factor groups:** Homomorphism factor group, factor group computation and simple groups.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT312 $\beta$ : Real Analysis-III (30 lecture hrs + 15 tutorial hrs) - (Credit Value 2.5)**

**Non Linear Analysis:** Functions from  $\mathbb{R}^n$  to  $\mathbb{R}^m$ , Open balls and Open sets, limit points. Limit and continuity, The derivative of scalar field with respect to a vector. Directional derivatives and partial derivatives, Partial derivatives of higher order, Directional derivatives and continuity, The Total derivative, The gradient of Scalar field, A sufficient condition for differentiability, A chain rule for derivatives of scalar fields. Derivatives of vector fields, Differentiability implies continuity, The chain rule for derivatives of vector fields, Sufficient



conditions for the equality of mixed partial derivatives. Derivatives of functions defined implicitly, Maximum, Minimum and saddle points, Extremes with constraints, Lagrange's Multipliers, Double integrals.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT313 $\beta$ : Mathematical Statistics-II (30 lecture hrs + 15 tutorial hrs)** - (*Credit Value 2.5*) *Op. for students following Mathematics, Prerequisite: MAT225 $\beta$*

**Point estimation:** The method of moments, The method of Maximum Likelihood, Properties of point estimation: Unbiasedness, Efficiency, Consistency, Sufficiency, Minimal Sufficient Statistics, Exponential family, Cramer - Rao Inequality, Completeness.

**Interval Estimation:** Confidence Interval for the mean and variance. Tests of Hypotheses: Simple Hypothesis, Composite Hypothesis, Critical Region, Types of Error, Power Function, Size of Test, Simple Likelihood-ratio Test, Most powerful Test, Neyman-Pearson lemma, Generalized Likelihood ratio Test, Uniformly Most Powerful Test, Tests of Hypotheses - Sampling from the Normal Distribution.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

### Level III - Semester II

Refer the Optional course units offered by the Department of Mathematics for Level III-Semester II, for details.

## Industrial Mathematics

### Level I - Semester I

**IMT111 $\beta$ : Classical Mechanics-I (Dynamics) (30 lecture hrs + 15 tutorial hrs)** - (*Credit Value 2.5*) Frame of reference, Inertial frames, Forces, Velocity, Acceleration, Linear momentum, Angular velocity, Angular acceleration, Angular momentum, motion of a particle (Newton laws), motion of a system particles, Rotating coordinate systems, moments and products of inertia. Parallel axes theorem, perpendicular axes theorem for moments and products of inertia. Principle axes and principle moments of inertia of a system of particles, Rotating coordinate systems, Infinitesimal rotation, Euler equations, Generalized coordinates, Lagrange's formulations, Hamiltonian functions, Theory of small oscillation, Impulsive motion.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT1b2 $\beta$ : Mathematical Computing (15 lecture hrs + 60 practical hrs)** - (*Credit Value 2.5*)

Introduction to computer systems and its historical development, contribution from mathematicians (e.g. Leibnitz, Boole, Pascal, Babbage, Turing, von Neumann), numerical computation and mechanical computing devices; General overview of: computer architecture, hardware, software and firmware, programming languages, application packages, the present day use of computers and its future; Introduction to Linux Operating System: Linux commands, directory structure, text editors, user accounts and file permissions, text editors, virtual terminals in text mode. programming with C on Linux system - editing (with emacs), compilation, debugging etc., ; Formatted input-output, control structures, loops,

C-functions, pointers, File input/output, command-line arguments (the above shall be discussed with mathematical applications); Introduction to Linux operating system. **Method of Evaluation: See subsection 14.2.4**

## Level I - Semester II

**IMT121 $\beta$ : Classical Mechanics-II (Statics) (30 lecture hrs + 15 tutorial hrs)**  
- (*Credit Value 2.5*)

**Theory of Forces and Couples:** Force acting at a point, Resultant of a system of Forces acting at a point, Condition for equilibrium of a system of Forces acting at a point, Vector moment of a Force, Couple, Moment of a Couple, Resultant of a system of Forces in 3D, Invariants, Wrench, Coplanar Systems of Forces, Varignon's Theorem of Moments, Parallel Systems, Conjugate forces.

**Bending of Beams:** Shear and Bending moment in a beam, Relations among Load, Shear and Bending Moment, Thin Elastic Beams, Bernoulli-Euler Law, Macaulay's Notation, Clapeyron's equation for three moments.

**The Catenary:** Flexibility, The common catenary, Parabolic chain, suspension bridge, Catenary of uniform strength, General equations of equilibrium of a string in one plane under given forces, Strings on rough curves, Variable chain hanging under gravity.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT122 $\beta$  : Mathematical Modelling-I (30 lecture hrs + 15 tutorial hrs)** -  
*Prerequisite MAT112 $\delta$  (Credit Value 2.5)*

**Introduction:** General Introduction to Modelling, concepts of system identification, Deterministic vs Stochastic, classification of models.

**Modelling via First Order Differential Equations:** Modelling Through First Order and Simple Higher Order Differential Equations, Linear Differential Equations (LDEs), systems of Ordinary Differential Equations (ODEs).

**Analysis of Solutions:** Existence and uniqueness of solutions, continuation of solutions, dependence on initial conditions and parameters, linear systems of equations with constant and variable coefficients, autonomous systems, phase space, and stability, Interpretation of solutions in modelling.

**Applications:** Population ecology, chemical kinetics, traffic dynamics, Mechanics, Biology and Medicine, Pharmacokinetics, Economics, Engineering, Special topics in modelling.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

## Level II - Semester I

**IMT211 $\beta$ : Classical Mechanics-III (Fluid Dynamics) (30 lecture hrs + 15 tutorial hrs)**  
- (*Credit Value 2.5*)

Equations of stream lines, Equations of vortex lines, Differentiation following the motion of a fluid. Equations of continuity, Euler's and Bernoulli's equations, Irrotational motion, uniqueness theorem, Kinetic energy, Sources and sinks, Images, Potential flow, Complex potential.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT2b2 $\beta$  : Mathematical Computing (15 lecture hrs + 60 practical hrs) - (Credit Value 2.5)**

**MATLAB workplace:** Overview of MATLAB features and workplace, using MATLAB command window as a scientific calculator, handling with variables, saving variables in files with extension mat, formatting output, arrays, matrices, matrix functions.

**Script and functions:** Simple MATLAB codes for matrix manipulations, finding roots, evaluating polynomials, structural programming, for loop, while loop, if, else if, 2D and 3D Plots, use of MATLAB for solving nonlinear equations, numerical differentiation and integration, solving linear systems, solving ordinary differential equations, solving and plotting numerical solutions of system of differential equations, MATLAB codes construction for curve fittings. **Method of Evaluation: See subsection 14.2.4**

## **Level II - Semester II**

**IMT221 $\beta$ :Mathematical Modelling-II (30 lecture hrs + 15 tutorial hrs) -Prerequisite IMT122 $\beta$  (Credit Value 2.5)**

Introductory Numerical Solutions of Differential Equations, Mathematical Modelling through Difference Equations, Further Study on Systems of Differential Equations with Matrices. Modelling with Partial Differential Equations (PDEs): The concept of a PDE, Method of separation of variables, Mass-Balance equation (The first method of obtaining PDE Models), Momentum-Balance Equation (The second method of obtaining PDE Models), Variational Principles (The third method of obtaining PDE Models), Probability Generating functions (The fourth method of obtaining PDE Models), Nature of PDEs Initial and Boundary Conditions.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT223 $\beta$ : Applied Probability (Information Theory)(30 lecture hrs + 15 tutorial hrs) -Op. for students following Industrial Mathematics (Credit Value 2.5)**

Event Spaces, probability measure, probability space, sample space, continuity of a probability measure, Defining random variables on probability spaces and their functions, partition theorem, conditional probabilities, Distribution Functions, The law of large numbers, Introduction to Information theory and Claude Shannon's remarkable work on mathematical formulation of the central problem in telecommunication channels, Error correcting codes for binary symmetric channel and their performances, Shannon's noisy channel coding theorem, probability and entropy, entropy and mutual information, convex functions and Jensen's inequality, the data processing theorem, Discrete memoryless channels and their capacity-cost functions, measuring the information content of an ensemble, the Source-Channel Coding Theorem for the Binary Symmetric Channel.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT224 $\beta$ : Applied Statistics-I (30 lecture hrs + 15 tutorial hrs) -Op. for students following Industrial Mathematics (Credit Value 2.5)**

**Collecting and Summarizing data:** Constructing tables and graphs, Measures of center of a set of observations, Median, Arithmetic Mean, Mode.

**Samples and Populations:** Methods of choosing a sample, Measures of variability: Range, Mean deviation, Variance and Standard deviation, Semi-interquartile range, five number summaries, Box and Whisker plots, stem and leaf plots.

**Joint distributions of data:** The Scatter diagram, the concept of a statistical relation,

Quantitative description of a statistical relation, Covariance, Correlation coefficient

**Linear regression:** Regression equation, Prediction and error, Interpreting regression.

**Statistical Applications with probability models:** Bernoulli, Binomial, Poisson, Normal approximations, Statistical software packages.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

### Level III - Semester I

**IMT3b1 $\beta$  : Industrial Mathematics Project (90 project hrs) - (Credit Value 2.5)**

This includes a real world problem solving task, using mathematical (modelling) techniques and computational tools that the student has learnt in Level I, II and III.

**Method of Evaluation: See subsection 14.2.4**

**IMT312 $\beta$  : Mathematical Modelling-III (30 lecture hrs + 15 tutorial hrs) -Op. for students following Industrial Mathematics ( Credit Value 2.5)**

Solution of Linear Differential Equations by Laplace Transforms, Mathematical Modelling through Graphs, Mathematical Modelling Through Calculus of Variations and Dynamic Programming or Special Topics and/or Project, Stochastic Modelling, A survey on Ancient Sri Lankan Science and Technological Methods, Topics in Mathematical Modelling of Life-Environmental relationships.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT313 $\beta$  : Applied Statistics-II (30 lecture hrs + 15 tutorial hrs) -Op. for students following Industrial Mathematics, Prerequisite IMT224 $\beta$  (Credit Value 2.5)**

**Testing hypotheses about many population means:** Introduction to analysis of variance, Linear model for analysis of variance, variability as sum of squares, Test statistics and rejection rules.

**The population regression:** Formulating hypotheses about regression, Analysis of Variance for regression

**Nonparametric tests:** Chi-square test, Contingency tables (test for independence), Kolmogorov-Smirnov test, The sign test, The Rank test (Mann-Whitney U-test), Runs test (one sample runs test, two sample runs test), Kruskal-Wallis, H-test

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

### Level III - Semester II

Refer the Optional course units offered by the department of Mathematics for Level III-Semester II, for details.

## Applied Mathematics

### Level I - Semester I

**AMT111 $\beta$  : Classical Mechanics-I (Dynamics) (30 lecture hrs + 15 tutorial hrs) (Credit Value 2.5)**

Refer IMT111 $\beta$  under Industrial Mathematics for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT112 $\beta$ : Mathematical Foundation of Computer Science (30 lecture hrs + 15 tutorial hrs)** (*Credit Value 2.5*)

Logic Syllogisms, propositional logic, propositions, arguments, predicates and quantifiers, logic programming.

**Number Systems:** Number Systems (decimal, Roman etc.), Binary number system, Octal system, Binary arithmetic (including complements methods)

**Boolean Algebra and Logic circuits:** Boolean Algebra, Switching circuits, logic circuits.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**Level I - Semester II**

**AMT121 $\beta$ : Classical Mechanics-II (Statics) (30 lecture hrs + 15 tutorial hrs)** (*Credit Value 2.5*)

Refer IMT121 $\beta$  under Industrial Mathematics for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT122 $\beta$ : Mathematical Modelling-I (30 lecture hrs + 15 tutorial hrs)** (*Credit Value 2.5*)

Refer IMT122 $\beta$  under Industrial Mathematics for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**Level II - Semester I**

**AMT211 $\beta$  : Classical Mechanics-III (Fluid Dynamics) (30 lecture hrs + 15 tutorial hrs)** (*Credit Value 2.5*)

Refer IMT211 $\beta$  under Industrial Mathematics for details.

**AMT212 $\beta$ : Computational Mathematics (30 lecture hrs + 15 tutorial hrs)** (*Credit Value 2.5*)

**Numerical computing and computers:** Introduction, Using a computer to do numerical analysis, Computer arithmetic and errors.

**Solving Non Linear equations:** Bisection Method, Newton's Method, Fixed point Iteration  $x = g(x)$  Method, Secant Method, Regular-Falsi Method.

**Interpolation and Curve Fitting:** Interpolation, Lagrange polynomials, Divided Differences, Interpolating with a Cubic Spline, Least Square Approximation.

**Numerical Differentiation and numerical Integration:** Getting derivatives and integrals numerically, Trapezoidal rule (composite formula), Simpson's rules, Applications of cubic splines.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**Level II - Semester II**

**AMT221 $\beta$ : Mathematical Modelling-II (30 lecture hrs + 15 tutorial hrs)** (*Credit Value 2.5*)

Refer IMT221 $\beta$  under Industrial Mathematics for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT223 $\beta$ : Applied Probability (Information Theory) (30 lecture hrs + 15 tutorial hrs)** *Op. for students following Applied Mathematics (Credit Value 2.5)*

Refer IMT223 $\beta$  under Industrial Mathematics for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT224 $\beta$ : Applied Statistics-I (30 lecture hrs + 15 tutorial hrs)** *Op. for students following Applied Mathematics (Credit Value 2.5)*

Refer IMT224 $\beta$  under Industrial Mathematics for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

### Level III - Semester I

**AMT311 $\beta$ : Numerical Analysis (30 lecture hrs + 15 tutorial hrs);** *(Credit Value 2.5) Op. for students following Applied Mathematics, and not allowed with AMT312 $\beta$*

**Solving Linear Systems:** Matrix Notation, Direct Methods Gauss, Jordan, Aitken Method, etc. Iterative Methods Jacobi, Gauss - Seidel, SOR Method, etc.

**Numerical solutions of ordinary differential equations:** Euler and Modified Euler methods, Runge - Kutta method, Convergence criteria, Errors and error propagation.

**Numerical solutions of partial differential equations:** Parabolic type, Elliptic type, Hyperbolic type.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT312 $\beta$ : Mathematical Modelling III (30 lecture hrs + 15 tutorial hrs);** *(Credit Value 2.5) Op. for students following Applied Mathematics, and not allowed with AMT311 $\beta$*

Refer IMT312 $\beta$  under Industrial Mathematics for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT313 $\beta$ : Mathematical Methods in Physics and Engineering-I (30 lecture hrs + 15 tutorial hrs);** *(Credit Value 2.5) Op. for students following Applied Mathematics, Prerequisite IMT223 $\beta$*

Laplace transformations, Inverse Laplace Transformations, Gamma, Beta and Bessel functions, Applications in Solving the wave equation and the heat equation, Fourier series.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT314 $\beta$ : Applied Statistics-II (30 lecture hrs + 15 tutorial hrs);** *(Credit Value 2.5) Op. for students following Applied Mathematics, Prerequisite IMT224 $\beta$*

Refer IMT313 $\beta$  under Industrial Mathematics for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

### Level III - Semester II

Refer the Optional course units offered by the Department of Mathematics for Level III-Semester II, for details.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**The optional course units offered by the Department of Mathematics for level III- Semester II**

**MAT321 $\beta$ : Functional Analysis (30 lecture hrs + 15 tutorial hrs),** *Prerequisite MAT211 $\beta$  Op. (Credit Value 2.5)*

**Metric spaces:** Definition and examples, Open set, Closed set, neighbourhood, Convergence, Cauchy Sequence, Complete Linear, Completion of metric spaces, Banach's fixed point theorem.

**Normed spaces:** Linear space, Normed space, Banach space, Finite dimensional normed spaces and sub spaces, Compactness and finite dimensions, Linear operators, Bounded and Continuous linear operators, Linear operators and functional, on finite dimensional spaces, Normed spaces of operators, Dual space, Inner product space, Hilbert spaces.

Fundamental Theorems for Normed and Banach spaces: Zorn's Lemma, Hahn-Banach Theorems, Reflexive spaces, Strong and weak convergence, Numerical integration and weak convergence.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT322 $\beta$ : Complex Variables (30 lecture hrs + 15 tutorial hrs),** *Op. (Credit Value 2.5)*

Theory of Complex Variables: Complex Functions, Complex differentiability, the Cauchy-Riemann equations, Analytic functions, Cauchy's Theorem, Cauchy's Integral Formula, Taylor's and Laurent's Theorem, Classification of singularities, Laurent expansions, Contour Integration, The Cauchy's residue Theorem, Integration of rational and trigonometric functions using residue theorem

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT323 $\beta$ : Differential Geometry and Tensor Analysis (30 lecture hrs + 15 tutorial hrs),** *Op. (Credit Value 2.5)*

**Differential Geometry:** Unit tangent vector, principal normal, binomial vector and curvature of a curve, surfaces, parametric curves, surfaces of revolution, metric, directional ratios and coefficients, Gauss and mean curvature, orthogonal trajectories, families of dual curves, Geodesics.

**Tensor Analysis:** Transformation of coordinates, summation convention, the Kronecker-delta, contravariant and covariant vectors, contravariant, covariant and mixed tensors, symmetric and skew-symmetric tensors, tensor algebra, metric tensor, conjugate metric tensor, Christoffel's symbols of first and second kind, covariant derivatives.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT324 $\beta$ : Mathematical Models in Ecology (30 lecture hrs + 15 tutorial hrs),** *Op. (Credit Value 2.5)*

**Introduction to Modelling:** Basic description of mathematical modelling, Introduction to Dynamical Systems, Ecological Models.

**Linear Dynamical Systems:** Analysis of Dynamical systems, Equilibrium, Stability, Ratios and Proportional Change.

**Nonlinear Dynamical Systems:** Introduction, Stability, Web Analysis.

**Population Dynamics:** Introduction to population Growth, Logistic Model, Nonlinear Growth Rates, Graphical Approach to Harvesting, Analytic Approach to Harvesting, Economics of Harvesting.

**Genetics:** Introduction to population Genetics, Mutation, Selection.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT325 $\beta$ : Introductory Econometrics (30 lecture hrs + 15 tutorial hrs),** (*Credit Value 2.5*) *Op. Prerequisite MAT211 $\beta$*

**Matrix algebra:** Definition of matrices; rules of matrix algebra; determinants; ranks, inverses and solutions; Cramer's Rule; quadratic forms; matrix definacy. Applications: solutions of multi-equation models; input-output analysis.

**Optimization:** Unconstrained optimization in the n-variable case; second order conditions and Hessian matrices. Constrained optimization in the n-variable case; multiple constraint cases and bordered Hessian matrices.

**Applications:** Maximization and minimization of various economic magnitudes in multi-variable settings. An Introduction to inequality-constrained optimization: profit maximization; non-negativity constraints.

**Difference equations:** Introduction to dynamics; applications: the cobweb pricing model; macroeconomic trade cycles.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT326 $\beta$ : Mathematical Foundation of Computer Science (30 lecture hrs + 15 tutorial hrs),** (*Credit Value 2.5*); *Op. for Students who do not follow Applied Mathematics or Computer Science*

**Logic:** Syllogisms, propositional logic, propositions, arguments, predicates and quantifiers, logic programming.

**Number Systems:** Number Systems (decimal, Roman etc.), Binary number system, Octal system, Binary arithmetic (including complements methods)

**Boolean Algebra and Logic circuits:** Boolean Algebra, Switching circuits, logic circuits.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MAT327 $\beta$ : Introduction to Financial Mathematics (30 lecture hrs + 15 tutorial hrs)** (*Credit Value 2.5*)

**Introduction:** Time Value of Money, Compound Interest, Simple Interest, Present Value, Future Value, Accumulation Function, Discount Rate, Continuous Interest, Force of Interest, and Equation of Value.

**Annuities:** Immediate, Due, Time Lines, Perpetuities, Continuous Annuities, Variable Annuities, and Reinvestment Problems.

**Loan Repayment:** Amortization, Prospective/Retrospective Methods, Instalment Loan, Sinking Funds, Net Interest, and Capitalization of Interest.

**Bonds:** Face value, Par value, Coupon rate, Redemption Value, Bond Price, Makehams Formula, Amortization of Premium/Discount, Callable Bond, Price-Plus Accrued, Market Price, and True Price.

**Yield Structure of Interest Rate:** Internal Rate of Return, Cash Flows, Borrowing Projects, Time/Dollar Weighted Rates, Portfolio Method, and Net Present Value.



**Term Structure Interest Rates:** Term Structure of Interest Rates, Risk Free Rates, Yield Curve, and Forward Rate.

**Asset Liability Management, Duration and Immunization:** Assets, Liabilities Management, Duration, Convexity, Immunization, Stocks, Dividends, and Mutual Funds.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT321 $\beta$ : Applied Algebra (Algebraic Data Encryption & Decryption Methods) (30 lecture hrs + 15 tutorial hrs),** *(Credit Value 2.5) Op. Prerequisites MAT111 $\beta$ , MAT211 $\beta$ , MAT221 $\beta$*

**Introduction to the RSA Encryption Scheme:** Raising integers to large powers to a given modulus, 'Egyptian exponentiation', Discussion of primality testing, The Little Fermat and Rabin tests, Implications for the RSA system, Verifying authenticity

**Topics in Rings and Fields:** GF(p), Polynomials over a ring, The Primitive Element Theorem, Recurrent Sequences, shift registers, The ideal and minimal polynomial of a sequence, Indexing polynomials. Congruence modulo a polynomial, Construction of finite fields, Construction of indexing polynomials, Cyclotomic polynomials, Factorizing polynomials over finite fields

**Error detection and correction in telecommunication:** ISBN codes, The Hamming metric, The minimum distance of a code, Elementary bounds on the minimum distance of a code, Equivalence of codes, Parity checks, The sphere-packing bound, Reed-Muller codes, Linear Codes, Dual codes, The parity check matrix of a linear code Syndrome decoding, The Hamming codes, Cyclic Codes, Generator polynomials and check polynomials, Construction of binary Hamming codes as cyclic codes, The BCH codes, the Golay code.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT322 $\beta$ : Computational Fluid Dynamics (30 lecture hrs + 15 tutorial hrs),** *Op. (Credit Value 2.5)*

**Basic Concepts of Fluid Flow:** Introduction, Conservation Principles, Dimensionless form of a flow equation

**Simplified Mathematical Models for fluid flows:** Incompressible Flow, Inviscid (Euler), Stokes (Creeping) Flow

**Mathematical Classification of Flows:** Hyperbolic Flows, Parabolic Flows, Elliptic Flows, Introduction to the Navier-Stokes Equation

**Introduction to Numerical Methods:** Approaches to Fluid Dynamical Problems, What is CFD? , Possibilities and Limitations of Numerical Methods.

**Components of a Numerical Solution Process:** Mathematical Model, Discretization Method, Numerical Grid, Finite Approximation, Solution process, Convergence Criteria, Properties of Numerical Schemes

**Discretization Approaches:** Finite Difference Methods, Application of Finite Difference Methods to Different types of Models, Idea of Finite volume and Finite Element Methods with motivating examples.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT323 $\beta$ : Theory and Applications of Neural Networks (30 lecture hrs + 15 tutorial hrs),** *Op. (Credit Value 2.5) Prerequisite: IMT2b2 $\beta$  or Level I and Level II of ICT2b13 (CCIT) course*

Biological computers and their capabilities over digital computers, problem of classification and recognition, biological neurons, artificial neural networks, Mathematics of single-layer neural networks - the Perceptron, learning and training, learning rate, Perceptron training algorithm, Introducing Mathematica, methods to adjust the learning rate, convergence of solutions, basins of attractions, Bayesian inference methods. Types of neural networks (feed-forward, back-propagation etc.) and algorithms for implementation. Monte- Carlo Methods, Hopfield network for optimization problems, e.g., traveling salesman problem, Applications in forecasting problems in finance, meteorology, particle physics.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**IMT324 $\beta$ : Statistics with Computer Applications (30 lecture hrs + 15 tutorial hrs),** *Prerequisite MAT225 $\beta$ , MAT313 $\beta$ , AMT314 $\beta$ , IMT313 $\beta$  Op. (Credit Value 2.5)*

Introduction to Statistical Packages, Data Analysis using a computer package, Descriptive Statistics, Graphical representation of data, Estimation, Hypothesis Testing, Regression, Analysis of Variance, non-parametric methods.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT321 $\beta$ : Electro-magnetic Theory (30 lecture hrs + 15 tutorial hrs),** *Op. (Credit Value 2.5)*

Electrostatic field equations, electrostatic potential, boundary value problems, magneto-static field equations, boundary value problems, vector potential, Maxwell's equations, Lorentz condition and gauge transformations, electromagnetic waves in non-conducting media, Electromagnetic waves in conductors.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT322 $\beta$ : Theory of Special Relativity (30 lecture hrs + 15 tutorial hrs),** *Op. for students not following Physics (Credit Value 2.5)*

Introduction (Inadequacy of Newtonian mechanics and the need of a new mechanics), The Space-time continuum and separation between events, Events and particles, Space-time, world lines and space-time diagrams, the motion of a material particle, the light-cone, the fundamental quadratic form, space-time as a Riemannian space, proper time and speed of light, Minkowskian coordinates, The Lorentz Transformations, Length contraction, the time dialation, composition of velocities, the velocity 4-vector and acceleration 4-vector, the expanding universe in S. R., The red-shift. Particles and mass, equation of motion, motion under a constant relative force.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT323 $\beta$ : Mathematical Quantum Mechanics (30 lecture hrs + 15 tutorial hrs),** *Op. (Credit Value 2.5)*

The failure of Newtonian Mechanics to explain phenomena at microscopic level, problem of separation of observable from the observer. Quantum states, representation of quantum states by state (column) vectors, Observables as Hermitian Matrices, mean values and correspondence principle, the angular momentum of a photon, Uncertainty. Equations of motion, quantum particles in one-dimension and three dimension. The Spin of the electron, quantum particle in a spherically symmetric potential. The bound states of the hydrogen

atom, The Dirac notation. Fourier transform, Applications to wave-packets, Basic Ideas of Hilbert space theory, theory of linear operators in Hilbert Spaces, Cauchy-Schwarz and Bessel inequalities, Completeness. Special Topics in Quantum Mechanics and applications: The EPR Paradox and Entanglement, Quantum effects in the computer-chip, Introduction to Quantum Computer.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**AMT324 $\beta$ : Basic Statistics and Data Analysis (30 lecture hrs + 15 tutorial hrs), (Credit Value 2.5) Op. Only for Bio Science Students**

Fundamental concepts in probability, Random variables, Mean, variance and expected values, Classification and Description of Sample Data, Sampling Distributions, Estimations, Hypothesis Testing, Regression Analysis, Analysis of Variance and Scientific Applications.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

## 8.6 B.Sc (Honours) Degree Programmes in Mathematics

**Introduction** The department offers two streams in the B. Sc Honours Degree Programme - namely,

- Mathematics and Applied Mathematics (Math & AM) and
- Mathematics and Statistics (Math & Stat).

The duration of the Honours degree course is four academic years (eight semesters), inclusive of Levels I and II of the General Degree and Levels I and II of the Honours Degree programme.

During the Levels I and II of the Honours degree programme, a student shall follow a minimum of **52 credits** of course units from the subject of Specialization. Furthermore, an Honours degree student should carry out a research/study project, should acquire additional skills (seminar, essay, etc.) and may undergo practical/industrial training as specified by the department.

### 8.6.1 Course Units offered for B.Sc.(Honours) Degree in Mathematics - Level I

B.Sc. Honours Degree (Level I) - Semester I						
Code	Title	Contact Hours	Math &AM stream		Math & Stat Stream	
			Credits	Status	Credits	Status
MSP311 $\beta$	Group Theory (MAT311 $\beta$ )	30L 15T	2.5	C	2.5	C
MSP312 $\beta$	Real Analysis-III(MAT312 $\beta$ )	30L 15T	2.5	C	2.5	C
MSP313 $\beta$	Mathematical Statistics-II (MAT313 $\beta$ )	30L 15T			2.5	C
MSP3144	Mathematical Methods in Physics and Engineering-II (AMT313 $\beta$ )	60L	4	C		
MSP316 $\beta$	Applied Statistics-II (IMT313 $\beta$ )	30L 15T			2.5	C
MSP3174	Topology	60L	4	C		
MSP3184	Numerical Methods with Applications	60L	4	C	4	C
MSP3193	Bayesian Inference and Decision Theory	45L			3	C
MSP3b9 $\beta$	Mathematical Computing (IMT2b2 $\beta$ )	75P	2.5	O	2.5	O
Total minimum compulsory credits			17		17	

B.Sc. Honours Degree (Level I) - Semester II						
Code	Title	Contact Hours	Math &AM stream		Math & Stat Stream	
			Credits	Status	Credits	Status
MSP321 $\alpha$	Advanced Group Theory	23L	1.5	C	1.5	C
MSP322 $\alpha$	Real Analysis-IV	23L	1.5	C	1.5	C
MSP323 $\beta$	Complex Variables(MAT322 $\beta$ )	30L 15T	2.5	C		
MSP324 $\alpha$	Complex Analysis	23L	1.5	C		
MSP3254	Measure Theory with Applications	60L	4	C	4	C
MSP3263	Regression Analysis	45L			3	C
MSP3274	Differential Geometry and Tensor Analysis	60L	4	C		
MSP3283	Special Topics in Statistics (e.g. Multivariate Data Analysis)	45L			3	C
MSP3292	Applied Statistics-III	30L			2	C
Total minimum compulsory credits			15		15	
$\beta$ : Credit value 2.5		C : Compulsory		O: Optional		
$\alpha$ : Credit value 1.5		E : Elective				

### 8.6.2 Detailed Syllabus for B.Sc. Honours Degree in Mathematics - Level I Semester I

**MSP311 $\beta$ : Group Theory (30 lecture hrs + 15 tutorial hrs)** Same as MAT311 $\beta$   
(Credit Value 2.5)

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP312 $\beta$ : Real Analysis-III (30 lecture hrs + 15 tutorial hrs)** Same as MAT312 $\beta$   
(Credit Value 2.5)

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP313 $\beta$ : Mathematical Statistics-II (30 lecture hrs+15 tutorial hrs)** Same as MAT313 $\beta$  (Credit Value 2.5)

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3144: Mathematical Methods in Physics and Engineering-II(60 Lecture hrs)** (Credit Value 4)

Part A:

Same as AMT313 $\beta$ .

Part B:

Applications of Laplace Transforms to Differential Equations, Fourier Transforms, Legendre Functions, Hermite Equation, Functions and Polynomials, Laguerre Equation and Polynomials, Riccati's Differential equation, The Dirac-Delta function,

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP316 $\beta$ : Applied Statistics-II (30 lecture hrs+15 tutorial hrs)** - Same as IMT313 $\beta$  (Credit Value 2.5)

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3174: Topology (60 hrs) (Credit Value 4)**

Topological Spaces, Basis for a Topology, The Subspace Topology, Closed Sets, Limit Points, Continuous Functions, The Product Topology, The Metric Topology, Connected Spaces, Compact Spaces

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3184: Numerical Methods with Applications (60 hrs) (Credit Value 4)**

**Solving Linear Systems:** Matrix notation, direct methods, Gauss, Jordan, Aitken Method etc.

**Iterative methods:** Jacobi, Gauss-Seidel, SOR method etc.

**Numerical Solutions of Ordinary Differential Equations:** Euler and modified Euler methods and Runge-Kutta methods, convergence Criteria, errors and error propagation.

**Numerical Solutions of Partial Differential Equations:** Parabolic type, Elliptic type and Hyperbolic type.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3193: Bayesian Inference and Decision Theory (45 hrs) (Credit Value 3)**

Fundamentals of the Bayesian theory of inference, probability as a representation for degrees of belief, the likelihood principle, the use of Bayes Rule to revise beliefs based on evidence, conjugate prior distributions for common statistical models, methods for approximating the posterior distribution. Graphical models for representing complex probability and decision models by specifying modular components.

Concepts in decision analysis, including influence diagrams, decision trees, and utility theory or/and Special topics in advanced Bayesian inference and decision theory.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3b9 $\beta$  Mathematical Computing (90 project hrs) (Credit Value 2.5)** Same as IMT2b2 $\beta$ ;

The symbolic/numerical mathematics package Mathematica is introduced to solve mathematical problems on the computer. In particular Special attention will be given to functional programming aspects of symbolic and numerical computations in Mathematica.

**Method of Evaluation: See subsection 14.2.4**

## **Semester II**

**MSP321 $\alpha$ : Advanced Group Theory (23 hrs) (Credit Value 1.5)**

Isomorphism Theorems, Series of groups, Sylow theorems, Applications of the Sylow theorem, Free groups.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP322 $\alpha$ : Real Analysis-IV (23 hrs) (Credit Value 1.5)**

**Implicit functions:** definition, derivative of implicit functions, Implicit function theorem

Jacobians, stationary values under subsidiary conditions . More on Integration on  $R^2$ : Green's theorem, Change of Variables in a double integral, Calculus of variation.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP323 $\beta$ : Complex Variables (30 lecture hrs + 15 tutorial hrs) - Same as MAT322 $\beta$**

**MSP324 $\alpha$ : Complex Analysis (23 hrs) (Credit Value 1.5)**

Review of elementary complex analysis topics from vector analysis: Morera's Theorem, Liouville's Theorem, Rouché's Theorem, Winding numbers, the generalized version of Cauchy's theorem, Morera's theorem, the fundamental theorem of algebra, the identity theorem, the Riemann sphere and Weierstrass-Casorati theorem, meromorphic functions, Rouché's theorem, integration by residues, Conformal mappings and its Physical applications.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3254 Measure Theory with Applications (60 hrs) (Credit Value 4)**

Borel - Algebra, Borel subsets, Lebesgue outer Measure, Lebesgue measurable subsets, Lebesgue measure, Lebesgue measurable functions. Properties that hold almost everywhere, Lebesgue Integral, Lebesgue integrable functions, Monotone Convergence Theorem, Dominated Convergence Theorem, Fatou's Lemma, Relation of Riemann and Lebesgue Integrals, Modes of convergence (topics are discussed with applications, for example, probability theory), Introduction to martingales.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3263: Regression Analysis (45 hrs) (Credit Value 3)**

**Introduction:** Regression and model building, use of regression, role of the computer.

**Simple Linear Regression:** simple linear regression model, least-square estimation of the parameters, hypothesis testing on the slope and intercept, interval estimation in simple linear regression, prediction of new observations, coefficient of determination, estimation by maximum likelihood.

**Multiple Linear Regression:** Multiple linear regression models, Estimation of the parameters, Hypothesis testing in multiple linear regression, Confidence interval in multiple regression, prediction of new observations, Multicollinearity.

**Model Adequacy Checking:** Residual analysis, Lack of fit of the regression model. Indicator Variables, Variable Selection and Model Building, Introduction to Nonlinear Regression, Introduction to Generalized Linear Models.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3274 Differential Geometry and Tensor Analysis (60 hrs) (Credit Value 4)**

Unit tangent vector, Principal normal, binormal vector and curvature of a curve, Serret-Frenet formula, surfaces, parametric curves, surfaces of revolution, metric, directional ratios and coefficients, Gauss and Mean curvature, Orthogonal trajectories, families of dual curves, Geodesics.

Transformation of coordinates, summation convention, the Kronecker-delta, contravariant and covariant vectors, contravariant, covariant and mixed tensors, symmetric and skew-

symmetric tensors, tensor algebra, metric tensor, conjugate metric tensor, Christoffel's symbols of first and second kind, covariant derivatives, Riemann and Ricci tensors.

Theory of Manifolds, Commutators or Lie Derivatives, Forms and Dual bases, The wedge product, Exterior and Covariant differentiation, First and Second Cartan equations, The Ricci Tensor and the Einstein Tensor.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3283 Special Topics in Statistics (eg. Multivariate Data Analysis) (45 hrs)**  
(Credit Value 3)

**Multivariate data and multivariate statistics:** Introduction, Types of data, Basic multivariate statistics, The aims of multivariate analysis.

**Exploring multivariate data graphically:** scatterplot, scatterplot matrix, checking distributional assumptions using probability plots.

Cluster analysis, Principal component analysis, Loglinear and logistic models for categorical multivariate data, Models for multivariate response models, discriminant analysis and factor analysis.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP3292: Applied Statistics III (30 hrs)** (Credit Value 2)

**One-Factor Experiments:** Analysis of Variance Techniques, One-Way ANOVA, Completely Randomized Design, Two-way ANOVA, Randomized Block Design.

**Chi-squared Tests:** Goodness of Fit Test, Categorical Data, Test for Independence, Test for Homogeneity,

**Nonparametric Tests:** Sign test, Signed-Rank test, Rank-Sum test, Kruskal-Wallis test, Runs test, Rank Correlation Coefficient.

**Applied Nonparametric Regression:** Introduction, Basic idea of smoothing, Smoothing techniques, Choosing the smoothing parameter.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

### 8.6.3 Course Units offered for B.Sc.(Honours) Degree in Mathematics - Level II

B.Sc. Honours Degree (Level II) - Semester I						
Code	Title	Contact Hours	Math & AM stream		Math & Stat Stream	
			Credits	Status	Credits	Status
MSP4114	Ring & Field Theory	60L	4	C	4	C
MSP4b26	Seminars and Research/ Study Project*	120	6	C	6	C
MSP4134	Functional Analysis	60L	4	C		
MSP4144	Time Series Analysis	60L			4	C
MSP4153	Statistical Laboratory	60L			3	C
MSP4164	Analytical and Numerical Methods for PDEs	60L	4	C		
Total minimum compulsory credits			18		17	

B.Sc. Honours Degree (Level II) - Semester II						
Code	Title	Contact Hours	Math &AM stream		Math & Stat Stream	
			Credits	Status	Credits	Status
MSP4214	Mathematical Foundations of Quantum Mechanics/Special Topics in Mathematical Physics (Eg. Classical & Quantum Information Theory)	60L	4	E		
MSP4224	Introduction to Stochastic Analysis	60L	4	E	4	E
MSP4234	Topics in Applied Mathematics-I (Eg. Dynamical Systems/ /Control Theory)	60L	4	E		
MSP4244	Topics in Applied Mathematics-II (Eg. Geo-mathematics/Relativity Theory/ Electro-magnetic Theory/ Computational Fluid Dynamics)	60L	4	E		
MSP4254	Special Topics in Applied Mathematics	60L	4	E	4	E
MSP4263	Design and Analysis of Experiments/ Operations Research	45L			3	E
MSP4273	Special Topics in Statistics, (Eg. Categorical Data Analysis/ Sampling Theory)	45L			3	E
MSP4283	Introduction to Stochastic Processes	45L			3	E
MSP4293	Medical statistics	45L			3	E
Total minimum compulsory credits			12		13	
$\beta$ : Credit value 2.5		C : Compulsory		O: Optional		
$\alpha$ : Credit value 1.5		E : Elective				
*Commences at the beginning of the Level II and runs throughout the year.						

### 8.6.4 Detailed Syllabus for B.Sc. Honours Degree in Mathematics - Level II

#### Semester I

#### MSP4114 Ring & Field Theory (60 hrs) (Credit Value 4)

**Ring and fields:** rings and fields, integral domain, characteristic of a ring, subrings and subfields, Ideals, maximal ideals and prime ideals. Homomorphisms and imbedding of rings,

**Isomorphism:** Quotient rings, homomorphism, imbedding of rings, more on ideals,

**Isomorphism theorems Euclidean and factorization domains:** Euclidean domains, prime and irreducible elements, polynomial rings, unique factorization domains.

**Extension fields:** Introduction to extension fields, algebraic extension, roots of polynomials, splitting fields, ruler and compass constructions, prime subfields, separable extension.

**Galois theory:** Normal extension, automorphism of field extension, fundamental theorem of Galois theory, Galoi's extension, finite fields.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

#### MSP4b26 Seminars and Research/Study Project-Mathematics/Statistics (Credit Value 6)

Every Honours degree student is required to conduct supervised investigation on a research topic assigned at the beginning of the Semester I and is required to submit a dissertation at



the end of the Semester II.

**Method of Evaluation:** (M1) Seminar/Presentation to defend

the Research Proposal (Semester I): Marks out of 100

(M2) Interim Progress Report/Presentation: Marks out of 100

(M3) Final Report, Oral Exam and Presentation: Marks out of 100

$$\text{Final Mark} = M1 \times 15\% + M2 \times 25\% + M3 \times 60\%$$

**MSP4134 Functional Analysis (60 hrs)** (*Credit Value 4*)

Metric Spaces, Limit and Continuity, Connectedness, Completeness and Compactness, Completion of Metric Spaces, Normed Vector Spaces, Normed Spaces, Finite Dimensional Normed Spaces, Linear Subspaces of Normed Spaces, Banach Spaces, Fundamental Theorems for Normed and Banach Spaces, Inner Product Spaces, Hilbert Spaces, Orthogonal Expansions, Separable Hilbert Spaces, Linear Operators and Functionals, Linear Transformations on Hilbert Spaces, Spectrum of a Linear Operators.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4144 Time Series Analysis (60 hrs)** (*Credit Value 4*)

Introduction to basic concepts of time series analysis such as auto-regression, moving averages, integration, ARIMA, autocorrelation, and trends and volatility.

Stationarity, testing for unit roots, and structural change different formulations of lags, and causality. Time series forecasting.

Time series modelling, such as multi-equation models, cointegration and error-correction models or/and Special topics in advanced time series analysis.

**Method of Evaluation: Continuous Assessments: 20%**

**Practical Examination: 20%**

**End of Semester Examination: 60%**

**MSP4153: Statistical Laboratory (60 hrs)** (*Credit Value 3*)

Analysing data with Computers using 'R' software package.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4164: Analytical and Numerical Methods for PDEs (60 hrs)** (*Credit Value 4*)

**Analytical methods for Partial Differential Equations:** Introduction to Elliptic, Parabolic and Hyperbolic PDEs, Initial and boundary value problems, Superposition Principle of solutions, Fourier series, Separation of variables, Homogeneous and non-homogeneous problems, Time dependent and independent non-homogeneous problems, Sturm-Liouville Systems, Eigenvalues and eigenfunctions, Finite Fourier Transforms and non-homogeneous problems, Problems in Infinite Spatial Domains, Fourier Transforms, Fourier Transforms method for PDEs, Laplace Transforms methods for PDEs.

**Numerical Methods for Partial Differential Equations:** Approximation of partial derivatives using finite differences, Finite-difference methods for parabolic, hyperbolic and elliptic equations, Heat equation, Wave equation and Poisson equation as examples, Convergence and Stability, Finite-element methods for PDEs in one dimensional space

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**  
**Semester II**

**MSP4214: Mathematical Foundations of Quantum Mechanics / Special Topics in Mathematical Physics (60 hrs)** (*Credit Value 4*) (This module shall be offered as a teaching module or a reading module.)

Physical background, Dynamics, Observables, The uncertainty principle, spectral theory, Scattering States, Special Cases (e.g. infinite well, potential well etc), Many-particle systems, density matrices, Survey of modern philosophy of quantum theory/quantum computing, Introduction to quantum information theory. Course contents of Special Topics in Applied Mathematics will depend on the availability of staff members.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4224: Introduction to Stochastic Analysis (60 hrs)** (*Credit Value 4*)

Prerequisites - MSP3254: Measure Theory with Applications

Basic Stochastic Processes, Brownian Motion Calculus. Stochastic Differential Equations, Diffusion Processes, Martingales, Calculus for Semimartingales, Pure Jump Processes, Change of Probability Measure, Applications in Finance, Biology, Engineering, Physics and other areas, computational solutions. Special topics in stochastic modelling.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4234: Topics in Applied Mathematics I (60 hrs)** (*Credit Value 4*)

(Eg. Dynamical Systems/Control Theory)

Course contents of Special Topics in Applied Mathematics will depend on the availability of staff members and shall be announced at the beginning of the academic year.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4244: Topics in Applied Mathematics II (60 hrs)** (*Credit Value 4*)

(Eg Geo-mathematics/Relativity Theory/ Electromagnetic Theory/Computational Fluid Dynamics)

Course contents of Special Topics in Applied Mathematics will depend on the availability of staff members and shall be announced at the beginning of the academic year.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4254: Special Topics in Applied Mathematics (60 hrs)** (*Credit Value 4*)

Course contents will depend on the availability of staff members and shall be announced at the beginning of the academic year.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4263: Design and Analysis of Experiments/Operations Research (45 hrs)** (*Credit Value 3*)

Introduction to the Design of Experiments, Analysis of Variance, One Factor Experiments, Randomized Complete Blocks, Latin Squares, Comparisons among treatments, Factorial

Experiments (Two or More Factors) , The  $2k$  factorial Experiments design, Confounding, Fractional Factorial Experiments, Higher Fractions and Screening Designs, Taguchi's Robust Parameter Design, Control and Noise Variables.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4273: Special Topics in Statistics (45 hrs) (Categorical Data Analysis (22.5 hrs) + Sampling Theory (22.5 hrs))** (*Credit Value 3*)

**Introduction to Distributions and Inference for Categorical Data:** Categorical response data, distributions for categorical data, statistical inference for categorical data.

**Describing Contingency Tables:** Probability structure for contingency tables, comparing two proportions, partial association in stratified  $2 \times 2$  tables, Extensions for  $I \times J$  tables.

**Inference for Contingency Tables:** Confidence intervals for association parameters, Testing independence in two-way contingency tables, two-way tables with ordered classifications, small-sample tests of independence.

**Logistic Regression:** Interpreting parameters in logistic regression, Inference for logistic regression, Multiple Logistic Regression, Fitting logistic regression models. Building and Applying Logistic Regression Models, Log-linear models for contingency tables and building of log-linear Models.

**Sample Survey:** Introduction, Sample versus complete enumeration, Planning and execution of sample surveys, Designing a questionnaire.

**Sampling Theory:** Probability and non-probability sampling, Formation of estimators, Biased estimators, Unbiased estimators, Precision of estimators, Confidence Intervals, Costs.

**Sampling Techniques:**

**Simple random sampling (SRS):** Introduction, estimation of population mean, total and proportion, selecting the sample size, comparing estimates, variances of estimates. confidence intervals for parameters.

**Stratified random sampling:** Introduction, formation of strata allocation of sample - proportional allocation, equal allocation, optimum allocation, Neymann allocation, estimation of population means, totals and proportions, variances of estimates. confidence intervals for parameters.

**Systematic sampling:** Introduction, linear and circular systematic samples, estimation of population mean, total and proportion, variances of estimates. confidence intervals for parameters.

**Cluster sampling:** Introduction, estimation of population mean and total of clusters of equal size.

**Two stage cluster sampling:** Introduction, estimation of population means, totals and proportions, variances of estimates. confidence intervals for parameters.

**Other sampling techniques:** Quota sampling, convenience sampling, purposive sampling.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4283: Introduction to Stochastic Processes (45 hrs)** (*Credit Value 3*)

Discrete and continuous Markov chains, point processes, random walks, branching processes and the analysis of their limiting behaviour. Renewal theory, Brownian motion, Gaussian processes and martingales.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

**MSP4293: Medical statistics (45 hrs)** (*Credit Value 3*)

**Clinical Trials:** Basic Concepts and designs: controlled and uncontrolled clinical trials, historical controls, protocol, placebo, randomization, blind and double blind trials, ethical issues. Multiplicity and meta-analysis: intern analysis, multi-center trials, combining trials. Cross over trials, Binary response data, Analysis of cohort and case-control studies

**Survival Data Analysis:**

**Basic concepts:** survival function, hazard function, censoring.

**Single sample methods:** life-tables, Kaplan-Meier survival curve, parametric models.

**Two sample methods:** log-rank test, parametric comparisons.

**Regression model:** inclusion of covariates, Cox's proportional hazards model, competing risks.

**Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%**

## 9 Department of Physics

The major commitment of the Department of Physics is to provide up to date Physics knowledge to undergraduate and graduate students through course work, practical classes, and research projects.

The department has facilities to offer B.Sc. General (three-year course) and B.Sc. Honours (four-year course) degrees for undergraduates, and research-based M.Phil. and Ph.D. Degrees for graduate students. At present Physics is offered as a subject to students in the Biology stream as well. In addition to standard Physics courses, the department offers optional course units in Electronics, Astronomy, Computational Physics and Miscellaneous Topics. Sufficient laboratory space (for 160 students in each level) including modern computerized laboratory experiments and computer facilities are available for teaching and research. The members of the staff conduct research in the areas of Semiconducting Materials, Experimental High Energy Physics, Ocean/Land Remote Sensing, Solar Energy Conversion Devices (Photovoltaic Cells and Photoelectrochemical Cells), Thin Films, Acoustics and Atmospheric Physics, Instrumentational Physics, Computational Physics, Astrophysics and Astronomy.

### 9.1 Research Areas

Senior academic staff members continue research in their fields of Specialization, which are indicated in the table under “Staff”. The Department has laboratory and computing facilities to carry out post-graduate studies leading to M.Phil. and Ph.D. Degrees. Current major research areas are:

- Semi-conducting materials
- High Energy Physics
- Electronic and ionic conductivity measurements of inorganic compounds
- Modeling of ocean optical properties
- Study coastal areas of Sri Lanka using remotely sensed and in-situ data
- Deposition of thin films including semiconducting thin films and studies of their properties (structure, optical and electronic properties etc.)
- Fabrication and characterization of CdS/CdTe Solar Cells
- Energy saving devices
- Acoustics (Noise and Noise Pollution, Acoustical Communication of animals)
- Lightning Physics
- Instrumentational Physics
- Semiconducting Nanostructures
- Astronomy
- Astrophysics
- Magnetic Resonance Imaging
- Astrobiology
- Robotics

## 9.2 Facilities in the Department

The department conducts several Physics experiments using computers. The computer laboratory is used for teaching general and Honours degree laboratory classes, optional courses and for research work.

A fully-fledged workshop is available in the department to facilitate development activities. The Ministry of Science and Technology has granted about Rs. 25 million to purchase several machinery required to establish the “Incubator cell” for the Southern Province which helps inventors in the Southern region (including university and school students) to develop prototypes of their inventions. The INNOTAL project which promotes student inventive capabilities has donated some equipment to develop students’ entrepreneurial skills.

## 9.3 Link Programmes

University of Ruhuna and CMS (Compact Muon Solenoid) collaboration have signed an Expression of Interest in the participation of physicists from the University of Ruhuna in the CMS experiment at the CERN (Organization for Nuclear Research) Large Hadron Collider (LHC) accelerator. Physicists in the department have involved in research in the CMS experiment in collaboration with the High Energy Physics group at Florida State University. Furthermore, the department expects to train graduate students in HEP at TIFR (Tata Institute of Fundamental Research) in India. Also the department has a collaborative research programme with Sivarathnam Laboratories Inc., Illinois, USA. The other partners of the programme are the Institutes of Fundamental Studies, Kandy and the Department of Physics, University of Jaffna.

## 9.4 Head of the Department

**Professor G. D. K. Mahanama**

B.Sc. (Ruhuna, S.L.), Ph.D.(London South Bank University, UK)

## 9.5 Members of the Academic Staff

Designation	Name	Specialization
<b>Professors</b>	Senior Professor W.G.D. Dharmaratna B.Sc. (P’deniya, S.L.) M.Sc., Ph.D. (Tufts, U.S.A.)	Theoretical Particle Physics, High Energy Physics Noise Pollution
	Professor (Mrs.) Kanthi K.A.S. Yapa B.Sc. (Kelaniya, S.L.) M.Sc., Ph.D. (Tufts, U.S.A.)	Bio Physics, Protein Folding Ocean Optics, Ocean Remote Sensing
	Professor G. D. K. Mahanama B.Sc. (Ruhuna, S.L.) Ph.D. (London South Bank University, UK)	Silicon Solar Cells; Low Temperature Processes of Crystalline Silicon Solar Cells
<b>Adjunct Professor</b>	Prof. Chandra N. Wickramasinghe B.Sc. (Colombo, SL), MA, PhD, ScD (Cantab), Hon DSc (Soka-Tokyo), Hon DSc (Ruhuna, SL) FRAS, FRSA, FINA, C Math	Astrophysics, Astrobiology Astrochemistry Panopermia
<b>Senior Lecturers</b>	Dr. K. P. S. Jayatilleke B.Sc. (Kelaniya, S.L.) M.Sc., Ph.D.(Cincinnati, U.S.A.)	Experimental Particle Physics Computational Physics
	Dr. J. A. P. Bodhika B.Sc. (Ruhuna, S.L.) M.Sc., Ph.D. (Colombo, S.L.)	Acoustics & Atmospheric Physics

Designation	Name	Specialization
	Mr. E. M. Ranatunga B.Sc. (Ruhuna, S.L.) M.Phil. (Ruhuna, S.L.) (Reading for Ph.D. at Ruhuna)	Instrumentational Physics
	Dr. H. A. D. S. D. Perera B.Sc.(Ruhuna,SL) M.Sc., Ph.D.(Cincinnati, U.S.A.)	Semiconducting Nano Wires, Heterostructures
	Dr. (Mrs.) N. M. Wickramage B.Sc. (Ruhuna, S.L.) Ph.D.(Ruhuna, S.L.)	Experimental High Energy Physics
	Dr. (Ms) N. T. Wickramasuriya B.Sc. (Ruhuna, S.L.) M.Sc., Ph.D.(Cincinnati, U.S.A.)	Characterization of Semiconductor Nanowires, Nanowire Device Fabrication
	Dr. W.M.K. De Silva B.Sc. (Ruhuna, S.L.) Ph.D.(Cincinnati, U.S.A.)	Magnetic Resonance Imaging
	Dr. K. V. S. Prasadh B.Sc. (Ruhuna, S.L.) M.Sc., Ph.D. (North Dakota, U.S.A)	Astronomy and Astrophysics
<b>Probationary Lecturers</b>	Mr. S. S. Abeywickrama B.Sc. (Ruhuna, S.L.) B.Tech.Eng. (OUSL) M.Sc. in Applied Electronics (University of Colombo) Reading for MPhil at University of Colombo	Electronics and Communication Engineering
	Mrs. K.M. Liyanage B.Sc. (Ruhuna, S.L.) Reading for PhD at CERN	Experimental High Energy Physics
	Mr. K.A.S. Lakshan B.Sc. (Colombo, S.L.)	

## 9.6 Course Units in Physics for B.Sc. (General) Degree

### B.Sc. Level I - Semester I

#### PHY1114: General Physics I (60 lecture hrs)

**Classical Mechanics I:** Particle Dynamics; Motion of a System of Particles; Conservation of Linear Momentum, Inertial and Non-inertial Frames of Reference, Rotation in Space, Conservation of Angular Momentum, Centrifugal and Coriolis Forces, Precession, Work-Energy; Conservative Forces, Equilibrium and Potential Energy, Bernoulli's Equation, Collisions and Reactions; Impulse, Center of Mass Reference Frame, Elastic and Inelastic Collisions and Their Conservation Laws, Reaction Threshold, Gravitation; Planetary Motion, Elasticity and Bending of Beams.

**Wave Motion and Acoustics Mechanical Systems:** Executing Simple Harmonic Motion; Wave Motion, Wave Propagation in Stretched Strings, Gases and Solids, Resonance Phenomena; Ear and Hearing; Intensity and Characteristics of Sound, Doppler Effect and Its Applications; Ultrasound, Shock Waves.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

#### PHY1b22: Elementary Physics Practical I (45 hrs × 2)

A three-hour laboratory class will be conducted in each week. A minimum of 12 distinct

relevant introductory experiments will be offered in each semester. Students are expected to submit a report for each experiment. The course runs through both semesters. Examination is held at the end of semester II.

**Evaluation methods:** Continuous Assessment: 25%, Practical Assessment Test: 10%, End Semester Examination : 65%

## **B.Sc. Level I - Semester II**

### **PHY1214: General Physics II (60 lecture hrs)**

**Electricity and Magnetism I :** Electrostatics, Electric Force, Electric Field, Gauss' Law, Electric Potential, Equipotential Surfaces, Electric Dipole, Capacitors, Dielectrics, Polarization, Susceptibility, Electric Energy Density, Electric Force on Charged Surfaces. Current Electricity; Electric Current, Drift Velocity, Conductivity, Network Theorems; Kirchhoff's Law, Maxwell's Cyclic Law, Superposition Theorem, Thevenin Theorem, Reciprocity Theorem, Delta( $\delta$ ) and Y Circuits. Magnetism; Magnetic Field, Biot-Savart Law, Ampere's Law, Gauss' Law, Lorentz Force, Force on a Current Element, EM Induction, Self and Mutual Induction, Transformers, Magnetic Materials, Magnetic Energy Density, Moving Coil Galvanometer and its Applications, DC and AC Circuits.

**Geometrical and Physical Optics:** Defects of Images, Dispersion, Principle of Superposition, Electromagnetic Wave Aspect of Light, Huygens Principle, Interference, Diffraction, Experimental Methods of Demonstrating Interference and Diffraction, Resolving Power, Polarization, Optics of Crystals, Lasers and their Applications, Holography, Fiber Optics

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

## **B.Sc. Level II - Semester I**

### **PHY2114: General Physics III (60 lecture hrs)**

**Thermal Physics:** Heat Transfer, Kinetic Theory of Gases, Real Gases, Equation of State, First and Second law of Thermodynamics, Heat Engines, Entropy, Enthalpy, Application of Principles of Thermodynamics to Special Systems, e.g. Latent Heat Equations, Specific Heats, Maxwell's Relations, Joule-Kelvin Effect, Liquefaction of Gases, Black Body Radiation.

**Classical Mechanics II:** Lagrangian Formulation, Lagrange's Equations and Their Application to Simple Systems, Small Oscillations, Coupled Oscillations and Normal Modes of Vibrations, Damped Vibrations, Forced Vibrations, Transient and Steady State Solutions. Motion Under a Central Force, Effective Potential.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

### **PHY2b22: General Physics Practical I (45 hrs x 2)**

A three-hour laboratory class will be conducted in each week. A minimum of 12 distinct relevant general experiments will be offered in each semester. Students are expected to submit a report for each experiment. The course runs through both semesters. Examination is held at the end of semester II.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

### **PHY2112: Electronics (30 lecture hrs)** *Op. (This course unit is a pre-requisite for those students who wish to follow the Honours Degree in Physics)*

Signals, Electronic Components, Voltage and Power Transfer, Semiconductors, Junction Diodes and their Characteristics, Rectifier Circuits, DC Power Suppliers, Smoothing Circuits, Filters, LED Display Circuits, Bipolar Junction Transistors, Transistor Characteristics



and Modes of Operations, Equivalent Circuits, Field Effect Transistors, Amplifiers; Tuned, Power and Feedback Amplifiers, Oscillators, Operational Amplifiers, Inverting and Non-inverting Amplifiers. Digital Electronics: Numerical representations, Binary Arithmetic, Use of Boolean Algebra, Logic Gates, Truth Tables, Combinational Logic Circuits, Sequential Logic Circuits, Flip-Flops and Their Simple Applications.

**Evaluation methods:** Continuous Assessment : 30%, EndSemester Examination : 70%

## **B.Sc. Level II - Semester II**

### **PHY2214: General Physics IV (60 lecture hrs)**

#### **Electricity and Magnetism II:**

Mathematical Formulation of Electrostatics, Magneto-statics and Electromagnetic Induction, Boundary Value Problems, Maxwell's Equations, Plane Electromagnetic Waves in Free Space.

#### **Atomic and Nuclear Physics:**

Quantum Theory of Radiation, Particle Properties of Light, Photoelectric and Compton Effects, Wave Properties of Material Particles, de Broglie Postulate and Its Experimental Verification, Rutherford Scattering, Structure of The Atom, Bohr Theory, Atomic Spectra, X-rays, X-ray Diffraction.

Radioactivity, Properties and Stability of Nuclei, Nuclear Reactions, Fission and Fusion, Nuclear Power, Structure of the Nucleus, Elementary Particles, Cosmic Rays, Quarks, Nuclear force, Applications in Medical Physics.

#### **Special Theory of Relativity:**

Galilean Transformation, Michelson-Morley Experiment, Einstein's Postulates, Lorentz Transformation, Length Contraction, Time Dilation and Twin Paradox, Velocity Transformation, Space-time Diagrams, Minkowski Space, Four Vectors and Tensors, Conservation of Four-Momentum, Relativistic Dynamics.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

### **PHY2222: Electronics Practical (45 hrs)** *Op. Prerequisite: PHY2112 (This course unit is a pre-requisite for those students who wish to follow the Honours Degree in Physics)*

A minimum of 12 distinct electronic experiments will be offered. In addition, a project relevant to electronics has to be completed. Examination is held at the end of semester II.

**Evaluation methods:** Continuous Assessment: 25%, Electronic Circuit Prototyping Modules: 25%, End Semester Examination: 50%

## **B.Sc. Level III - Semester I**

### **PHY3114: General Physics V (60 lecture hrs)**

**Quantum Mechanics:** Failures of Classical Physics, Heisenberg Uncertainty Principle, Schrodinger Equation, Probability Interpretation of The Wave Function, Solution of The Schrodinger Equation for Piecewise Constant Potentials, Operators, Expectation Values and Eigen Value Problems, Angular Momentum, Hydrogen Atom.

**Statistical Physics:** Basic Probability Concepts; Binomial, Gaussian and Poisson distributions, Canonical Ensemble, Partition Function, Maxwell velocity distribution, Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein Distributions and Their Applications to Simple Systems.

**Solid State Physics:** Introduction to Crystallography; Crystal Structures, Crystal Defects, X-ray Diffraction, Free and Nearly Free Electron Theories, Electron Specific Heat,

Band Theory of Solids, Metals, Semiconductors and Insulators, p-n Junction and Its Applications.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY3121: General Physics Practical II (45 hrs)**

A three-hour laboratory class will be conducted in each week. A minimum of 12 distinct relevant general experiments will be offered during semester I. Students are expected to submit a report for each experiment. Examination is held at the end of semester I.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**B.Sc. Level III - Semester II**

**PHY3232: Astronomy (30 lecture hrs)** *Optional*

**Solar System and Stars:** The Earth, The Moon and Planets, Other Bodies of The Solar System, Comets, Asteroids. Classification, Formation and Evolution of Stars, Red Giants, White Dwarfs, Neutron Stars, Pulsars, Binary Stars and Black Holes.

**Nature of The Universe:** The Milky Way Galaxy, The Interstellar Medium, Formation, Evolution and Classification of Galaxies, Radio Galaxies, Quasars, Cosmological Models, Big Bang Theory.

**Evaluation methods:** Quizzes: 10%, Continuous Assessment : 20%, Semester End Examination : 70%

**PHY3242: Computational Physics I (15 lecture hrs + 30 hrs of Computer Laboratory Classes)** *(Op. Prerequisite: C++/Java Programming Knowledge)*

Computer Arithmetic, Error and uncertainties in computation, Numerical differentiation: first order and second order derivatives, 2-point, 3-point and 5-point formulae; Numerical integration: Trapezoidal and Simpson's rules, composite and recursive formulae; Solving non-linear equations: Bisection, Newton's and Secant methods; Interpolation: Lagrange, linear, polynomial, divided difference and cubic spline interpolation, Neville algorithm, least square fitting, Goodness of fit estimator, Maximum likelihood method.

**Evaluation methods:** Continuous Assessment : 30%, End Practical Examination : 30%, End Semester Written Examination : 40%

**PHY3252: Special Topics in Physics (30 lecture hrs)** *Op. Prerequisite: Physics Core Courses*

Topics will vary depending on available resources and the topics will be announced at the beginning of the semester. Some possible topics: Medical Physics, Energy Technology, Renewable Energy (Solar, Wind, etc.), Particle Physics and Accelerators, Superconductors, Fibre Optics, Thin Films, Semiconductors, Satellite Remote Sensing, Atmospheric Physics and Nanotechnology.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY3262: Physics for Bioscience Students (30 lecture hrs)** *Op. Prerequisite A/L Physics*

Force and Motion, Linear and Angular Momentum and their Conservation, Forces in Equilibrium, Work and Energy, Conservation of Energy, Fluids; Pressure, Surface Tension, Viscosity, Fluids in Motion, Sound Waves and Hearing, Temperature and Heat, Electric Fields and Currents, Resistance, Capacitance, Dielectrics, Magnetic Fields and Induction, Light

and Optics and Vision, Nuclei and Particles, Radioactivity. (Emphasis will be given to applications of above concepts to biological systems).

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY3272: Computational Physics II (15 lecture hrs + 30 hrs of Computer Laboratory Classes)** *Op. Prerequisite: PHY3242*

Solving systems of linear Equations: Gaussian elimination, Triangular Factorization, Jacobi and Gauss-Seidel iterative methods; Numerical Solution to Ordinary Differential Equations: Euler, Euler-Cromer, Improved Euler, Taylor Series and Fourth order Runge-Kutta methods; Carlo methods: Uniform and non-uniform random number generation, evaluation of multi-dimensional integration, Random Walk, Simulation applications; Solution of partial differential equations: Heat, Wave and Laplace equations.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Practical Examination : 30%, Semester End Written Examination : 40%

**PHY3282: Microcontrollers and Applications. (15 Lecture hrs + 30 Electronic Laboratory Classes)** *Op. Prerequisite: PHY2112 and PHY2222*

Introduction to Microcontrollers, CISC and RISC Architectures, Microchip PIC Microcontrollers, Hardware Configuration, Memory Organization, Instruction Set, Assembly Language Programming, Programming Tools, Development Boards, I/O Ports, Basic I/O Programming, Software Delays, Lookup Tables, Interrupts Programming, Timers & Counters, Data Manipulating built-in EEPROM, Microcontrollers Programming in High Level Languages, A/D Conversion, D/A Conversions, Communications(USART Based serial communication ,, SPI and I2C), External EEPROMs, Interfacing the Sensors and Transducers, Keyboards, LCDs, PWM, Capture, Compare ,Sound Generating, Embedded System Development.

**The details of optional course units that are offered during each semester will be announced before registration period - please consult the Head of the Department before registration for any further clarification.**

**Evaluation methods:** Continuous Assessment: 25%, Group Project Report & Presentation: 25%, End Semester Examination: 50%

## 9.7 Course Units in Physics for B.Sc. (Honours) Degree

**PHY4014: Mathematical Methods for Physics (60 lecture hrs)**

Complex Variables, Analytic Functions, Residue Theorem, Contour Integration and Conformal Mapping, Special Functions, Legendre Polynomials and recursion relations, Bessel Functions, Hankel Functions, Hermit Polynomials, Orthogonal Properties, Partial Differential Equations and Boundary Value Problems, Laplace's Equation, Integral Transforms, Fourier Series, Fourier Transforms, Calculus of Variations, Euler-Lagrange Equations, Matrices, Eigen Value Problems, Integral Equations, Degenerate Kernel, Introduction to Group Theory.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY4024: Classical Mechanics & Special Relativity (60 lecture hrs)**

Lagrangian Formulation, Variational Principles, Hamilton's Equations, Small Oscillations, Rigid Dynamics, Hamilton-Jacobi Theory, Poisson Brackets, Introduction to Classical Theory of Fields, Relationship between Classical and Quantum Mechanics.

Space-Time, Lorentz Transformations, Velocity Transformations, Minkowski Space, 4-Vectors,

Relativistic Invariance, Propagation 4-Vector for waves, Relativistic Doppler Effect, Relativistic Dynamics, Conservation of 4-Momentum, Covariant Equation of Motion, Introduction to General Theory of Relativity.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

#### **PHY4034: Quantum Mechanics (60 lecture hrs)**

Failures of classical physics, Heisenberg Uncertainty Principle, Schrodinger Equation, Wave function, Piecewise Constant Potentials, Operators, Eigen values and Eigen functions, Angular momentum, Hydrogen Atom, Harmonic Oscillator, Electron Spin, Time Independent Perturbation Theory, Variational method, Matrix Formulation of Quantum Mechanics, Dirac Bra-Ket Notation, Transformation Theory, Pictures, Time-Dependent Perturbation Theory, Transition Probabilities, Laser Physics.

**Evaluation methods:** Continuous Assessment : 30%, EnSemester Examination : 70%

#### **PHY4044: Electromagnetic Theory (60 lecture hrs)**

Conservation of charge, Scalar and vector potentials, Lorentz condition, Wave equations, Maxwell's equations, Electromagnetic Waves in free space, in non conductors, in conductors and in low pressure ionized gases, Reflection of electromagnetic waves; Snell's law, Fresnel's equations, reflection at air/dielectric interface, reflection at air/good conductor interface, Reflection by an ionized gas, Wave guides; Modes of propagation, critical frequency, phase velocity, group velocity, Energy Transmission, Transmission lines; equation of telegraphy, characteristic impedance, current and voltage distribution, impedance matching, Electromagnetic Radiation; retarded potentials, electric and magnetic dipole radiation, antennas.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

#### **PHY4053: Special Physics Practical I (135 hours)**

Students are expected to submit a report for each experiment. Three hour practical examination will be held at the end of semester I.

**Evaluation methods:** Continuous Assessment and/or End Semester Examination

#### **PHY4063: Special Physics Practical II (135 hours)**

Students are expected to submit a report for each experiment. Three hour practical examination will be held at the end of semester II.

**Evaluation methods:** Continuous Assessment and/or End Semester Examination

#### **PHY4071: Practical Course Work**

All practical course work are evaluated under this course unit. Students are required to submit all course work at the end of each experiment completed.

#### **PHY4084: Nuclear and Particle Physics (60 lecture hrs)**

Properties of nuclei including size, shape, spin, electric and magnetic moments, The deuteron, Nuclear reactions; Q value; Threshold energy, The compound nucleus; Direct reactions, Stripping reactions, Nuclear models; Liquid drop model, Semi-empirical mass formula, Fission, alpha decay, beta decay, Shell model; energy of shells, angular momentum and magnetic dipole moment of the nucleus, Barrier penetration, Collective model.

Discovery of Particles; Electrons to quarks, Classification of Particles: Leptons, Mesons and Baryons, Interaction of Particles: Strong, Electromagnetic, Weak and Gravity, Symmetry and Conservation Laws: Energy, Linear Momentum, Total Angular Momentum ( $J = L+S$ ), Lepton number, Baryon Number, Isospin, Strangeness, Parity, Charge Conjugation, Time

reversal, CP and CPT.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY4094: Statistical Mechanics (60 lecture hrs.)**

Statistical description of systems of particles, Postulates of Statistical Mechanics, Probability calculations, Behavior of states, Interactions between macroscopic systems, Quasi-static process, Exact and inexact differentiations, Equilibrium conditions and constraints, Reversible and irreversible process, Thermal and general interactions between microscopic systems, Gibbs paradox, Equipartition theorem, Maxwell velocity distribution, Formation of statistical problem, Microcanonical and Canonical Ensembles, Grand Canonical Ensemble, Classical Ideal Gases; the Partition Function; Boltzmann, Fermi and Bose Distributions, Fermi and Bose Gases, Black body radiation.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY4104: Solid State Physics (60 lecture hrs.)**

Crystal Structure, Bravais Cells, Lattice Operations, Bragg Law, Miller indices, Reciprocal Lattice Vectors, Scattering Amplitude, Brillouin Zone, Thermal Properties of Solids, Lattice Vibrations and Phonons, Thermal Energy and Heat Capacity of Solids, Density of States, Debye Model, Electrons in Crystals, Fermi-Dirac Distribution, Fermi Energy, Electrical Conductivity, Semiconductors, Energy Gap, Conduction and Valence Bands, Direct and Indirect Photon Absorptions, Holes, Intrinsic Carrier Concentration, Donor and Acceptor Extrinsic semiconductors, Magnetic and Dielectric Materials, Optical Phenomena in Solids, Superconductivity, Meissner Effect, London's Equation, Coherence Length, Formation of Cooper pairs.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY4112: Electronics II (30 lecture hrs)**

Number systems and codes, BCD and ASCII codes. Designing of combinational logic circuits, Minimization of logic expressions using algebraic and Karnaugh map methods, Construction of a Full adder, Decoders, Encoders, Multiplexes, Demultiplexes, and their applications, Characteristics of TTL, ECL, PMOS, NMOS and CMOS gates, Open collector devices, Sequential logic circuits, Flip-Flops as a memory element, S-R, J, K, and Master-Slave Flip-Flops, D and T Flip-Flops, Applications of Flip-Flops, Asynchronous circuits, Registers, Shift registers, Serial and parallel data transfer (SISO, SIPO, PISO, and PIPO) Frequency division and counting, Asynchronous (ripple) counters, Counters with Mod numbers, Up counters, Down counters, Up/Down counters, IC Asynchronous counters, Digital arithmetic in the 2S complement system, Parallel binary adder, Complete parallel adder with registers,. Integrated Logic Circuits families, TTL series, Tristate TTL devices, Bus-oriented devices, MOSFET and CMOS series, Analysis and Synthesis of synchronous circuits, Memory systems, and Digital data communication.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY4124: Astronomy and Cosmology (60 lecture hrs)**

Astronomy: Stars, Energy Production in Stars, Classification of Stars and Black Holes, Multiple Star Systems, Star Clusters, Galaxies and their Classification, Active Galaxies, Groups, Clusters, and Superclusters of Galaxies. Cosmology: Issues in Cosmology, Cosmic Distance Scales, Expansion of the Universe, The Hubble Law, The Age of the Universe, Gravitation and the General Theory of Relativity, The Principle of Equivalence, The Geometry of the Universe, The Cosmological Principle, Solutions of the Einstein Equations, The Hot Big

Bang, The Cosmic Background Radiation, Matter in the Universe, Dark Matter, Dark Energy, Gamma-Ray Bursts, The Inflationary Universe, Growth of Large-Scale Structure, The Planck Era.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**PHY4132: Miscellaneous Topics I (30 lecture hrs)**

Topics (Eg: Remote sensing, Thin film deposition, Solar energy, Nanotechnology, Atmospheric Physics, Medical Physics etc.) will be announced at the beginning of each semester.

**Evaluation methods:** Continuous Assessment : 30%, Semester End Examination : 70%

**PHY4144: Miscellaneous Topics II (30 lecture hrs + 60 practical hours))**

Topics (Eg:, Computational physics) will be announced at the beginning of each semester.

**Evaluation methods:** Continuous Assessment : 30%, End Practical Examination : 30%, End Semester Written Examination : 40%

**PHY4151: Learning Skills**

Industrial practical training programmes and Honours degree student's seminars will be considered as general course assessments.

**PHY4166: Research Project**

Honours degree level II student's research projects (including project report and presentation). Projects are assigned at start of Level II. The report must be submitted by the end of the academic year.

**Assessment method:** Evaluation of the Dissertation, Presentation and viva voce at the end of semester-II

**PHY4173: Special Physics Practical III (135 hrs)**

Students are expected to submit a report for each experiment. Students' accumulated knowledge from theory and practical courses is tested in a three hour practical examination held at the end of semester I of Level II.

**Evaluation methods:** Continuous Assessment and/or End Semester Examination

**PHY4182: Special Physics Practical IV (90 hrs)**

Students accumulated knowledge from theory and practical courses is tested in a six hour practical examination held at the end of semester II of Level II.

**Evaluation methods:** Continuous Assessment and/or End Semester Examination

**PHY4192: Fundamentals of Engineering Workshop Practices (15 lecture hrs + 39 practical hours)**

Introduction to workshop practices: Historical background, conventional machining techniques, Safety measures: Safety equipment, safety measures to be incorporated inside the workshop, Metrology: Uses of devices such as calipers, micrometers, thread gauges, etc. for accurate and precise measurements, Machining: Introduction, Single and multi-point cutting tools, Tool geometry and tool materials, Lathe operations, drilling operation, Milling operations, shaping operation, Work holding devices, Welding: Introduction, Arc and gas welding, Welding equipment. Project: Operation of conventional machines to fabricate simple mechanical components and assemblies.

**Evaluation methods:** Continuous Assessment : 50%, End Semester Examination : 50%

## 10 Department of Zoology

The Department of Zoology conducts courses covering basic and applied fields of Zoology for undergraduate students registered for B. Sc. General Degree and B.Sc. Honours Degree programs. The department has following infrastructure facilities for undergraduate students: one lecture theatre, two elementary laboratories to cater about 120 students, and two research laboratories. The department has well equipped research laboratories, instrument room, animal house, and indoor/ outdoor fish-ponds and a computer room to facilitate full time or part time postgraduate studies leading to M. Phil and/or Ph.D. The department has academics Specialized in various fields including Aquatic Ecology, Fish Biology and Fisheries, Entomology, Environmental Science, Animal physiology, Genetics & Molecular Biology and Environmental Toxicology.

### 10.1 Research Areas

Current research activities of the department are in the following areas:

- Biodiversity of various groups of animals.
- Integrated Pest Management in vegetable crops in southern Sri Lanka.
- Tritrophic interaction of insect pests.
- Effects of entomopathogens on control of pests of vegetables.
- Phylogenetic relationships of various aquatic organisms in Sri Lanka.
- Effects of environmental pollutants (pesticides) on different groups of animals.
- Investigation of sperm maturation and storage in mammals (rats as a model).
- Assessment of water quality using bioindicators.
- Morphological and genetic markers in population differentiation of fish.
- Plant parasitic nematodes and their management.
- Toxicity assays and biological effects on fish.

### 10.2 Head of the Department

**Dr. W.A.H.P. Guruge**

B.Sc. (Ruhuna, SL), M.Sc. (Chiangmai, Thailand), Ph.D. (Ruhuna, SL) (until 23.11.2020)

**Prof. (Mrs.) D.H.N. Munasinghe**

B.Sc. (Ruhuna, SL), Ph.D. (Deakin, Australia) (From 24.11.2020 up to date)

### 10.3 Members of Academic Staff

Designation	Name	Specialization
Senior Professor	Prof. (Mrs.) N.J. De S. Amarasinghe B.Sc. (Colombo, SL) D. Sc. (Namur, Belgium) M. I. Biol., Chartered Biologist	Fish population dynamics & Fisheries, Limnology, Bioindicators of water quality
Chair Professor	Prof. (Mrs.) K.B.S. Gunawickrama B.Sc. (Ruhuna, SL) M.Phil. (Bergen, Norway) Ph.D. (Bergen, Norway)	Conservation Genetics, Biodiversity Research

Designation	Name	Specialization
<b>Professor</b>	Prof. (Mrs.) W.T.S.D. Premachandra B.Sc. (Ruhuna, SL) M.Sc. (Hanover, Germany) Ph.D. (Hanover, Germany)	Entomology, Plant Nematology, Entomopathogenic nematodes
	Prof. P.M.C.S. De Silva B.Sc. (Ruhuna, SL) M. Phil (Bergen, Norway) Ph.D. (Amsterdam, The Netherlands)	Environmental Toxicology
	Prof. (Mrs.) D.H.N. Munasinghe B.Sc. (Ruhuna, SL) Ph.D. (Deakin, Australia)	Fisheries and Molecular Genetics
	Prof. (Mrs.) M.P.K.S.K. de Silva B.Sc. (Kelaniya, SL) M.Sc. (Brussels, Belgium) Ph.D. (Ruhuna, SL)	Aquaculture, Fisheries Biology and Molecular Biology
<b>Associate Professor</b>	Prof. (Mrs.) H.C.E. Wegiriya B.Sc. (Kelaniya, SL) Ph.D. (Reading, UK)	Animal Biology, Entomology and Psychology
<b>Senior Lecturer</b>	Dr. W.A.H.P. Guruge B.Sc. (Ruhuna, SL) M.Sc. (Chiangmai, Thailand) Ph.D. (Ruhuna, SL)	Fish Biology, Environmental Risk Assessment
	Mrs. K.A.M. Sudarshanie B.Sc. (Ruhuna, SL) M.Phil. (Ruhuna, SL) M.Sc. (Bremen, Germany)	Entomology, Animal reproductive Biology, Aquatic Ecology
<b>Lecturer</b>	Dr. K.V. Sandun N. Bandara* B.Sc. (Kelaniya, SL) M.Sc. (CCU, Taiwan) Ph.D. (Kelaniya, SL)	Biodiversity and Conservation, Fish reproductive biology, Aquatic Ecology, Fisheries Ecology and Life history strategies
<b>Probationary Lecturer</b>	Mrs. W. P. S. N. Wijeweera B.Sc. (Ruhuna, SL)	Entomology
	Mr. W.M.C.D. Wijekoon B.Sc. (Ruhuna, SL) M.Phil. (Ruhuna, SL)	Entomology, Physiology
	Ms. K. G. D. D. Thilakarathne* B.Sc. (P'deniya, SL)	Wildlife and Conservation biology, Biodiversity and animal ecology, Malacology
	Mr. W.G.D. Chathuranga* B.Sc. (P'deniya, SL)	Ornithology, Veterinary Medical Entomology, Vector-borne & Zoonotic Diseases

\*Joined November 2020

## 10.4 Course Units in Zoology for B.Sc. (General) Degree

### B.Sc. Level I - Semester I

**ZOO1102: Core Zoology (30 Lecture hrs) Origin of life, Evolution, and Animal Cell Biology:** Theories of origin of life on earth; Chemical evolution; Origin of cellular organisms; Concept of evolution; Theories of evolution and evidence; Role of natural selection and variation; Patterns of evolution; Modern synthesis of evolution. Animal cell biology -



prokaryotic and eukaryotic organization; Structure, function and organization at subcellular level; Transmembrane transport processes; Cell division and cell cycle; DNA as the genetic material; Gene expression; Protein trafficking; Cancer; Integration of cells into tissues.

**Animal Histology and Development:** Tissues: covering epithelial tissues, glandular epithelia, nerve and muscle, connective tissues; Embryology: Oogenesis, Vitellogenesis, Fertilization; Cleavage; Cell movements; Gastrulation; Neurulation; Embryogenesis of a bird and a mammal.

**Evaluation methods:** Continuous Assessment : 20%, End Semester Examination : 80%

**ZOO1112: Invertebrate Diversity I (30 Lecture hrs)** Introduction to Taxonomy of animals; Geological time scale and evolutionary organization of animals; General classification of animals; Major phyla of Kingdom Animalia. Invertebrate diversity: General invertebrate features, morphological and functional diversity, ecological importance and evolutionary trends in phyla Protozoa, Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida and minor phyla.

**Evaluation methods:** Continuous Assessment : 20%, End Semester Examination : 80%

**ZOO1121: General Zoology Practical I (45 practical hrs)** Basic laboratory techniques in biology: microscopic methods, tissue preparation for light microscopy, different staining techniques; Study of the components of animal cells; Study of different types of tissues; Embryology of amphibians (frog) and birds (chick) and mammal/ rabbit; Invertebrates: taxonomy, morphology, functional adaptations, ecology and evolutionary trends of diverse examples in phyla Protozoa, Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida and minor phyla.

**Evaluation methods:** Continuous Assessment : 20%, End Semester Examination : 80%

## **B.Sc. Level I - Semester II**

**ZOO1202: Invertebrate Diversity II (30 Lecture hrs)** Taxonomy, morphology, biology, diversity, and ecological, economic/medical importance, and evolutionary trends in Phyla- Mollusca, Arthropoda, and Echinodermata; Origin & Evolution of chordates, protochordates.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO1212: Chordate Organization and Diversity (30 Lecture hrs)** Classification and diversity of vertebrates - Pisces: earliest fishes and adaptive radiation of modern fishes; Evolution of terrestrial vertebrates; Origin and radiation of tetrapods; Amphibia: as transitional stage of terrestrial vertebrates, Reptilia: origin and diversity and Specialization of reptiles; Endothermic vertebrates - Aves: origin and evolution of birds, flight mechanisms, ecology and behaviour of birds.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO1221: General Zoology Practical II (45 Practical hrs)** Taxonomy, morphology, biology, ecology, importance, adaptations and evolutionary trends of diverse examples in Phyla- Mollusca, Arthropoda, and Echinodermata; Study of evolution, diversity, functional adaptations, ecology and life habits of chordates: protochordates, early and modern fishes, amphibians, reptilians, aves.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

## B.Sc. Level II - Semester I

**ZOO2102: Mammalian Organization and Diversity (30 Lecture hrs)** Evolution and classification of mammals, Prototherian and metatherian mammals, adaptive radiation of eutherian mammals and their success, Diversity of major eutherian orders: Insectivora, Chiroptera (flying mammals), Carnivora, Proboscidea, ungulates, Primata; aquatic mammals; Ecology and sociality of terrestrial mammals, Continental Drift and distribution of fauna with special reference to the mammalian distribution.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO2112: Comparative Animal Physiology (30 Lecture hrs)** Homeostasis, Nervous system: structure and function; Sensory receptors and the basic mechanisms of action; Respiratory system and function; Circulatory system: structural components and function; Excretory system: structure and function; Muscular system: functional anatomy; Animal Nutrition: feeding, digestion and nutrition; Endocrinology: Function of other regulatory chemicals (Prostaglandins & Pheromones); Animal reproduction: reproductive systems and function, pregnancy and lactation, fetal and neonatal physiology.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO2121: General Zoology Practical III (45 practical hrs)** Diversity and characteristics of major mammalian groups and their functional adaptations; comparative animal physiology laboratory exercises: analysis of digestive enzymes in vertebrates; action of nerve and muscle coordination using frog models, features of muscular activity - cardiac muscle & smooth muscles; circulatory system: constituents of blood and hematological analysis; respiration: Human Oxygen Consumption Levels; analysis of excretory products; mammalian reproductive systems and function, control methods of human reproduction (contraception).

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO2142: Conservation and Management of Biological Resources (20 Lecture hrs, 20 practical hrs)** *Optional/ Open for all students; a prerequisite for Honours degree students in Zoology*

Introduction to Biological Resources (BR) & biodiversity; Species diversity; Genetic diversity; Ecosystem diversity; Ecological perspective of biodiversity: Alpha, Beta and Gamma diversity; Diversity and area relationships; BR diversity patterns; Determinants of BR diversity patterns: environmental factors, speciation and extinction, geographical factors, endemism and correlations; Importance of BR, significant causes for loss of BR, Loss of BR in Sri Lanka, Impact of the loss of concepts of conservation and management; Biological resources; Management of protected natural areas; IUCN functional categories of protected areas, management of rare and endangered species: introduction, re-introduction, translocation; In-situ conservation, captive breeding.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO2152: Evolution and Zoogeography (20 Lecture hrs, 15 practical hrs)** *Optional/ Open for Biology students*

Process of evolution and factors responsible for it; Zoogeography and factors responsible for distribution of fauna: historical and vicariance events, glaciations, long distance dispersal, extinction and speciation; Phylogeography and cladistic approach; Ecological zoogeography and eco-geography rules; Pattern of faunal distribution: cosmopolitan, provincialism, endemism and disjunct distribution; Reconstructing fauna distribution pattern using morphological, genetic and fossil data; Faunal distribution in Sri Lanka with Special reference

to Western Ghats region.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

## **B.Sc. Level II - Semester II**

**ZOO2202: Human Biology & Genetics (30 Lecture hrs)** Origin and evolution of humans, human anatomy and uniqueness of man, human races and their variability and adaptability, cultural evolution, human behaviour; man and the environment: human impact on the environment and health hazards, interaction between microbes and man.

Mendelian and non-mendelian inheritance; Interaction of genes; Multiple allele inheritance: human blood groups; Lethal genes; Holandric inheritance; Genetic balance theory; Mutations; Extrachromosomal inheritance; Population genetics; Genetic engineering; Molecular genetics; Genetic basis of various human genetic disorders.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO2212: Animal Ecology (30 Lecture hrs)** **Population and community ecology:** Introduction to population ecology, population growth and size; Population growth curves; Survivorship curves; Life table analysis; Population regulation; Intraspecific and interspecific competition; Methods of population estimation. Introduction to community ecology: aquatic, coastal, and wetland communities; Niche theory; Diversity indices; Species distribution; Island biogeography

**Ecosystem structure and function:** Ecosystem structure; terrestrial ecology, freshwater ecology, estuarine ecology, shore ecology; Functionary units of ecosystems, Biogeochemical cycles (gaseous type, sedimentary type), Human influences on biogeochemical cycles (green house effects, acid rains, air pollution, ozone depletion); Energy flow in different ecosystems, trophic structure.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO2221: General Zoology Practical IV (45 practical hrs)** Study of human anatomy and other unique features of man, human races and their variability and adaptability; Population genetic problems; Population growth and size, Life table analysis, Intraspecific and interspecific competition; Different sampling techniques used in population estimations; Field and laboratory exercises related to aquatic communities: freshwater communities, coastal communities - shore and estuaries, wetland communities; Niche theory, diversity indices.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO2232: Research Methodology (20 Lecture, 20 practical hrs)** *Optional/Open for all students*

Introduction to scientific research methodology - terminologies and overview of the scientific method; Types of scientific research methods; Steps of the scientific method - Problem identification; Literature search for background knowledge; Formulation of hypotheses and defining objectives; Different types of experimentation; Methods of data collection, processing, and presentation; Analysis of data and importance of statistical methods for testing hypotheses; Interpretation of results and drawing conclusions; Dissemination of results and importance of technical writing; Problem of plagiarism; IMRAD format for scientific writing; Critical appraisal of research papers; Ethical considerations in research.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO2262: Molecular Genetics & Biotechnology (20 Lecture hrs, 20 practical hrs)** *Optional/ Open for Biology students; a prerequisite for Honours degree students*

Molecular properties of genes and genome structure; Traits and genetic variation; Molecular tools and their use in individual and population genetic analysis, Applications of protein and DNA markers in various fields: agriculture, conservation and management of biological resources, forensic and parentage testing; Molecular diagnosis of human diseases; **Biotechnology:** Recombinant DNA technology; Genetic engineering for human benefit: pharmaceutical farming, gene therapy; Genetically modified organisms; Animal cloning; Ethics, policies and regulations in biotechnology; Biotechnology industry and research in the world and Sri Lanka, Laboratory exercises on various genetics markers and use of bioinformatics. **Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**B.Sc. Level III**

According to the rules and regulations stipulated by the UGC, Department of Zoology also requires minimum of 24 credits obtained by a student during the period of three years. To fulfill this requirement all students following Zoology as a subject should offer course units amounting at least to four credits in the third year.

**B.Sc. Level III - Semester I**

**ZOO3112: Basic Entomology (20 Lecture hrs, 20 Practical hrs)** *Optional/ Open for Biology students*

Insects and the environment; Insect morphology and classification; Structural diversity of insects related to their modes of life; Morphological adaptations of insects; Basic physiological adaptations of insects: development, nutritional biology, insect behaviour; Insect ecology: Insect diversity and the tropic relationships; Role of insects in ecosystems; Sampling techniques for terrestrial and aquatic insects; Collecting and preserving insects for taxonomic studies.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3122: Applied Entomology (20 Lecture hrs, 20 Practical hrs)** *Optional/ Open for Biology students*

Concepts of Applied Entomology, Identification of insect pests; Parasites and predators of major insect pests of agricultural and medical importance; Criteria for determination of pest status; Major insect pests of rice, coconut, tea, vegetables, fruits and stored products and their management strategies: Commercial utilization of insects: apiculture and sericulture; medically important insects, vector biology, management strategies of insect vector borne diseases.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3133: Wetlands & Aquatic Ecosystems (30 Lecture hrs, 30 Practical hrs)** *Optional/ Open for Biology students*

Hydrosphere and major types of aquatic ecosystems, Water as a medium of life' Physico-chemical and biological properties of water, Freshwater ecosystems; classification; characteristics of lotic and lentic ecosystems; Biota of lakes and rivers; energy flow in lotic ecosystem (River continuum concept), Marine and coastal ecosystems; salient features of marine ecosystems; Life zones of oceans; Shore Ecology, Biota of oceans; Coastal zone and coastal habitats; Classification, formation and characteristics of estuaries and lagoons; Biota of estuaries and lagoons, threats to aquatic ecosystems and their conservation, Definition, Introduction and

classification of wetlands; RAMSAR convention and IUCN wetland categories; Wetland dynamics and hydrology, Evolution of wetlands and succession, Uses, functions and attributes; Wetlands in Sri Lanka, Wetland management strategies, Problems in wetland conservation.  
**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3152: Parasitology (20 Lecture hrs, 20 Practical hrs)** *Optional/ Open for Biology students*

Introduction to parasitism and other animal associations; Parasitism in animals; Morphology, biology, pathogenicity and control of widely known parasites of human importance and of livestock: Protozoan parasites, Helminth parasites (flukes, tapeworms and Nematodes), Parasitic arthropods; Arthropod parasites with respect to vector-borne diseases, Plant parasitic Nematodes, Parasites of fishes and crustacean of economic importance; Immunity to parasites.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3162: Immunology (20 Lecture hrs, 20 Practical hrs)** *Optional/ Open for Biology students*

Self and non-self; Innate immunity; Acquired immunity: T lymphocytes and B lymphocytes, antigen presenting cells; Humoral immunity, cell mediated immunity, lymphoid organs, clonal selection theory, antigens and immunogens; Antibodies: structure, classes and function; Isotype switching; Biology of the B lymphocyte; Antibody secretion; MHC class I and II molecules; Antigen processing and presentation by APCs; Biology of the T lymphocyte; T cell differentiation; B and T cell activation by antigen, MHC-restriction of T cell responses, cytokines, cytotoxic T cells, apoptosis, agglutination, opsonization, ADCC, the complement system, immunization, vaccination, primary and secondary immune responses, immunological memory, hypersensitivity reactions, autoimmunity; Immunological methods.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3172: Ornithology (20 Lecture hrs, 20 Practical hrs)** *Optional/ Open for all students*

Introduction; Bird flight mechanisms and adaptive features; Anatomy and physiology of birds: food, feeding and digestion, circulatory and respiratory systems, energy balance and thermoregulation, brain and senses; Vocal communication; Territorial and colonial behavior; Mating systems; Avian reproduction - nesting, incubation, hatching and parental care, bird migration; Basic identification characters of birds; Birds of Sri Lanka; Avifaunal zones of Sri Lanka; Endemic, indigenous and migratory birds; Significance of the location of Sri Lanka for birds migration; Habitat-oriented birds' distribution; Ecological relationship of habitats and availability of resources; Nests of birds and nest ecology; Conservation practices; Classification of birds.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3182: Animal Behaviour (20 Lecture hrs, 20 Practical hrs)** *Optional/ Open for all students*

Introduction and Course Overview: The Science of Animal Behavior (Historical Pathways) : Ethology: Historical Background: Ethologists and their Work: Animal Behavior (An Evolutionary Approach): Ethological Concepts (Stimulus-Response Concept, Reflexes, Motivation or Drive): Patterns of Behavior (Feeding, Predation, Agonistic, Dominance hierarchies, Reproduction, Epimeletic Behavior, Social Behavior: Learning, Habituation, Classical; Conditioning, Imprinting, Rhythmic Behavior and Biological Clocks): The Behaviour Diversity

(Instincts and learning: Kin Discrimination: Special Features of all Forms of Learning: Biased Learning): Methods of Studying Behavior: Genes, Genetics and Behavior: Brain Nerve Cells and Behavior: Communication Among Animals: Orientation: Migration: Social Organization in Primates: Human Behavior: Animal Behavior and Wild Life Management.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3192: Biological Psychology I (25 Lecture hrs, 10 Practical hrs)** *Optional/ Open for all students*

Biological and other psychological theories, fields in Psychology, Mind- Brain relationship, Human behaviour; biology, genetics and evolution, Nerve cells and nerve impulses, Synapses and hormones, Hormones and behaviour, development and plasticity of brain, sensory systems and perception, Rhythms of wakefulness and sleep, biological clocks, Regulation of internal body state, Temperature, taste and hunger regulation.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**B.Sc. Level III - Semester II**

**ZOO3202: Biological Psychology II (25 Lecture hrs, 10 Practical hrs)** *Optional/ Open for all students.*

Emotional behaviours; stress and health, abnormal behaviours, mood disorders and Psychotic disorders and therapies, Human psycho A social development; prenatal, postnatal, infantile, childhood, adolescence, Biology of learning and memory; learning theories, Personality theories, counselling skills and techniques.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3211: Bioethics (15 Lecture hrs)** *Optional/ Open for all students*

Ethical theories, Ethical principles in different societies, Bioethics and ethics of science and technology, Environmental ethics, Neurosciences, Genetics and Social ethics, Professional ethics.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3223: Fisheries & Aquaculture (30 Lecture hrs, 30 Practical hrs)** *Optional/ Open for Biology students*

**Trends in fisheries:** Marine and inland fisheries (Global & Sri Lankan trends), Fishing gears and usage, Fish population dynamics A age, growth and mortality of fish; Principles of aquaculture; Aquaculture systems & farming strategies; Site selection, Infra structure facilities; Feeding & nutrition; Fish fecundity and Induced breeding; Shellfish culture, Culture of molluscs and shrimps; Impact of aquaculture on environment; Health Management in aquaculture.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3232: Principles of Pest Management (20 Lecture hrs, 20 Practical hrs)** *Optional/ Open for Biology students*

Host plant interaction; Concept of pest; Insect pests of vegetables, rice, coconut, tea and stored products; Pathogens, parasitic nematodes and weeds of agriculture importance; Pest Management strategies: cultural, biological, physical, chemical methods and genetically resistant cultivars and biopesticides; Concept of Integrated Pest Management (IPM).

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3252: Environmental Impact Assessment (20 Lecture hours, 20 Practical hours)** *Optional/ Open for all students*

Definition and objectives of an EIA; Authorities/persons involved in an EIA; Important principles in managing an EIA; Component/process of an International EIA; EIA procedures in Sri Lanka; Project cycle and place of EIA in project cycle; Sequential stages of EIA; Methods used in EIA; Assessor's tools; Desirable properties of EIA methods; Resources available to the assessor; A conceptual framework for an EIA; Types of projects requiring EIA's in Sri Lanka.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3272: Environmental Pollution and Toxicology (20 Lecture hrs, 20 Practical hrs)** *Optional/ Open for all students*

Introduction: pollution and pollutants; Types and properties of pollutants; Sources of pollution: agricultural and industrial practices, solid waste; Eutrophication; Air pollution; Water pollution; Pollution of oceans: waste dumping, oil spills, heavy metals, synthetic organic chemicals; Monitoring of environmental pollution; Effects of pollution on ecosystem: habitat destruction, atmospheric changes - ozone layer depletion, global warming, acid rains; Environmental Toxicology: effects of pollution on animals and humans, bioaccumulation, xenobiotics and biotransformation of xenobiotics, mechanisms of toxin action, genotoxicity.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO3292: Human Health (25 Lecture hrs, 10 Practical hrs)** *Optional/ Open for all students*

Elements of human health, Physical health, mental health and social health, factors which affect human health, Human diseases and disorders, Human growth and psycho-social development, nutritional and reproductive health, occupational and environmental health problems, challenges for well being and protection.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

## **10.5 Course Units in Zoology for B.Sc. (Honours) Degree**

Students are advised to follow relevant course units conducted in B. Sc. General Degree Level III.

**ZOO4013: Entomology (30 Lecture hrs, 30 Practical hrs)** Insect taxonomy, morphology and physiology; Morphological and functional adaptations of insects; Insect Behaviour; Insect Ecology; Insect diversity and the tropic relationship; Major insect groups of agricultural, medical and veterinary importance; Biology of beneficial insects.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4023: Parasitology (30 Lecture hrs, 30 Practical hrs)** Animal associations; Parasitism; Parasites on human, livestock, fishes and crustaceans of economic importance; Arthropod parasites and vector borne diseases; Parasites of Plant parasites; Nutrition, adaptations and host specificity of parasites; Parasitic transmission; Parasitic zoonoses.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4034: Ecosystem Structure and Function (45 Lecture hrs, 30 Practical hrs)**  
**Terrestrial and aerial ecosystems:** Composition and structure of the terrestrial and

aerial ecosystems; Atmospheric circulations, air pollution, green house effects, global warming, ozone depletion & acid rains, quality indices of the air; Soil and its contents, soil organisms and their importance to the environment; Drivers that affect on the transformation of terrestrial ecosystems; Impact of transformation of terrestrial ecosystems, urbanization, agriculture, industrialization, etc.

**Freshwater, brackish water and marine ecosystems:** Energy flow and community structure in aquatic ecosystems; Primary productivity in oceans further; Adaptations of various life forms in aquatic habitats; Marine resources; Anthropogenic impacts on ecosystems.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4051: Practical Course in Invertebrate Biology (45 Practical hrs)** Comparative study on the external morphology, internal anatomy, diversity and evolutionary trends in invertebrate fauna.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4061: Laboratory Techniques in Biology I (45 Practical hrs)** Principles of staining techniques; Automated tissue processing & staining; Types of Microscopes and Staging; Micrometry; Taxidermy; Transparency techniques; Skeleton preparation; Slide preparation; Animal embryo preparation; Animal breeding techniques.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4073: Animal Behaviour (30 Lecture hrs, 30 Practical hrs)** Sexual selection and mating systems; Parental Care; Group Living: Costs and Benefits; Dominance; Territoriality. Communication among animals: mechanisms; Conflict and game theory in animal behaviour; Genes, Genetics and Behaviour: Neural circuits and behaviour Laboratory and field methods in animal behaviour; Animal behaviour and animal management (Domestic and Wild Life).

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4083: Ornithology (30 Lecture hrs, 30 Practical hrs)** Anatomy and physiology of birds: Food and feeding, Bird flight mechanisms and adaptive features, Avian reproduction: Reproductive behaviour, nesting, incubation, hatching and parental care, Classification of birds, Birds of Sri Lanka, Avifaunal zones, Indigenous and migratory birds, Bird conservation and Management.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4092: Conservation and Management of Biological Resources (20 Lecture hrs, 20 Practical hrs)** Conservation practices of threatened animals-turtles & Whales; Human-elephant conflict in Sri Lanka and mitigation measures; Applications of traditional knowledge in biodiversity conservation; Eco-tourism; Issues of biopiracy and bio-prospecting related to biodiversity conservation.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4103: Animal Pathology/ Immunology (30 Lecture hrs, 30 Practical hrs)** Micro organisms and man; Infectious diseases of man and livestock: Dynamics and modes of transmission, Susceptibility and host defences to infectious disease; Introduction to immunology: Innate and acquired immunity; Structure and function of immune system: Antibody structure and function, Humoral and cellular immunity; Parasitic adaptations to avoid the



immune system, vaccines and vaccination.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4121: Practical Course in Vertebrate Biology (45 Practical hrs)** Comparative study on the morphology and diversity and evolutionary trends in vertebrate fauna Study on laboratory techniques in vertebrate anatomy; Comparative study on the structure and functions of major organ systems of animals with Special reference to man.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4133: Subject Specialization (30 Lecture hrs, 30 Practical hrs)** Students who are following Zoology Honours Degree should select a discipline on their choice (eg: Molecular Biology, Environmental Science, Entomology, Parasitology, Nematology, etc.) to gain further knowledge in that particular field. Fields available for Specialization may change in each academic year; Field of Specializations for such selection will be granted on the availability of staff Specialized on said field.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4144: Molecular Biology and Genetics (45 Lecture hrs, 30 Practical hrs)** Genome organization; Structure of DNA molecule; Prokaryotic and eukaryotic gene organization- operons and interrupted genes; RNA types and structures, gene duplication and pseudo-genes; non-genic DNA elements, tandem and non-tandem repeats, transposable elements; nuclear genome and cytoplasmic genomes. Prokaryote and Eukaryote gene expression and transcription, Molecular basis of Protein synthesis, Regulation of Prokaryote and Eukaryote Gene expression, Post translational processes of proteins, protein trafficking. Recombinant DNA and stem cell technology and its applications, Genome projects. Molecular genetic techniques and their applications; DNA and protein markers, bioinformatics and its applications in molecular genetic studies, industrial applications of biotechnology, regulations and policies.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4152: Evolutionary Biogeography (20 Lecture hrs, 20 Practical hrs)** Basic concepts of Biogeography, Ecological and historical biogeography, Evolutionary biogeography; Biogeographic components; Zoogeography and Phytogeography, Cladistics and panbiogeography, areas of endemism ; Testing relationships among biotic components: morphological, paleontological and genetic approaches; Regionalization: realms, provinces, transition zones and biogeographic lines; Relevant case studies.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4164: Conservation and Management of Environment (45 Lecture hrs, 30 Practical hrs)** Management and conservation of terrestrial ecosystem - factors affecting degradation of terrestrial ecosystem, mitigations and remedies to restore degraded terrestrial habitats; Management and conservation of aquatic ecosystems; Watershed as a functional unit, watershed management, Human impacts on aquatic ecosystems, Classification and significance of wetlands Wetland management and conservation; Environmental Impact Assessment (EIA).

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4172: Selected Topics in Biology (Self Learning; Equivalent to 30 hrs)** Topics are given to ameliorate the knowledge of students in different study areas of Zoology,

and to assess their essay writing abilities (Each student should write and submit three essays as continuous assessment which equals to 30% of the final grade).

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4184: Statistics and Computation (45 Lecture hrs, 30 Practical hrs)** Introduction to statistics; Descriptive statistics; Binomial and Poisson distribution; Normal distribution, Application of normal distribution, Normal distribution of means and t- distribution, Hypothesis testing, Experimental designs, Regression, Multiple regression, F-tests, Analysis of variance, Factorial experiments, Use of computers for statistical analysis.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4192: Animal Rearing (Terrestrial) (20 Lecture hrs, 20 Practical hrs)** Rearing animals for pleasure, recreation activities and experimental purposes; Animal rearing techniques, Invertebrates and vertebrates of commercial value, breeding techniques, Impacts of commercial animal rearing on the environment, rearing animals for conservation.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4203: Fisheries Biology and Aquaculture (40 Lecture hrs, 21 Practical hrs + field visits)** Fishery resource management; Fish population dynamics; Fishing gears; Fish nutrition; Fish health management; Principals of aquaculture; Shellfish culture; aquaculture design processes; Impacts of aquaculture.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4213: Principles of Pest Management (30 Lecture hrs, 30 Practical hrs)** Concept of pest; Criteria for determination of pest status, Insect pests and other animal pests of agriculture importance, Pest Management strategies: cultural, biological, physical and chemical methods of pest control; Agrochemicals and their environmental impacts; Principles of Integrated Pest Management (IPM); Designing of IPM for selected Agro ecosystems.

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4221: Laboratory Techniques in Biology II (45 Practical hrs)** Analysis of geospatial data; Advance techniques used in ecological surveys; Calibration and cleaning of scientific equipment; Preparation of stock solutions, dilution series and pipetting; Advanced microbiological techniques; Nutrient analysis in samples (Lipids, carbohydrates, proteins and enzymes); Study the principles and usage of Analytical instruments (hematology analyzer, chromatography, ICP-MS, HPLC, GC-MS, FT-IR and XFR).

**Evaluation methods:** Continuous Assessment : 30%, End Semester Examination : 70%

**ZOO4236: Research Project** Each student will be required to conduct a research project related to his/her field of Specialization and complete within one semester. The candidate must submit the results as a dissertation and present a seminar.

**Evaluation methods:** Defend the research proposal : 15%, Seminar presentations : 25%, Thesis : 60%

**ZOO4242: Assessment of Key Skills** A student has to present a minimum of four seminars (45 minutes duration each) on given topics. Senior academics of the department will evaluate presentation and communication skills of the presenter and marks will be given accordingly. Teams of students are required to carry out investigations in field and/or laboratory either in the University or any other recognized institutions and should present

their teamwork as standard scientific reports. On the basis of these reports, teamwork, analytical ability, originality and other key skills of the students will be assessed.

**Evaluation methods:** Continuous Assessment : 100%

## 10.6 Credit Values

### 10.6.1 B.Sc. General Degree

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
ZOO1102: Core Zoology	30		2		2
ZOO1112: Invertebrate Diversity I	30		2		2
ZOO1121: General Zoology Practical I		45		1	1
ZOO1202: Invertebrate Diversity II	30		2		2
ZOO1212: Chordate Organization and Diversity	30		2		2
ZOO1221: General Zoology Practical II		45		1	1
ZOO2102: Mammalian Organization and Diversity	30		2		2
ZOO2112: Comparative Animal Physiology	30		2		2
ZOO2121: General Zoology Practical III		45		1	1
ZOO2142: Conservation and Management of Biological Resources	20	20	1.3	0.7	2
ZOO2152: Evolution and Zoogeography	20	20	1.3	0.7	2
ZOO2202: Human Biology & Genetics	30		2		2
ZOO2212: Animal Ecology	30		2		2
ZOO2221: General Zoology Practical IV		45		1	1
ZOO2232: Research Methodology	20	20	1.3	0.7	2
ZOO2262: Molecular Genetics & Biotechnology	20	20	1.3	0.7	2
ZOO3112: Basic Entomology	20	20	1.3	0.7	2
ZOO3122: Applied Entomology	20	20	1.3	0.7	2
ZOO3133: Wetlands & Aquatic Ecosystem	30	30	2	1	3
ZOO3152: Parasitology	20	20	1.3	0.7	2
ZOO3162: Immunology	20	20	1.3	0.7	2
ZOO3172: Ornithology	20	20	1.3	0.7	2
ZOO3182: Animal Behaviour	20	20	1.3	0.7	2
ZOO3192: Biological Psychology I	25	10	1.7	0.3	2
ZOO3202: Biological Psychology II	25	10	1.7	0.3	2
ZOO3211: Bioethics	15		1		1
ZOO3223: Fisheries & Aquaculture	30	30	2	1	3
ZOO3232: Principles of Pest Management	20	20	1.3	0.7	2
ZOO3252: Environmental Impact Assessment	20	20	1.3	0.7	2
ZOO3272: Environmental Pollution & Toxicology	20	20	1.3	0.7	2
ZOO3292: Human Health	25	10	1.7	0.3	2

### 10.6.2 B.Sc. Honours Degree

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
ZOO4013: Entomology	30	30	2	1	3
ZOO4023: Parasitology	30	30	2	1	3
ZOO4034: Ecosystem Structure & Function	45	30	3	1	4
ZOO4051: Practical Course in Invertebrate Biology		45		1	1
ZOO4061: Laboratory Techniques in Biology I		45		1	1
ZOO4073: Animal Behaviour	30	30	2	1	3
ZOO4083: Ornithology	30	30	2	1	3
ZOO4092: Conservation and Management of Biological Resources	20	20	1.3	0.7	2

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
ZOO4103: Animal Pathology/ Immunology	30	30	2	1	3
ZOO4121: Practical Course in Vertebrate Biology		45		1	1
ZOO4133: Subject Specialization	30	30	2	1	3
ZOO4144: Molecular Biology and Genetics	45	30	3	1	4
ZOO4152: Evolutionary Biogeography	20	20	1.3	0.7	2
ZOO4164: Conservation and Management of Environment	45	30	3	1	4
ZOO4172: Selected Topics in Biology	30		2		2
ZOO4184: Statistics and Computation	45	30	3	1	4
ZOO4192: Animal Rearing (Terrestrial)	20	20	1.3	0.7	2
ZOO4203: Fisheries Biology & Aquaculture	40	21	2	1	3
ZOO4213: Principles of Pest Management	30	30	2	1	3
ZOO4221: Laboratory Techniques in Biology II		45		1	1
ZOO4236: Research Project					6
ZOO4242: Assessment of Key Skills					2
Total number of credits					60

## 11 Optional Course Units (or FSCs) offered by the Faculty

The undergraduate programme in the Faculty of Science comprises of a large number of course units offered by individual departments. In addition to the course units under the subject areas, several other course units from different disciplines (for example management, sports, personnel development etc.) are also available as optional course units. These course units are offered by faculty of science and the denotations of such course units begin with FSC.

These interdisciplinary course units offered for both bioscience and physical science students. Course units are organized at two levels, namely level II and level III for the general degree. Theory course units consist of lectures, assignments and tutorials. Combined course units consist of both theory and practical components. In addition, students are also given the opportunity to conduct research projects in an area/problem of his/her interest under a particular course unit.

Lectures and practical classes of FSC course units are conducted from 4.00 p.m. to 6.00 p.m. on week days. Course units can be selected at the discretion of the student according to the selection criteria prescribed by the faculty.

### 11.1 Optional Course Units offered in Semester I

FSC214 $\alpha$	Physical Fitness & Health Management
FSC2122	Active Citizenship
FSC3112	Management
FSC3122	Accounting
FSC3132	Speech Communication skills
FSC3bP2	Research Project

**FSC214 $\alpha$ : Physical Fitness and Health Management** (*This course is offered to Level II students only.*)

**Students who follow FSC214 $\alpha$  are not eligible to follow FSC225 $\alpha$  (Health related physical fitness and wellness) and vice versa**

**Time Allocation:** 15 hrs of theory and 30 hrs of practical lessons

**Course Objective:** To achieve greater success in life by learning to integrate mind and body

**Outline of the Syllabus:**

1. **Assessment of personal potential:** Basic human physiology(a map of self), Mind body Dynamics, Principles of winning mind, Pathophysiology of disease
2. **Principals of life:** Science of Yoga in Physical Fitness & Health, Proper relaxation, Proper breathing, Proper Food, Maintaining a youthful mind, Eliminating toxins from your life, Cultivating flexibility and creativity
3. **Sports Nutrition for Health and Performance:** Importance of carbohydrate, lipid and protein as building blocks, role of vitamins and minerals in nutrition, role of nutrients in man, nutritional requirements for pre-, during and post competition

4. **Sports Injuries and Rehabilitation:** Incidence, severity and mechanisms of sports injuries, injuries due to extreme heat, Strategies for prevention of sports injuries, methods of recovery, Rehabilitation of skin, muscles, ligaments and bones
5. **First Aid**
6. **Basic Physiology of Sports and Exercises:** Proper Exercises, Avoid Exercises, Prevent of Injuries, Lever system and body mechanism
7. **Testing and Measurement:** Evaluation of Testing, Evaluation of Measurements
8. **Weight Training for Sports:** Physical Fitness through Weight Training, Schedule for Weight Training Programme for various sports
9. **Sports Skill:** Knowledge of Fundamental Skills, Rules of the Game, Competition

(80% attendance is required to be eligible for the final examination)

**Assessment method:** Theory and practical examination (also, a team project needs to be completed)

**Marks:** Theory - 50 marks and Practical - 50 marks.

A student should obtain a minimum of 20 marks from the theory paper and minimum of 20 marks from practical to be eligible for a grade C or better for the course. (When a student does not meet this minimum requirement, he/she will only be eligible for a maximum grade of D. )

### **FSC2122: Active Citizenship**

Time Allocation: 32 hrs of lectures

#### **Course Unit Objectives**

The objectives of this course unit is

- to develop self- and social awareness
- to understand how identities and cultures form and to value different perspectives
- to build trust and understanding within and between communities through dialogue
- to recognize the nature of citizen rights and responsibilities
- to develop motivation to act for long term benefit of society
- to develop skills in social development project planning, management and delivery

#### **Learning Outcomes**

On completion of the course unit, students should be able to

- understand sense of identity and how cultures are formed, influenced and changed
- engage in respectful dialogue through active listening and responding appropriately
- arrive at good social decision
- recognize the need to uphold human rights

- demonstrate leadership skills and skills in social development project planning
- assess the benefits a project may bring and to measure achievements

### **Course Content**

Introduction to Active Citizens, Me: Identity and culture, self-awareness, How identities and cultures form, Me and You: Intercultural dialogue, learn and share through dialogue, We together: Local and global communities, Interplay of culture, community and society, Citizen rights and responsibilities, Skills in social action project planning, management and delivery, Identify problems and approaches to bringing solutions

### **Methods of teaching and learning**

Reading materials, Lectures, Problems Solving, LMS, Audio-Video and live demonstrations, group activities, presentations

### **Method of Assessment**

- Continuous assessment 50%
- End Semester Examination 50%

### **References**

British Council Active Citizens website  
( [http : //activecitizens.britishcouncil.org](http://activecitizens.britishcouncil.org) )

### **FSC3112: Management**

- Introduction to Management
  - The Definition of Management
  - The four Management Functions
  - Management types and Skills
  - Management-and New Work place
- Managerial Decision making
  - Types of Decisions and problems
  - Decision making Models
  - Decision making steps
  - New decision approaches for the New Work place
- Change and Development
  - Forces for change
  - Need for Chance
  - Resistance to Change (force -field Analysis)
  - Organizational Developments

- Leadership is Organization
  - The Nature of Leadership
  - Leadership Vs Management
  - Leadership traits
  - Behavioural approach
  - Contingency approach
  - Change Leadership
- Motivation in Organization
  - The Concept of Motivation
  - Foundations of Motivation
  - Content Perspectives on Motivation
  - Price Perspectives on Motivation
  - Motivating is the new Workplace
- Team in Organization
  - Teams at Work
  - Types of Teams
  - Team Process
  - Managing Team Conflict
- Human Resource Management
  - The Strategic Role of HRM
  - Alternating an Effective Workplace
  - Developing an Effective Workplace

### **FSC3122: Accounting**

- Introduction to Basic Accounting
  - Introduction of Business
  - Introduction of accounting equation
  - Theory of double entry
- Process of recording and preparing accounts
  - Document used in collecting information for book keeping purposes
  - Recording transactions in books of prime entry
  - Posting them to the ledger
  - Balancing of accounts and preparation of the trail balance
- Preparation of final accounts introducing minor adjustment.
- Bank transactions and related accounting work



- Opening of a current account
- Cheque transactions
- Preparation of cashbook with bank column
- Preparation of bank reconciliation statements
- Manufacturing Accounts
  - Transactions of manufacturing concerns
  - Preparation of manufacturing accounts
- Accounts of non- trading concerns.
  - Transactions of non-trading concerns
  - Introduction of receipts and payments accounts
  - Introduction of income and expenditure accounts
  - Preparation of statements of affairs
- Petty cash procedures
  - Recognize petty Expenses in an office
  - Introduction of imprest system
  - Posting the totals to the respective accounts
- Accounting Concepts.
  - Various aspects of accounting concepts

### **FSC3132: Speech Communication**

- **Introduction to the theory of speaking**
  - **Speakers and Audiences:**  
Unity and communication, learning about audiences, Accommodation and civility
- **Foundations of speaking:**  
Dimensions of speech,
  - **The practical and formal;**  
The interpersonal, Roles speaking as a social action
  - **Speech communications:**  
Variables, speech communication noise, Human conditions and interactions Identification, Use of speech, Speaking situations
  - **Disciplines of speech communication:**  
Defensive response, Trust, Social nature, Questions about you, You and your group, you and society
- **Making choices about what to speak:**  
Audience, age, gender, cultural and ethnic Identity, speeches to inform, speeches persuade, The thesis of speech, Extemporaneous speech

- **Organizing the speech:**

Preparing outlines, Headings and indentations, Coordinate points and subordinate points, Speech outline,

- **Speech analysis:**

The introduction, the thesis, The body, The conclusion

- **Face to face interaction:**

Oral, written, commercial Interpersonal awareness. Forces against identifications Cohesive meaning and emphasis Model speech outlines.

- **Development of ideas:**

materials and use of audio visual aids.

- **Verbal materials:**

Use of statistics, quotations and authority, selecting materials finding material, citing sources, space of outlines

- **Persuasion:**

Three assumption of persuasion

- **Bases in modes of proof:**

Logical proof, Psychological proof/Maslow's theory

**Personal proof:**

Credibility

**Bases in Organization:**

Direct Patterns, Indirect Patterns, Combined Patterns, Monroe's Patterns

Bases in Language- clarify, liveliness, variety, acceptability, Bases in delivery, Answering Persuasive message, Sample analysis, Model speech outlines

- **Speaking and Listening:**

Certainty Interaction Vs probability, Objecting Vs subjective forms of reasoning Obstacles to critical thinking, Cognitive emotional, strengthening critical thinking

- **Listener:**

**Goals of Listening:**

Listening Problems, Improving listening, Good audience

- **Language and purpose:**

Language Symbols, Social agreement, Denotation Identification and Connotation, Facilitating

- **Identifying:**

Your self, Nonverbal Behavior, Nonverbal strategies, Eye Contact Voice,

Articulation, Pronunciation, and enunciation

- **Personal and Social goals:**

Personnel and social growth, Subject of speaking, Wording the questions for discussion, Strategic format for discussion, Panel discussion, Symposium

- **Interpersonal Problem:**

Mob rule, Qualities of successful group Interaction

- **Speech Preparation for Special Occasions:**

Impromptu speech, The announcement, Speech of introduction, After dinner speech, Nomination speech, Presentation speech, Acceptance speech, Welcome speech, Response to welcome speech

- **Types of public speaking:**

Information speaking, Speech designs (spatial, categorical comparison and contrast, sequential, Causation combined historical combined causation), Persuasive speaking, Ceremonial speaking (Tribute, acceptance, introduction, inspiration after dinner)

- **Group communication:**

Speeches for analysis, Model speech

- **Research in communication:**

Library, Correspondence, Direct observations

Hours - 30; Practical Hours - 25

### **FSC3bP2: Research Project**

A Student may do an individual research project under a chosen supervisor(s). A project report must be submitted. A presentation/viva will be held at the end of the semester.

## **11.2 Optional Course Units offered in Semester II**

FSC225α Health related physical fitness and wellness

FSC2212 Active Citizen Community Project

FSC3212 Marketing Management

FSC3242 Human Resource Management

FSC3252 Scientific writing and communication (Compulsary for B.Sc. Honours Degree Students)

### **FSC225α: Health Related Physical Fitness and Wellness**

This course is offered to Level II students during the first semester. Students who follow FSC214α are not eligible to follow FSC225α (Health related physical fitness and wellness) and vice versa

Time Allocation: 60 hrs of practical lessons

**Course Objectives:** Learning to prevent sports accidents and disease through regular exercise and weight training

- To detail the meaning and importance of health-related physical fitness
- To assist the student in the acquisition of basic knowledge related to resistance training, exercise programs and conditioning
- To improve the student's physical capacities through participation in specified training programs and experiences.
- To develop an appreciation for the importance of physical activity/exercise in maintenance of a healthy body

### **Outline of the Syllabus:**

- Benefits of regular physical activity/exercise (e.g. prevention of disease)

- Use of weight training for increasing muscle strength and endurance
- Use of aerobic activity (e.g. running, fitness walking, aerobics) to improve cardio-respiratory function
- Use of range of motion exercise to improve flexibility and prevent injury
- Use of physical activity/exercise to improve body composition

**Practical schedule:** Students will be able to use the training facility at the gymnasium. They are required to maintain an exercise/activity/weight-lifting chart

- 1st week: walking, running, aerobic dance
- 2nd week: Exercise principles & techniques, Prevention & care of injuries
- 3rd week: Introduction to Weight training & weight management
- 4th week: Weight training/lifting (step by step)
- 5th - 15th week: regular physical/aerobic activities, exercise program and weight training program (All students start with 12 min. of aerobic activity working towards reaching their individual Target Heart Rate and add 1-2 min. per session to reach 20-30 min. of continuous activity by the end of the course) (For weight training, students determine their individual 10-repetition maximum and work towards reaching the target in progression)
- Assessment method: Continuous assessments (30%) and final practical examination (70%)
- 80% attendance is required to be eligible for the final examination

### **FSC2212: Active Citizen Community Project**

This course is offered to Level II students who follow FSC2122 (Active Citizenship).

Time Allocation: 60 hrs of practical lessons

### **Course Objective**

- to workout needs assessment
- to develop skills in social action project planning
- to identify and consult key stakeholders
- to assess risks involved in a community project
- to experience implementation of a project
- to complete a project successfully

### **Learning Outcomes**

On completion of the course unit, students should be able

- to conduct a needs assessment of a particular community
- to engage in respectful dialogue with community leaders and other stakeholders

- to make right decisions
- to respect cultures, religions and communities
- to display skills in leadership and in social development project planning and implementation
- to assess the benefits of the project and to measure achievements

### **Course Content**

Needs assessment, planning the project, project proposal submission, proposal revision, approval of the project, implementation, project presentation, Evaluation.

### **Methods of Teaching and Learning**

and learning Reading material, community surveys, discussions, proposal writing, implementation, group activities, presentations.

### **Method of Assessment**

- Continuous assessment - 50%
- Report and Presentation - 50%

### **References**

British Council Active Citizens website  
( [http : //activecitizens.britishcouncil.org](http://activecitizens.britishcouncil.org) )

## **FSC 3212: Marketing Management**

### **Course Objective**

This course unit expects to provide students with an understanding of the key concepts of marketing philosophy by providing insights into the role of marketing in contemporary business organisations.

### **Learning Outcomes**

Upon successful completion of the course unit, the students should be able to;

- Understand the Marketing Philosophy
- Understand the Marketing Management process
- Appraise the role of Marketing function in contemporary businesses

### **Course Content**

#### **1. Understanding the Critical Role of Marketing**

Introduction to Marketing, Evolution of Marketing

#### **2. Creating and Capturing Customer Value**

Customer Value and Satisfaction, The Marketing Process, Marketing Mix

### 3. **Analyzing the Marketing Environment**

The Company's Microenvironment, The Company's Macroenvironment

### 4. **Consumer Markets and Consumer Buying Behaviour**

Model of Consumer Behavior, The Buyer Decision Process

### 5. **Business Markets and Business Buying Behaviour**

Model of Business Behaviour, The Business Buying Process

6. Managing Marketing Information to Gain Customer Insights Marketing information system (MIS)
7. Customer-Driven Marketing Strategy: Creating Value for Target Customers Market Segmentation, Market Targeting, Differentiation and Positioning
8. Products, Services, and Branding Strategy Product and Services Decisions Branding Strategy: Building Strong Brands
9. New-Product Development and Product Life-Cycle Strategies New-Product Development Process Product Life-Cycle Strategies
10. Pricing Strategies Internal and External Considerations Affecting Price Decisions New-Product, Product Mix and Price Adjustment Strategies
11. Marketing Channels The Nature and Importance of Marketing Channels The Role of Retailing and Wholesaling
12. Integrated Marketing Communications Strategy The Promotion Mix Advertising, Sales Promotion, Personal Selling, Public Relations, Direct and Online Marketing The Communications Process
13. Creating Competitive Advantage Competitor Analysis Competitive Strategies
14. Ethics and Social Responsibility in Marketing

## **FSC3242: Human Resource Management**

### **Course Objectives:**

This course simply introduces the functions of Human Resources Management in the development of an effective work force in an organization and make the student capable of handling of issues in Human Resources Management with Special reference to Sri Lankan context.

### **Expected Outcomes:**

On completion of this module, students are expected to be able to:

- Explain the human resources management process and its importance to Organizational effectiveness
- Understand the processes related to the design, implementation and administration of human resource management programs in an organization.
- Identify various challenges facing the management of human resources
- Explain the strategic role of human resources management

**Method of Assessment:**

- End semester examination- 60%
- Continuous assessment- 40%

**Course content:**

1. Introduction to Human Resource Management
2. Job Design and Job Analysis
3. Human Resource Planning
4. Recruitment & Selection
5. Hiring & Employee , Induction
6. Human Resource Development
7. Employee Performance Evaluation
8. Career Management
9. Employee Compensation & welfare Management
10. Employee and Labor Relations
11. Employee Movements
12. Employee Health and Safety Management
13. Employee Discipline Management
14. Employee Grievances Handling

**Recommended readings:**

1. Opatha H.H.D.N.P. (2009), Human Resource Management, Sri Lanka.
2. Dessler G, (2008), Human Resource Management, 11th ed, Prentice Hall of India; New Delhi.

**FSC3252: Scientific writing and communication .**

**Target group:** B.Sc. Honours Degree student (Level I/ compulsory), B.Sc. General Degree student (Level III/ optional).

**Time Allocation:** 20 lecture hrs and 30 practical hrs.

**Outline of the Syllabus:** Communicating science; The ABC of science communication, Types of written communication (i.e. memo, report, letter, manual, description, popular article, thesis, scientific paper), Scientific and popular writing, Precise writing and Language (i.e. coherence, choice of words, active and tight writing, parallel structure, transitions to link ideas), Components of the scientific paper, Presenting statistics, Designing effective tables and figures, Writing abstracts, Literature search and referencing, Tools for effective

search (i.e. ISI web, Scopus and journal data bases), Planing and preparing oral presentations, Performing oral presentation, Designing an effective poster, Poster presentations, Ethics in publishing (i.e. fabrication, falsification and plagiarism), Ownership and authorship of data, Journal selection, Indexing and journal impact factors, Publication process.

**Assessment method:** Students will be evaluated on writing (50%) and communication (50%) skills. Writing assessment(s) may include writing a small review in their subject Specialties or case studies based on critical evaluation/ analysis of published abstracts and scientific papers. Communication skills will be evaluated through oral/ poster presentations.



## 12 Learning Resources

### 12.1 Library Facilities

#### 12.1.1 Introduction

The Library system of the University of Ruhuna is the most advanced academic library in the southern region of Sri Lanka. Main Library is located in the Wellamadama university premises and mainly serves five faculties; Faculty of Humanities and Social Sciences, Faculty of Fisheries and Marine Science & Technology, Faculty of Science, Faculty of Management and Finance and Faculty of Graduate Studies. In addition to that, services are provided for outside communities too.

#### 12.1.2 Staff of the Library

Library Staff of the Main Library consists of 6 Academic, two administrative staff members paraprofessionals to cater the library needs of the patrons.

##### Academic Staff Members

<b>Librarian (Acting)</b>	Mr. N. Hettiarachchi B.Sc. (Hons) (Ruhuna), MSSc. (Lib. & Inf. Science) (Kelaniya)
<b>Senior Assistant Librarian</b> (Reader Services)	Mr. U.A. Lal B.A. (Hons) (Peradeniya), MSSc. (Lib. & Inf. Science) (Kelaniya)
<b>Senior Assistant Librarian</b> (Legal Deposit)	Mrs. T. KuruppuArachchi B.Sc.(Hons)(Ruhuna) MLS (Colombo) Reading for Ph.D. (Australia)
<b>Senior Assistant Librarian</b> (Digital Library and Periodicals)	Mr. I.D.K.L. Fernando B.Sc. (Hons) (Ruhuna) M.ISM. (Colombo)
<b>Senior Assistant Librarian</b> (Cataloguing and Classification)	Mrs. Sakunthala Senevirathna B.A. - Lib Sci. (Hons) (Kelaniya) Dip. in Journalism (Colombo) MSSc. (Lib. & Inf. Science) (Kelaniya)
<b>Senior Assistant Librarian</b> (Acquisition Division)	Ms. P.K. Jayasekara B.Sc. Agri (Hons) (Ruhuna) MLS (Colombo)

##### Administrative Staff Members

<b>Senior Assistant Registrar</b> (Library Services)	Mr. C.P.K. Edirisinghe BA. (Hons)(J'Pura) PDBA (Ruhuna)
<b>Senior Assistant Registrar</b> (Library Services)	Mrs. G.A. Jagathi Hemmali

### 12.1.3 Library Opening Hours

Opening hours of the library may vary according to the time of the academic year and faculty. Opening hours of the main Library are listed in Table 3.

Table 3: Opening hours of the Main Library

Description of the period	Days of opening	Hours of opening
Regularly	Monday to Friday	8.00 a.m. to 6.00 p.m.
	Saturdays	8.30 a.m. to 5.00 p.m.
	Sundays	closed
StudyLeaveAndExamination	Monday to Friday	8.00 a.m. to 8.00 p.m.
	Saturdays and Sundays	8.30 a.m. to 5.00 p.m.
Vacation	Monday to Friday	8.00 a.m. to 5.00 p.m.
	Saturdays	8.30 a.m. to 5.00 p.m.
	Sundays	Closed
Public Holidays and Poya Days	–	Closed

### 12.1.4 Library Collections

The library consists of sections for lending, reference, periodicals and special collections. The detail descriptions of library collections are given below.

- **Lending Section :** Lending section is located in the second floor of the Library. Lending section issues books for a period of two weeks to undergraduates. If needed which can be extended for another two weeks through the "ISURu" database.
- **Reference Section :** This section is located in the first floor of the Library. Reference section includes reference materials and permanent reference materials. Reference materials are issued to students for overnight use. Reference materials could be borrowed between 3.00 p.m. to 5.00 p.m. and should be returned before 10.00 a.m. of the due date.

Permanent reference materials (such as encyclopaedias, dictionaries, glossaries and other valuable books) are intended strictly for reference within the library. Reading facilities are provided in this section.

- **Periodical Section :** Periodical section is located in the first floor of the Library. The periodical section consists with different kinds of printed and online resources, such as; back volumes of printed journals, newsletters, printed periodicals currently subscribed by University of Ruhuna Library, online databases subscribed through Consortium of Academic Libraries of Sri Lanka (CONSAL) and past examination papers.

Printed periodicals currently subscribed by University of Ruhuna Library

1. Scientific American
2. National Geographic Magazine
3. Time magazine
4. Lanka Monthly Digest
5. Journal of the National Science Foundation of Sri Lanka

6. ටෙවද්‍යවරයා
7. විෂය පරිගනක සහරාව

Databases subscribed through Consortium of Academic Libraries of Sri Lanka (CON-SAL)

1. Emerald
2. Taylor & Francis
3. SAGE Research Methods Online
4. Oxford University Press
5. Wiley online Journal
6. HINARI
7. AGORA
8. OARE

Printed materials available in periodical section are meant to be used within the Library. This collection is opened from 9.00 a.m. to 4.00 p.m. on weekdays.

- **The Sri Lanka Collection (Ceylon room) :** This collection is arranged in a separate room in the first floor. The library materials, which are useful to obtain various information about Sri Lanka, are arranged in this collection, such as;

1. Government publications (Annual reports, statistical reports)
2. Rohana collection
3. Copies of Master's and Doctoral theses of Academic staff and postgraduate students of the University of Ruhuna
4. Professor Justin Labrooy collection
5. Professor Alawaththagoda Pemadasa collection
6. Newspaper collection

Readers are not allowed to remove library resources from this collection. This collection is opened from 9.00 a.m. to 4.00 p.m. on weekdays.

- **Legal Deposit Collection :** The Legal Deposit Collection is located in the second floor of the Library and it is the latest collection in the Main Library, University of Ruhuna. The University of Ruhuna has been fortunate to join the group of institutes in Sri Lanka that have been maintaining legal deposit collections since 2013. This collection consists of all the publications published within Sri Lanka since 1990. Currently, this valuable collection has about 200,000 items including books, newspapers, journals, magazines, handbooks, annual reports, pamphlets, government publications such as gazettes, hansards, acts and school text books, proceedings, posters etc. written in various languages. These items are stored under preserved conditions and only available for reference within the collection. This collection is open from 9.00 a.m. to 4.00 p.m. on weekdays.
- **Colour Plate Collection :** Colour plate collection is located in the first floor of the library. This collection consists of books with valuable colour images. Colour plate collection is kept in a locked glass cupboard in the Reference section of the library for careful preservation. Students need to make a request to use this collection.

### 12.1.5 Library Resource Classification

The materials in the University of Ruhuna Library are organized according to the Dewey Decimal Classification (DDC) system. DDC helps to arrange library materials by discipline. The main classes of DDC are shown in Table 2.

Table 4: Dewey Decimal Classification (DDC) system.

DDC Number	Discipline
000	Computer science and general works
100	Philosophy and Psychology
200	Religion
300	Social Sciences
400	Language
500	Natural sciences and Mathematics
600	Technology (Applied science)
700	Arts; Fine arts and decorative arts
800	Literature and rhetoric
900	Geography and history

### 12.1.6 Library Catalogue

An Online Public Access Catalogue (OPAC) is a computerized online database of all the resources held in the library. Users can use OPAC to search library materials available in the library. It can be accessed from URL: [isuru.lib.ruh.ac.lk](http://isuru.lib.ruh.ac.lk). OPAC provides facilities to search library materials using keywords, title, author, subject, ISBN, series and call number

### 12.1.7 Library Services

- **Ask a Librarian Service :** Senior Assistant Librarians and Assistant Librarians of the University of Ruhuna Library provide reference services to the library users with direction to library materials, advices on library collections and services and searching multiple kinds of information from multiple sources.
- **Skill Development Programs :** Library of University of Ruhuna is currently conducting Information Literacy course modules in Faculty of Fisheries and Marine Science & Technology, Faculty of Agricultural, Faculty of Engineering and Faculty of Medicine. The main purpose of these modules is to develop students information literacy and library skills. Academic staff of the library facilitates students throughout the course module with comprehensive theoretical and practical work.  
In addition to this course unit, library conducting continuous student orientation, training and support with information management through workshops and seminars.
- **Inter-Library Loans (ILL) :** Any book and photocopies of research articles in journals, which are not available in the University of Ruhuna Library, but available elsewhere, could be obtained via inter-library loan. readers who wish to avail themselves of the faculty should use the application available at the Library Office.

- **Library Resource Centre** : Library Resource Centre provides following facilities; Computer Lab - 20 users can occupy at a time Library Auditorium - can be used for 80 users with the modern electronic facilities
- **Photocopying Service** : The Library provides a photocopying service for those who requires copies of reference materials available in the Library. An agency photocopy service was installed to the Library.
- **Student Counselling** : The student counselling service of the library provides services and programs which promote the personal development and psychological well-being of students. Students have the opportunity to discuss their various psychological, social and financial issues or any other difficulties they face during their university education and library use. counselling services maintain strict confidently.
- **Outreach Programs** : Library of University of Ruhuna is conducting workshops, training programs and awareness programs to enhance the information literacy skills of teacher librarians, library science students and different target populations in Southern province.
- **Institutional Repository** Institutional repository (IR) is an online system that collect, store, index, and disseminate scholarly information over the internet. IR of the University of Ruhuna (IRUoR) only provide materials that the University of Ruhuna can claim the copyright. Library users can access to this service through the URL: <http://ir.lib.ruh.ac.lk>.

### 12.1.8 Library Membership

Full membership of the library is available to all registered undergraduate and postgraduate students of University of Ruhuna. All students are required to register at the library by using the application form provided.

- **Borrowing Library Resources** : With the exception of certain categories (i.e. Permanent reference materials, dictionaries, atlases, books under Special collections etc.) all other books may be borrowed. The university record book or identity card must be produced when borrowing books. Books may be borrowed before 5.00 p.m. Details about the number of books can be borrowed is given in Table 5.

Table 5: Number of books that can be borrowed by students from each library

Study Level	Main		
	Lending	Reference	Electronic Media
Level I	03	01	01
Level II	04	02	01
Level III	05	02	01
Level IV	06	02	01
Level V			
Postgraduate	03	01	

**Note:** Level I students are only allowed to borrow one ‘Student centred learning’ material.

- **Returning Library Resources :** Borrowed lending items must be returned between 08:30 a.m. - 5:00 p.m. on the due date. Borrowers should responsible for the library materials that they lend. If any borrowed item lost or damaged accidentally, the borrower shall inform to the library immediately through any of the contact information mentioned at the end of this document.
- **Fines and Payments :** ny borrower that unable to return the borrowed library materials by the due date may subject to fine. The fine policy of each faculty library is different due to the availability of materials and the item type. The fines charged by each library is as follows:

Fines per day	
Item type	Fine
Reference	Rs. 3.00
Lending	Rs. 1.00

**Note: Items in the darken cells are not for lending in the desired library**

Students can keep a limit of LKR. 100.00 and can borrow library materials regularly. When the total fine amount exceeds the upper level (LKR. 100.00) the user account is automatically suspended and students are unable to borrow items anymore. In such situations, students should consult the main library counter and obtain a fine invoice which can payable to the Shroff counter of the University from 09:00 a.m. 03:00 p.m. on weekdays.

If a borrower lost the lend item, he/she has to replace it with a new copy of the same edition or subsequent edition/ latest edition of the same book as soon as possible. If the book is not available in the market, the borrower will be charged for the replacement cost of the book and a processing fee of 25% from the value of the book.

### 12.1.9 Use of the Library

Except for a few half sheets, the students are not allowed to bring personal books, files, notebooks, bags, umbrellas, etc. into the Library. Those items should be kept in the file rack before entering the Library. Smoking is completely prohibited and complete silence should be observed within the Library. The cellular phones are also not allowed to be used within the library. All these rules, regulations and conventions are aimed at providing a better library service to the patrons.

### 12.1.10 Contact information

Contact person	Direct line	Intercom*	Email
Librarian	+94 (41) 222 7028	2201	mainlib@lib.ruh.ac.lk
Main Library Office		2203	

**\*In order to contact through the general telephone line, please dial any of the university hotline numbers and enter the desired intercom number.**

## 12.2 Department of English Language Teaching (DELT)

The Department of English Language Teaching (DELT), located in the Faculty of Humanities and Social Sciences, is common to all faculties of the University. It offers academic programmes aimed at developing in the undergraduates English Language Skills.

### 12.2.1 Staff of DELT - Faculty of Science

Name	Educational / Professional Qualifications
K.S.G.S. Nishantha (S.L.-II) Head/DELT	B.A.(Kelaniya), M.A. (Kelaniya), M.A. in Applied Linguistics-TESL(Newcastle), MPhil in Linguistics (Kelaniya)
Ruwan Gunawardene (S.L.)	MPhil (J'pura), M.A. (Kelaniya), BA (Sabaragamuwa),
Hirumi Senevirathne (P.L.)	BA (Sabaragamuwa), MA (J" Pura - Reading)
Shavindra Chandradasa	BA (Colombo), MA (Kelaniya) MPhil (Kelaniya, Reading)

### 12.2.2 English Courses offered by DELT

- **Intensive Course in English :** The Department offers an intensive course in English for university entrants prior to the commencement of the first academic year depending on the time available. The duration of this course depends on the time permitted before the commencement of the academic programme.

- **Courses offered during academic years**

#### **Introduction:**

The DELT offers a three-year compulsory programme of English for the BSc undergraduates of the Faculty of Science in three levels. In this programme, the students are provided with handouts prepared by the DELT. The lessons are meant to boost the four major skills of communication identified as reading, writing, listening and speaking and student-centered interactive teaching and learning is considered the main mechanism applied in classroom management.

- **Level I - ENG1b10 (Semester - I & II):**

**Course Unit Specific Learning Outcomes (developed in accordance with the level of course unit and the action verbs corresponding to appropriate level descriptor of SLQF).**

Upon successful completion of the course unit, the student should be able to perform the following tasks under each main topic of the course unit:

#### **Course Outline:**

- Topic 1 & 2 : Extract required information from a variety of sources and Express ideas in comprehensive language.
- Topic 3 & 4 : Integrate literature into creative presentations.
- Topic 5 & 6 : Enhance presentation skills.
- Topic 7 & 8 : Give directions and instructions in relevant social and academic contexts.
- Topic 9 & 10 : Present information through graphs and diagrams.
- Topic 11 & 12 : Express ideas in comprehensive language.
- Topic 13 & 14 : Develop language skills through literature.
- Topic 15 : Write informal letters.
- Topic 16 & 17 : Compare various situations and circumstances.

- Topic 18 & 19 : Produce a short report.  
 Topic 20 : Grasp main ideas through note taking.  
 Topic 21 & 22 : Deliver impromptu speeches.  
 Topic 23 : Acquire skimming and scanning skills.  
 Topic 24 & 25 : Obtain the skill of problem solving.

**Contribution of the course unit to achieve the SLQF learning outcomes:**

	1.Subject/Theoretical Knowledge	2.Practical Knowledge and Applications	3.Communication	4.Team work and Leadership	5.Creativity and Problem Solving	6.Managerial and Entrepreneurship	7.Information Usage and Management	8.Networking and Social Skills	9.Adaptability and Flexibility	10.Attitudes, Values and Professionalism	11.Vision for Life	12.Updating Self/Lifelong Learning
Topic 1			✓				✓				✓	✓
Topic 2			✓								✓	✓
Topic 3			✓	✓	✓						✓	✓
Topic 4			✓	✓	✓						✓	✓
Topic 5			✓	✓							✓	✓
Topic 6			✓	✓							✓	✓
Topic 7		✓	✓								✓	✓
Topic 8	✓	✓	✓								✓	✓
Topic 9	✓	✓	✓								✓	✓
Topic 10	✓	✓	✓								✓	✓
Topic 11			✓					✓			✓	✓
Topic 12			✓					✓			✓	✓
Topic 13		✓	✓		✓						✓	✓
Topic 14		✓	✓		✓						✓	✓
Topic 15		✓	✓					✓			✓	✓
Topic 16	✓		✓								✓	✓
Topic 17		✓	✓								✓	✓
Topic 18	✓	✓	✓	✓							✓	✓
Topic 19	✓	✓	✓	✓							✓	✓
Topic 20			✓								✓	✓
Topic 21			✓		✓				✓		✓	✓
Topic 22			✓		✓				✓		✓	✓
Topic 23		✓	✓								✓	✓
Topic 24		✓	✓		✓						✓	✓
Topic 25		✓	✓		✓						✓	✓

**Teaching and Learning Methods used to achieve the learning outcomes (based on the student-centred teaching and learning methods recommended for the respective learning outcomes stipulated in the Updated SLQF)**



1. Subject / Theoretical Knowledge	Independent learning activities, interactive lectures, team-based learning, and other small group activities
2. Practical Knowledge and Application	Problem-based learning, team-based learning, inquiry-based learning, role play
3. Communication	Student presentations, role play, debates, dramas
4. Teamwork and Leadership	Group projects, small group learning; e.g. problem-based learning, games
5. Creativity and Problem Solving	Assignments, projects, small group learning activities; e.g. problem-based learning
7. Information Usage and Management	Assignments, presentations, projects
8. Networking and Social Skills	Student presentations, role-play, debates, dramas
9. Adaptability and Flexibility	Group projects, small group learning; e.g. problem-based learning, role plays, portfolios
11. Vision for Life	Portfolios
12. Updating Self / Lifelong Learning	Portfolios

### Assessments:

The final grade will be computed in the following manner:

**Assignment I = 30%**

**Group presentation on a topic of general science**

**Assignment II = 30%**

**Writing a review on materials uploaded to LMS**

**Final exam= 40%**

**Written exam at the end of the year**

### Learning Time:

Being a 2-credit course unit, the **notional learning time** for the course unit totals **100 hours**, consisting of:

- \* **Face to face contact time** = 60 contact hours
- \* **Directed self-study through LMS**  $\approx$  20 hours
- \* **Self-directed learning expected**  $\approx$  10 hours
- \* **Assessments**  $\approx$  10 hours

### Schedule of Work:

Week	Lecture Topics	Activities/Assessments	Materials uploaded to LMS
1	Self-Description: Life in three stages	Pre-task: Talking about a celebrity Reading & listening to extracts from an autobiography	Reading extracts uploaded to LMS
2	Self-Description: Life in three stages	Writing and presenting a self-description Talking about others	
3	Language through literature I	Group discussion on the film Writing a short story in groups	Reading short stories Watching a short film
4	Language through literature I	Acting out a scene from the story written	

Week	Lecture Topics	Activities/Assessments	Materials uploaded to LMS
5	Introduction to presentation skills	Classroom discussion on presentation Preparing a presentation on a given topic	Watching a sample presentation
6	Introduction to presentation skills	Presenting a presentation on a given topic	
7	Giving directions	Discussion on key phrases Giving directions to places: Acting out Demonstrating an experiment	Watching videos on giving directions
8	Giving directions	Discussion on key phrases Giving instructions on scientific processes Demonstrating an experiment	Watching videos on giving instructions
9	Describing graphs & charts	Vocabulary related to graphs & charts Explaining a given graph (writing task)	Reading descriptions on graphs and charts
10	Describing graphs & charts	Oral presentation on given graphs & charts	
11	General conversations	Small talks. Group discussions on current topics	Reading newspaper articles on current topics
12	General conversations	Writing and presenting a small talk based on the newspaper articles uploaded to the LMS	
13	Language through literature II	Classroom discussion on fictions Building up a story (Science related)	Reading science fictions Watching a science fiction movie
14	Language through literature II	Presentation of the story Q & A session	
15	Informal writing	Discussion on key phrases Writing informal letters to friends	
16	Comparisons	Discussion on methods of comparisons Group presentations on comparisons (preparation)	Reading articles watching videos related to comparisons
17	Comparisons	Group presentations on comparisons Eg: Fashion then and now Technology then and now Q & A session	
18	Report writing	General discussion on reports and their structures Techniques of writing a paragraph	Reading sample reports
19	Report writing	Writing and presenting a short report	

Week	Lecture Topics	Activities/Assessments	Materials uploaded to LMS
20	Note taking	Techniques of note taking Listening to sample lectures	Listening to lectures in different accents
21	Impromptu speeches	Individual speeches Q & A session	
22	Continuation of the previous lesson	Individual speeches Q & A session	
23	Skimming & scanning	Discussion on techniques of reading Testing the reading skills acquired	Reading tests
24	Lateral thinking	Classroom discussion on solving problems creatively Problem solving tasks and presentations	
25	Lateral thinking	Problem solving tasks and presentations	

**NOTE:** \* Any class that is missed due to a public holiday or to an unforeseen incident will be made up by arranging an additional class if required to cover the total face to face time.

• **Level II - ENG2b10 (Semester - I & II):**

**Course Unit Specific Learning Outcomes (developed in accordance with the level of course unit and the action verbs corresponding to appropriate level descriptor of SLQF).**

Upon successful completion of the course unit, the student should be able to perform the following tasks under each main topic of the course unit:

**Course Outline:**

- Topic 1 & 2 : Express ideas in comprehensive language.
- Topic 3 & 4 : Present information academically.
- Topic 5, 6 & 7 : Integrate literature into creative presentations and review them.
- Topic 8 : Extract required information from a variety of sources.
- Topic 9 : Paraphrase & summarize research articles.
- Topic 10 & 11 : Recognize & apply appropriate language in relevant contexts.
- Topic 12 & 13 : Compare & contrast findings by writing a lab report.
- Topic 14 & 15 : Express ideas in comprehensive language.
- Topic 16 : Communicate through emails, letters & memos.
- Topic 17 : write a project report.
- Topic 18, 19 & 20 : Plan, implement and present a community project.

**Contribution of the course unit to achieve the SLQF learning outcomes:**

	1.Subject/Theoretical Knowledge	2.Practical Knowledge and Applications	3.Communication	4.Team work and Leadership	5.Creativity and Problem Solving	6.Managerial and Entrepreneurship	7.Information Usage and Management	8.Networking and Social Skills	9.Adaptability and Flexibility	10.Attitudes, Values and Professionalism	11.Vision for Life	12.Updating Self/ Lifelong Learning
Topic 1		✓	✓				✓				✓	✓
Topic 2		✓	✓				✓				✓	✓
Topic 3		✓	✓				✓				✓	✓
Topic 4		✓	✓				✓				✓	✓
Topic 5		✓	✓	✓	✓		✓				✓	✓
Topic 6		✓	✓	✓	✓		✓		✓		✓	✓
Topic 7		✓	✓		✓		✓				✓	✓
Topic 8		✓	✓				✓				✓	✓
Topic 9		✓	✓				✓				✓	✓
Topic 10		✓	✓				✓		✓		✓	✓
Topic 11		✓	✓	✓			✓		✓		✓	✓
Topic 12		✓	✓				✓				✓	✓
Topic 13		✓	✓				✓				✓	✓
Topic 14		✓	✓				✓		✓		✓	✓
Topic 15		✓	✓	✓	✓		✓	✓	✓		✓	✓
Topic 16		✓	✓				✓				✓	✓
Topic 17		✓	✓	✓			✓				✓	✓
Topic 18		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Topic 19		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Topic 20		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓

**Teaching and Learning Methods used to achieve the learning outcomes (based on the student-centred teaching and learning methods recommended for the respective learning outcomes stipulated in the Updated SLQF)**

2. Practical Knowledge and Application	Problem-based learning, team-based learning, inquiry-based learning, role play
3. Communication	Student presentations, role play, debates, dramas
4. Teamwork and Leadership	Group projects, small group learning; e.g. problem-based learning, games
5. Creativity and Problem Solving	Assignments, projects, small group learning activities; e.g. problem-based learning
7. Information Usage and Management	Assignments, presentations, projects
8. Networking and Social Skills	Student presentations, role-play, debates, dramas
9. Adaptability and Flexibility	Group projects, small group learning; e.g. problem-based learning, role plays, portfolios
11. Vision for Life	Portfolios
12. Updating Self / Lifelong Learning	Portfolios

#### **Assessments:**

The final grade will be computed in the following manner:

**Assignment I = 30%**

**A PowerPoint presentation on a science related topic - Group work**

**Assignment II = 30%**

**Summarizing a prescribed chapter from a subject related book - Individual task**

**Final exam= 40%**

**Written exam**

**Learning Time:**

Being a 2-credit course unit, the **notional learning time** for the course unit totals **100 hours**, consisting of:

- \* **Face to face contact time** = 60 contact hours
- \* **Directed self-study through LMS**  $\approx$  20 hours
- \* **Self-directed learning expected**  $\approx$  10 hours
- \* **Assessments**  $\approx$  10 hours

**Schedule of Work:**

Week	Lecture Topics	Activities/Assessments	Materials uploaded to LMS
1	Your Role Model	Talking about an inspiring character	Listening to audio and video clips on inspiring characters
2	Your Role Model	Writing about an inspiring character	
3	Academic writing	Introduction to academic writing Essay writing I	Reading academic essays
4	Academic writing	Essay writing II	
5	Language through literature III	Producing a short script for a drama	Reading a short drama based on science
6	Language through literature III	Acting out the drama in groups	
7	Language through literature III	Film review	Watching a science related movie
8	Extensive reading	Extracting key information from science related articles	Reading science related articles
9	Paraphrasing and summarizing	Introduction to Paraphrasing and summarizing techniques Paraphrasing and summarizing short research articles	Listening to audio and video clips
10	Toning	Tone in written correspondence	Reading materials

Week	Lecture Topics	Activities/Assessments	Materials uploaded to LMS
11	Toning	Tone in speaking interactions	Watching videos
12	Report writing II	Writing a lab report Comparing and contrasting findings	
13	Report writing II literature II	Presentation of reports	
14	Public speaking	Impromptu speeches	
15	Public speaking	Debates	
16	Formal/Business correspondence	Writing formal letters, emails and memos	Reading sample formal letters
17	Introduction to project report	Discussion on how to write a project report	Reading sample project reports
18	Community project	Introduction Planning	
19	Community project	Implementation of the project	
20	Community project	Presentation of the project Writing a report on the project implemented	

**NOTE:** \* Any class that is missed due to a public holiday or to an unforeseen incident will be made up by arranging an additional class if required to cover the total face to face time.

● **Level III - ENG3b10 (Semester - I & II):**

**Course Unit Specific Learning Outcomes (developed in accordance with the level of course unit and the action verbs corresponding to appropriate level descriptor of SLQF).**

Upon successful completion of the course unit, the student should be able to perform the following tasks under each main topic of the course unit:

**Course Outline:**

- Topic 1 : Conduct discussions and debates on current issues.
- Topic 2 : Write argumentative essays.
- Topic 3 & 4 : Express ideas in comprehensive language.
- Topic 5 & 6 : Write a CV, a covering letter & a personal statement.
- Topic 7 & 8 : Engage in both formal & informal telephone conversations.
- Topic 9, 10, 11 & 12 : Learn necessary language needed for job interviews & how to face an interview.
- Topic 13 : Give opinions on controversial topics.
- Topic 14 : Write short reports on surveys, experiments and research.
- Topic 15 : Present a theory.
- Topic 16 : Write an abstract.
- Topic 17 : Write a research proposal.
- Topic 18 & 19 : Enhance presentation skills.
- Topic 20 & 21 : Plan & organize an event.

**Contribution of the course unit to achieve the SLQF learning outcomes:**

	1.Subject/Theoretical Knowledge	2.Practical Knowledge and Applications	3.Communication	4.Team work and Leadership	5.Creativity and Problem Solving	6.Managerial and Entrepreneurship	7.Information Usage and Management	8.Networking and Social Skills	9.Adaptability and Flexibility	10.Attitudes, Values and Professionalism	11.Vision for Life	12.Updating Self/Lifelong Learning
Topic 1		✓	✓	✓	✓		✓	✓	✓		✓	✓
Topic 2		✓	✓				✓				✓	✓
Topic 3		✓	✓				✓				✓	✓
Topic 4		✓	✓	✓			✓		✓		✓	✓
Topic 5		✓	✓				✓				✓	✓
Topic 6		✓	✓				✓				✓	✓
Topic 7		✓	✓				✓	✓			✓	✓
Topic 8		✓	✓				✓	✓			✓	✓
Topic 9		✓	✓				✓	✓	✓	✓	✓	✓
Topic 10		✓	✓				✓	✓	✓	✓	✓	✓
Topic 11		✓	✓				✓	✓	✓	✓	✓	✓
Topic 12		✓	✓				✓	✓	✓	✓	✓	✓
Topic 13		✓	✓		✓		✓		✓		✓	✓
Topic 14		✓	✓				✓				✓	✓
Topic 15	✓	✓	✓				✓				✓	✓
Topic 16		✓	✓				✓				✓	✓
Topic 17		✓	✓				✓				✓	✓
Topic 18		✓	✓	✓			✓				✓	✓
Topic 19		✓	✓	✓			✓				✓	✓
Topic 20		✓	✓	✓			✓	✓	✓		✓	✓
Topic 21		✓	✓	✓			✓	✓	✓		✓	✓

**Teaching and Learning Methods used to achieve the learning outcomes (based on the student-centred teaching and learning methods recommended for the respective learning outcomes stipulated in the Updated SLQF)**

1. Subject / Theoretical Knowledge	Independent learning activities, interactive lectures, team-based learning, and other small group activities
2. Practical Knowledge and Application	Problem-based learning, team-based learning, inquiry-based learning, role play
3. Communication	Student presentations, role play, debates, dramas
4. Teamwork and Leadership	Group projects, small group learning;
5. Creativity and Problem Solving	e.g. problem-based learning, games Assignments, projects, small group learning activities; e.g. problem-based learning
7. Information Usage and Management	Assignments, presentations, projects
8. Networking and Social Skills	Student presentations, role-play, debates, dramas
9. Adaptability and Flexibility	Group projects, small group learning;
	e.g. problem-based learning, role plays, portfolios
10. Attitudes, Values and Professionalism	Group projects, small group learning; e.g. problem-based learning, role play, portfolios
11. Vision for Life	Portfolios
12. Updating Self/Lifelong Learning	Portfolios

**Assessments:**

The final grade will be computed in the following manner:

**Assignment I = 30%**

**Writing a covering letter & a Curriculum vitae**

**Assignment II = 30%**

**A mock interview for employment**

**Final exam= 40%**

**Written exam**

**Learning Time:**

Being a 2-credit course unit, the **notional learning time** for the course unit totals **100 hours**, consisting of:

- \* **Face to face contact time** = 60 contact hours
- \* **Directed self-study through LMS**  $\approx$  20 hours
- \* **Self-directed learning expected**  $\approx$  10 hours
- \* **Assessments**  $\approx$  10 hours

**Schedule of Work:**

Week	Lecture Topics	Activities/Assessments	Materials uploaded to LMS
1	Discussions & Debates	General discussions on current topics Debates on a current issue	Reading extracts Listening to current news BBC, CNN Reading newspaper/ magazine articles
2	Academic writing	Writing argumentative essays based on the classroom discussions	
3	Self-branding	Classroom discussion on the importance of self-branding to suit the job market	Watching videos on self-branding
4	Self-branding	Presenting personality traits & skills	
5	Writing a CV	Discussion on the format of a CV Preparation of a CV	Watching a sample presentation
6	Writing a CV	Writing a cover letter Writing a personal statement to a university	Reading sample CVs, cover letters, statement of intent
7	Telephoning	Useful language for formal & informal telephone conversations Pair work - Informal telephone conversation	Listening to telephone conversations
8	Giving directions	Discussion on key phrases Giving instructions on scientific processes Demonstrating an experiment	Watching videos on giving instructions



Week	Lecture Topics	Activities/Assessments	Materials uploaded to LMS
9	Describing graphs & charts	Vocabulary related to graphs & charts Explaining a given graph (writing task)	Reading descriptions on graphs and charts
10	Describing graphs & charts	Oral presentation on given graphs & charts	
11	General conversations	Small talks, Group discussions on current topics	Reading newspaper articles on current topics
12	General conversations	Writing and presenting a small talk based on the newspaper articles uploaded to the LMS	
13	Language through literature II	Classroom discussion on fictions Building up a story (Science related)	Reading science fictions Watching a science fiction movie
14	Language through literature II	Presentation of the story Q & A session	
15	Informal writing	Discussion on key phrases Writing informal letters to friends	
16	Comparisons	Discussion on methods of comparisons Group presentations on comparisons (preparation)	Reading articles watching videos related to comparisons
17	Comparisons	Group presentations on comparisons Eg: Fashion then and now Technology then and now Q & A session	
18	Report writing	General discussion on reports and their structures Techniques of writing a paragraph	Reading sample reports
19	Report writing	Writing and presenting a short report	
20	Note taking	Techniques of note taking Listening to sample lectures	Listening to lectures in different accents
21	Impromptu speeches	Individual speeches Q & A session	
22	Continuation of the previous lesson	Individual speeches Q & A session	
23	Skimming & scanning	Discussion on techniques of reading, Testing the reading skills acquired	Reading tests
24	Lateral thinking	Classroom discussion on solving problems creatively Problem solving tasks and presentations	
25	Lateral thinking	Problem solving tasks and presentations	

**NOTE:** \* Any class that is missed due to a public holiday or to an unforeseen incident will be made up by arranging an additional class if required to cover the total face to face time.

- i. Students can sit both Level I & II examinations in the second year. If Level II is passed then the certificate would not be issued until Level I is completed in a repeat attempt. In such cases they can repeat only Level I examination.
  - ii. If a final year student has failed Level I but passed Level II then he/she may be allowed to sit both Level I and Level III examinations in the final year. However, Level I should be passed to receive certificate.
- **Requirement of English Language for obtaining the B.Sc. Degree :** In order to obtain the B.Sc. (General) Degree, it is compulsory that students pass Level I and Level II examinations in English. In the case of Bachelor of Science (Honours) Degree, in addition to the above levels, they should also obtain a pass in Level III examination.

## 12.3 Department of Physical Education

Activities pertaining to sports and recreation are conducted by the Department of Physical Education. The Department is advised by a sports advisory board, which consists of officials of the department and two academics from each of the faculties. Whenever necessary, external assistance is sought for coaching on part time basis.

### Staff of Department of Physical Education

Designation	Name
Director	Mr. P. N. Weerasinghe, B.Com. Sp. (Sri J'Pura), Sports Dip. (Ministry of Sports)
Instructors	Mrs. S. V. K. de Silva, Sports Dip. (Ministry of Sports)
	Mr. K. H. Keerthi Kumara, B.A. (Kel)
	Mr. P. K. Sanath Chandana, Teacher Training (Ministry of Education)
	Mr. J.P.A.N.M. de Silva, (B.Sc. Kelaniya)
	Miss. D.D.Priyadarshani B.Sc.(Physical Education Honours) (Sabaragamuwa)

### Our Vision

*“To socialize a law-abiding and socially productive graduate with the ability of effective leadership qualities and fair decision making, who is physically and mentally well balanced”*

There are numerous student sports activities organized by the Department of Physical Education including both indoor and outdoor sports. A gymnasium with training facilities is located in the Wellamadama University Complex for indoor sports and it is open for the students after 10.00 a.m. on weekdays up to 7.00 p.m. The department has well equipped Strength Training Hall to develop the Physical Fitness for Specially Sportsmen/women and other students.

## 13 Sports and Recreation

### Facilities for Sports

At present, Department of Physical Education provides the facilities for following indoor sports:

- Basketball (Men and Women)
- Badminton (Men and Women)
- Table Tennis (Men and Women)
- Weight Lifting (Men and Women)
- Volleyball (Men and Women)
- Chess (Men & Women)
- Taekwondo (Men & Women)
- Carrom (Men & Women)
- Netball (Women)
- Wrestling (Men)
- Karate (Men, Women)
- Power Lifting (Men, Women)
- Scramble (Men & Women)

Outdoor sports facilities are provided to students at Wellamadama University grounds. Following sports facilities are made available free of charge to all students.

- Athletics (Men and Women)
- Hockey (Men and Women)
- Elle (Men and Women)
- Cricket (Men)
- Football (Men)
- Rugger (Men)
- Swimming (Men and Women)
- Tennis
- Baseball (Men)
- Swimming (Men, Women)
- Softball Cricket (Women)
- Kabadi (Men, Women)

There are annual sports events such as Inter-Faculty and Inter-University tournaments. In addition, Sri Lanka University Games (SLUG) is held at a selected University once in three years. Students are able to participate in the World University Games and Asian University Championships, which is held once in two years. At the end of each two years, Colours Award Ceremony is held and those who excel in these sports activities at Inter University tournaments and meets are awarded colours.

The University provides several facilities for those who participate in sports events. Sports goods are freely available to students who participate in Inter University tournaments/meets and also for practice sessions. A subsistence of Rs. 500.00 is paid per day when a student participates in an event held outside the University. For team events, the required clothing is provided to students at a cost of only 20% of the value. For practice sessions of Inter University Championships, the University provides an allowance of Rs.50.00 per day per student to have a nourishment.

We have already started two academic courses for Level II students named "Physical Fitness & Health Management" and "Health Related Physical Fitness and Wellness". Fifteen (15) hours of theory classes and thirty (30) hours of practical classes includes for the first course and sixty (60) hours of practical classes for the second course.

## 14 Examinations

### 14.1 Bachelor of Science Degree Programmes

#### 14.1.1 The Bachelor of Science (General) Degree

The Bachelor of Science (General) Degree will include six semesters during which students will have to follow Core Course Units (CCU) offered by respective departments and Optional Course Units (OCU) acceptable to the Faculty of Science, University of Ruhuna. The Bachelor of Science (General) Degree Examination will consist of end of semester examinations for theory Course Units. In the case of practical course units, examinations will be held as desired by respective departments.

A candidate shall be eligible for the conferment of the Bachelor of Science (General) Degree after the successful completion of all requirements (as specified in the Sections 14.2 and 14.3) within a maximum period of five academic years from the date of entry to the University of Ruhuna.

#### 14.1.2 The Bachelor of Science (Honours) Degree

The duration of the Honours degree programme is four academic years (eight semesters), inclusive of Levels I & II of the General Degree and Levels I & II of the Honours Degree.

During the four academic years of the degree programme, a student shall complete course units of 120 credits with a minimum of 52 credits of course units from the subject of Specialization during Level I and Level II of the Honours Degree programme subjected to the approval of the department of his/her subject of Specialization. Furthermore, a Honours degree student shall carry out a research project, shall acquire additional skills (seminar, essay, etc) and may undergo practical/industrial training.

It is compulsory for B.Sc. (Specail) Degree students to pass FSC3252-Scientific Writing and Research Course Unit.

The Honours Degree consists of examinations at the end of each semester or at the end of course unit for the theory course units and other examinations for practical course units, research project, industrial/practical training and additional skills (essay, seminars) units which are decided by respective departments.

A candidate shall be eligible for the conferment of the Bachelor of Science (Honours) Degree after the successful completion of all requirements (as specified in the Sections 14.2 and 14.3) within a maximum period of six academic years from the date of entry to the University of Ruhuna.

#### 14.1.3 Attendance

The minimum attendance for theory and/or practical classes should be 80% for a student to be eligible to appear for the examination(s) of relevant course unit. Those who do not fulfill this requirement will be considered as to have failed in that particular Course Unit.

**B.Sc. (General) Degree:** In the event if a student fails to maintain at least 40% attendance for any of the practical course units of Level I of the general degree programme, he/she will not be allowed to sit for the examination of that particular course unit even as a repeat student and hence he/she has to leave the university.

**B.Sc. (Honours) Degree:** In the event if a student fails to maintain at least 40% attendance for any of the practical course units of Level I of the Honours degree programme, he/she will have to revert back to the general degree programme.

## 14.2 Examination Criteria

### 14.2.1 Grades allocated for Course Units

A grade will be awarded on the overall performance in each Course Unit as follows:

Grades	Grade Point Value (GPV)	Marks	Grades	Grade Point Value (GPV)	Marks
A+	4.0	85-100	C+	2.3	45-49
A	4.0	70-84	C	2.0	40-44
A-	3.7	65-69	C-	1.7	35-39
B+	3.3	60-64	D+	1.3	30-34
B	3.0	55-59	D	1.0	25-29
B-	2.7	50-54	E	0.0	0-24

### 14.2.2 Evaluation Criteria for course units of BSc/BCS General and Honours degrees

The following evaluation criteria is used for all course units offered under the General degree and Honours degree programmes subjected to the By-Laws of the Faculty of Science.

#### Evaluation of Theory/Practical course units

The evaluation criteria for all theory/practical course units offered by each department of the faculty shall have any of the following structures.

Evaluation method for each course unit	Percent weightages of each evaluation method
Continuous Assessments (practical or theory) may include quizzes, structured questions, written assignments, report writing, presentations, mid-semester examinations and class tests, etc. as announced at the commencement of each course unit	30% to 50% (=A) Eg: A=40%
Final Examination (End Semester or End Year)	(100% - A) Eg: (100% - A) =60%

All Students should sit for the final examination to earn a grade. Otherwise grade E\* shall be given. A student must earn minimum of 25% from the continuous assessment component and 30% from the final examination to earn a grade of C or better for the course unit. Otherwise he/she shall earn only a maximum grade of C-.

#### Continuous assessment of course units with weightage as per credit value of the course unit

##### 1.1 Course units of 4 credit with 3 hour final examination:

- Three continuous assessments shall be given during the semester/year
- Each in-class assessment should be 40 - 50 minutes duration

- (c) Only 2 assessments with best marks are counted towards final grade

**1.2 Course units of 2.5 to 3 credit (2 - 3 hour final examination):**

- (a) Three continuous assessments shall be given during the semester/year
- (b) Each in-class assessment should be 30 - 45 minutes duration
- (c) Only 2 assessments with best marks are counted towards final grade

**1.3 Course units of 1.25 to 2 credit (1 - 2 hour final examination):**

- (a) Two continuous assessments shall be given during the semester/year
- (b) Each in-class assessment should be 30 - 45 minutes duration
- (c) Only 1 assessment with best marks are counted towards final grade

**1.4 Course units of 1 credit (1 hour final examination):**

- (a) Two continuous assessments are given during the semester/year
- (b) Each in-class assessment should be 20 - 30 minutes duration
- (c) Only 1 assessment with best marks are counted towards final grade

Students shall attend all continuous assessments offered as per course unit during the relevant semester/year. If a student misses an assessment and fails to provide an acceptable reason zero mark is allocated for the particular assessment.

If a student is unable to sit for the final examination or fail the final examination, marks earned for continuous assessments will be carried forward to the final grade of the repeat examination.

Under any circumstances if a student is unable to earn 25% from continuous assessments component, he/she must do all the continuous assessments in the following year.

## **Evaluation of Research Projects**

The following structure shall be adopted for the evaluation of the research projects.

- (a) Defend the research proposal - 15%
- (b) Interim progress report/presentation - 25%
- (c) Final report/presentation/Examination - 60%

### **14.2.3 Pass in a Course Unit**

1. A candidate who obtains grade C or better for a course unit will be considered to have passed in that course unit.
2. If a student fails to complete a course a grade of E will be given unless an acceptable reason is produced. In the event of given reason is accepted by the Senate on the recommendation of the Faculty Board, he/she will be considered as a candidate sitting for the first time in a subsequent attempt for that course unit.
3. A student who obtains a C- or lower grade in a particular course unit may re-sit for the examination in respect of that course unit for the purpose of improving the grade within the stipulated period. The highest grade a student can obtain is C, which is in this instance equivalent to GPV 2.00. In the event a student obtains a lower grade, he/she will be entitled to the previous grade. Repeat candidates are not entitled to attend lectures/practical classes in the course unit in which he/she has failed.

#### 14.2.4 Examination Criteria on Mathematical Computing Course Units (IMT1b1 $\beta$ , IMT2b2 $\beta$ and IMT3b1 $\beta$ ) in Industrial Mathematics

A student who follows Industrial Mathematics as a subject must pass all IMT1b1 $\beta$ , IMT2b2 $\beta$  and IMT3b1 $\beta$  to earn the B.Sc. (General) Degree. These course units consist of learning a mathematical software/programming language in the Semester I and carrying out a project work in the Semester II.

1. Final mark of these course units will be calculated as follows:

##### **Method of Evaluation: Throughout Semester I:**

**(Learning mathematical software/programming language)**

(M1) *Practical Exam (Continuous Assessment): Marks out of 100*

##### **Throughout Semester II: (Project Work)**

(M2) *Project Report: Marks out of 100*

(M3) *Oral Exam and Presentation: Marks out of 100*

$$\text{Final Mark} = M1 \times 35\% + M2 \times 30\% + M3 \times 35\%$$

2. A student can continue with the project work in the Semester II irrespective of results of the practical examination of the relevant mathematical software/programming language at the end of Semester I in the relevant Level. If a student fails in that practical examination, his/her final result of that particular course unit will be withheld until he/she gets 40 marks for the practical examination in the relevant level at a subsequent attempt. The maximum mark a student can obtain for practical examination is 40 marks if he/she fails the practical examination at the first attempt.
3. A student shall be considered as pass the project if he/she earns overall 40% of the marks with a minimum 30% of marks for each of the project reports and the oral examinations. If a student fails in the project, he/she can earn only up to a grade of C- in that course unit and he/she should work on the same project and mathematical software/programming language resubmit a project report in the next academic year.

#### 14.2.5 Verification of Marks

Students are given the opportunity for the verification of marks after releasing results of course units by paying a fee at each semester. Further details of the process of the verification of marks are available at the faculty office. The final recommendation that will be made by the committee appointed for the verification of marks will be submitted to the approval of the Senate of the University of Ruhuna.

#### 14.2.6 Bachelor of Science (General) Degree Examinations

##### **Minimum Requirements for the Completion of the Bachelor of Science (General) Degree:**

A student shall be deemed to have passed the Bachelor of Science (General) Degree Examination if he/she has obtained

1. a minimum of 90 credits
2. grades of C or better from theory aggregating to a minimum of 60% credits of CCU from each main subject,



3. grades of D+ or better aggregating to a minimum of 60% credits of optional Course Units,
4. grades of C- or better in all practical CCUs, and
5. a Grade Point Average (GPA) of 2.00 or more. GPA will be calculated as follows:

$\text{GPA} = \frac{\sum (\text{Grade Point Value for a Course Unit}) \times (\text{Number of credits of that Course Unit})}{\text{Total number of credits}}$
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#### 14.2.7 Award of Classes for B.Sc. (General) Degree

A candidate who has satisfied conditions given in Section 14.2.6 is eligible for an award Honours Degree if he/she completes the requirements indicated below within three academic years from the date of first registration securing grades of C or better aggregating to a minimum of 75 credits with grades of C or better for a minimum of 40% credits of practical Core Course Units.

1. First Class Honours
  - (a) a minimum GPA of 3.70 and
  - (b) grades of A or better in Course Units aggregating to a minimum of 40 credits.
2. Second Class (Upper Division)
  - (a) a minimum GPA of 3.30 and
  - (b) grades of B or better in Course Units aggregating to a minimum of 40 credits.
3. Second Class (Lower Division)
  - (a) a minimum GPA of 3.00 and
  - (b) grades of B or better in Course Units aggregating to a minimum of 40 credits.

**Subject Certification Requirement:** The minimum number of credits required for a subject to be called a main subject of a three year degree would be 24 credits.

#### 14.2.8 Bachelor of Science (Honours) Degree Examinations

**Minimum Requirements for the Completion of the Bachelor of Science (Honours) Degree** A student shall be deemed to have passed the Bachelor of Science (Honours) Degree Examination if he/she has obtained the following:

1. An overall minimum Grade Point Average (GPA) of 2.00 for all course units followed throughout the four academic years of the degree programme, and
2. from the Honours Degree Course Units
  - (a) a minimum of 52 credits,
  - (b) grade of C or better from theory aggregating to a minimum of 60% credits,
  - (c) grade of C- or better in all practical course units,
  - (d) grade of C or better to a minimum of 75% credits for research project, industrial/practical training an additional skills (seminar, essay, etc.), and
  - (e) Grade Point Average (GPA) of 2.00 or more for Honours Degree Course Units.

#### **14.2.9 Award of Classes for B.Sc. (Honours) Degree**

A student who has fulfilled all the stipulated conditions in Section 14.2.8 shall be awarded Honours, if he/she fulfills the following additional requirements within four academic years from the date of first registration (it shall be within the power of the Senate to declare for some specified reason that a student is eligible for the award of the Honours at a subsequent occasion) securing grades of C or better aggregating to a minimum of 48 credits from Honours Degree Course Units.

1. First Class Honours

- (a) a minimum GPA of 3.70 for Honours Degree Course Units,
- (b) a minimum GPA of 3.70 for all course units of the subject of specialization, and
- (c) grades of A or better for Honours Degree Course Units aggregating to a minimum of 30 credits

2. Second Class (Upper Division)

- (a) a minimum GPA of 3.30 for Honours Degree Course Units,
- (b) a minimum GPA of 3.30 for all course units of the subject of specialization, and
- (c) grades of A- or better for Honours Degree Course Units aggregating to a minimum of 24 credits

3. Second Class (Lower Division)

- (a) a minimum GPA of 3.00 for Honours Degree Course Units, and
- (b) a minimum GPA of 3.00 for all course units of the subject of specialization

#### **14.2.10 Option of reverting to B.Sc. General Degree**

A student reading for a B.Sc. Honours Degree may request for the award of the B.Sc General Degree foregoing the Honours degree. This request should be made in completion of the 3rd academic year or within 14 days after the release of the final results of the Honours Degree programme. The student shall satisfy the following conditions:

1. The results of the B.Sc General Degree shall be determined solely on the basis of course units he/she has followed in the first three academic years.
2. A student shall be deemed to have passed the Bachelor of Science (General) Degree Examination if he/she has satisfied the requirements of the section 7 of the Bachelor of Science (General) Degree By-Law.
3. The minimum number of credits required for a subject to be called a main subject of a three year degree would be 24 credits.
4. A student shall be eligible for an award of Honours for the B.Sc. (General) Degree if he/she has completed the requirements within first three academic years from the date of first registration in accordance with the section 8 of the Bachelor of Science (General) Degree By-Law.

## 14.3 Other requirements for the completion of a Degree

### 14.3.1 Attendance at Practical Course Units:

Students are required to maintain a minimum of 80% attendance at theory and/or practical classes of a Course Unit to be eligible to sit for the relevant examination. Those who do not fulfil this requirement will be considered as to have failed in the particular Course Unit.

N.B. The procedure that should be followed when a student gets absent at classes and examinations due to an illness is described under Section 16.3.

### 14.3.2 Release of Final Results

**B.Sc. (General) Degree:** In addition to the examination Criteria stated under Section 14.2, the candidates have to fulfill the following in order to release the final results of the B.Sc. (General) Degree.

1. Pass in English Proficiency Level I (ENG1b10) and Level II (ENG2b10) tests.
2. Pass in Course Unit “MAT1142: Mathematics for Biology”. This requirement is applicable only for Biological Science candidates.
3. Pass the examination of Computer Literacy Course (ICT1b13 (CLC)) conducted by Computer Unit. This requirement is applicable only for students who do not follow computer science as a subject.

**B.Sc. (Honours) Degree:** In addition to the examination Criteria stated under 14.2, the candidates have to fulfill the following in order to release the final results of the B.Sc. (Honours) Degree.

1. Pass in English Proficiency Level I, Level II and Level III (ENG1b10, ENG2b10, and ENG3b10) Examinations.
2. Pass in Course Unit “MAT1142: Mathematics for Biology”. This requirement is applicable only for Biological Science candidates.
3. Pass the examination of Computer Literacy Course (ICT1b13 (CLC)) conducted by Computer Unit. This requirement is applicable only for students who do not follow computer science as a subject.
4. Pass in course unit(c- or better) FSC3252: Scientific Writing and Research.

## 14.4 Fees

### 14.4.1 Fees Levied for Registration for a Degree Programme

Following table provides the details of fees to be paid for different activities by each undergraduate on registration for a degree programme.

Degree Programme	Fees per Level	Amount (Rs.)
Undergraduate	Registration fee:	
	B.Sc. (General) Degree - Level I	450.00
	B.Sc. (General) Degree - Level II	200.00
	B.Sc. (General) Degree - Level III	200.00
	B.Sc. (Honours) Degree - Level I	200.00
	B.Sc. (Honours) Degree - Level II	200.00
	Medical fee*	50.00
	Science deposit	100.00
	Library deposit	100.00
*Should be paid at the beginning of every Level		

Any repeat student who wants to follow a relevant Theory Course Unit for another occasion may follow it after making a payment of Rs.250.00 per course Unit, only if the Faculty Board approval is granted.

#### 14.4.2 Examination Fees

No examination fee is levied from all undergraduates, who are sitting for any examination for the first time. Students, who sit for examinations more than once, will have to pay an examination fee as lay down by the university. Information on present examination fees is listed below.

All theory course units		- per credit Rs. 20/=
All practical course units		- per credit Rs. 30/=
All combined course units		- per credit Rs.25/=
Other course units	MAT1142, ICT1b13 (CLC), ICT2b13 (CCIT) ENG1101/1201/2101/2201/3101/3201	Rs. 40/=

## 15 Gold Medals and Awards

### 15.1 Gold Medals

- **L.C. De Silva Memorial Gold Medal**  
A student who obtains the highest aggregate marks in the Bachelor of Science Degree final examination in Biological Science with a First Class Honours or a Second Class Honours (Upper Division) is awarded this Gold Medal.
- **R. H. Wijayanayake Gold Medal**  
A student who obtains the highest aggregate marks in Bachelor of Science (Honours) Degree in Chemistry with a First Class Honours or a Second Class Honours (Upper Division) is awarded this Gold Medal.
- **Dr.(Mrs.) Chandra Jayawardana Memorial Gold Medal**  
A student who followed the Bachelor of Science (General) Degree Course in Physical Science with Physics as a subject, and scored the highest aggregate marks at the Bachelor of Science (General) Degree Examination is awarded this Gold Medal.
- **Wasantha Mohotti Memorial Gold Medal**  
A student who obtained a First Class Honours with the highest aggregate marks in the Bachelor of Science (Honours) Degree Examination in Physical Science is awarded this Gold Medal.
- **Mallika de Mel Memmorial gold Medal by the Ronie de Mel Funded Trust Fund**  
A student who obtained a First Class Honours with the highest aggregate marks in the final Examinations leading to the Degree of Bachelor of Science is awarded this Gold Medal.
- **Professor Isabelle Attali Memorial Gold Medal**  
A student who scored the highest aggregate marks at the B.Sc. (Honours) Degree Examination in Mathematics with a First Class Honours is awarded this Gold Medal.
- **Dr. Jude Peiris Memorial Gold Medal**  
A student who scored the highest aggregate for the Industrial Mathematics Course at the B.Sc. (General) Degree in Physical Science Examination with at least a Second Class Honours (Upper Division) Honours is awarded this Gold Medal.
- **Industrial and Financial Systems(IFS)Gold Medal**  
A student who followed Computer Science as a subject achieving grade A for at least 50% of Computer Science core course units and obtained the highest aggregate mark with at least a Second Class Honours (Upper Division) pass at the B.Sc. General Degree final examination in Physical Science.
- **Tissaweera Siriwardene Jinasena Memorial Gold Medal**  
A student who obtained the B. Sc. (General) Degree with at least a Second Class (Upper Division) Honours, securing the highest overall GPA for Chemistry (core and optional) Course Units registered for the degree is awarded this Gold Medal
- **Professor Alawattagoda Pemadasa Memorial Gold Medal**  
A student who obtained the B.Sc. (Honours/General) Degree with a First Class Honours securing the highest GPA for Botany Course Units with at least 24 core and optional Botany Course Units registered for the degree is awarded this Gold Medal.

## 15.2 Annual Student Awards

Vice Chancellor's and Dean's awards shall be awarded annually to the students with the best overall performance in each faculty under the approved marking scheme. These awards are funded by the University and administered by the office of the Deputy Vice Chancellor with the collaboration of faculties and assistance of the Examinations and the Student Affairs branches.

### 15.2.1 Dean's Awards and Dean's List for Overall Performance

Best five students in each batch from each faculty shall be selected under the approved marking scheme.

- **Dean's Awards for Overall Performance** Dean's awards shall be awarded to the best student in each batch under following categories at an award ceremony held at the faculty.

#### **For non medical students**

- Best first year students
- Best second year student
- Best third year student (including both general and Honours students)
- Best fourth year student (For Honours students of Faculties of Science and Humanities and Social Sciences , and students from Faculties of Agriculture, Engineering, Fisheries and Marine Science & Technology, Management and Finance and Faculty of Graduate Studies and Allied Health Science degree programme )

#### **For medical students**

- Best 2nd MBBS student
- Best 3rd MBBS student
- Best Final MBBS Student

A certificate of achievement (and a cash prize of Rs.10,000.00) will be awarded annually at an Awards Ceremony held at faculty level.

- **Dean's List for Overall Performance** Next four students in each batch who top the list under the approved marking scheme shall be included in the Dean's list and announced at the relevant Faculty Board. A certificate of achievement will be awarded to each student at an awards ceremony held at the faculty.

### 15.2.2 The Vice Chancellor's Awards and Vice Chancellor's List for Overall Performance

Best overall student who completed the degree from each faculty shall be selected under the approved marking scheme. Next two best students from each faculty shall be included in the Vice Chancellors's list.

- **Vice Chancellor's Award for Overall Performance** A Gold Medal and a Certificate of Achievement shall be awarded. Students of graduating batch will be eligible for the Vice Chancellor's Award. The Gold Medal and the Certificate of Achievement will be awarded at the General Convocation.

- **Vice Chancellor's List for Overall Performance** Next two students who top the list under the approved marking scheme from each faculty shall be included in the Vice Chancellor's list and announced at relevant Faculty Board. A certificate of achievement will be awarded at an award ceremony held at the Faculty.

### 15.2.3 Application procedure

- Students shall apply for the awards using an application form issued by the University. Application forms shall be available at Dean's office and can be downloaded from university website.
- Students shall submit certified copies of all the documentary evidence with the application.
- Students shall submit their applications through their Mentors/Academic Advisors who shall certify the contents of the applications.
- Students shall be prepared for and participate in an interview if the selection panel requests.

### 15.2.4 Eligibility requirements

- **Academic Requirements**

**For Non-Medical students:** The students obtaining an average GPA required for a Second Class Upper Division or above in the first attempt of the relevant examination of the courses of study in each academic year will be eligible for an award.

**For Medical students:** Students obtaining 2nd Class Upper division or above in the first attempt of the relevant examination of the courses of study will be eligible for an award.

- **Other Requirements**

- Any student who has been punished by the University and/or warned (in writing) by the Vice Chancellor or Deputy Vice Chancellor as found guilty for any misconduct shall not be eligible for an award.
- The overall score achieved by the applicant shall be 70 marks or above for the Vice Chancellor's Award/ List and 65 marks or above for the Dean's Award/ List.

### 15.2.5 Selection Criteria

- **Academic Achievements (Maximum 60 marks)**

- **For Non- Medical students:**

**Case 1:** If the applicant has the highest GPA above the required GPA for first class or the required GPA for the first class which is higher shall be given 60 marks and other student shall be given marks which are scaled down according their GPA.

**Case 2:** If there no applicant having highest GPA above the required GPA for first class or the required GPA for the first class, 60 marks shall be given for the required GPA for the first class and the other eligible students shall be given marks which are scaled down according to their GPA.

The average of the GPA obtained at each examination of relevant academic year shall be considered separately for the Dean's Award. The overall GPA obtained for all examinations shall be considered for the Vice Chancellor's Award.

- **For Medical students:**

**Case 1:** The applicant with the highest total aggregate above the required marks for the first class or the required marks for the first class which is higher shall be given 60 marks. The other eligible students shall be given marks which are scaled down according to their total aggregate.

**Case 2:** If there no applicant having highest aggregate above the required marks for first class or the required marks for the first class, 60 marks shall be given for the required total aggregate for the first class and the other eligible students shall be given marks which are scaled down according to their total aggregate.

The total aggregate obtained at each examination of relevant academic year shall be considered separately for the Dean's Award, the total aggregate obtained for all examinations (2nd MBBS, 3rd MBBS and Final MBBS) shall be considered for the Vice Chancellors Award.

- **Sports Achievements (Maximum 20 marks)** Maximum twenty marks shall be allocated for Sports achievements as follows:

Description	Marks
World University Games/National Games	
First Place	20
Second Place	15
Third Place	10
Participation for an event (maximum up to 10 marks)	5
International Sports event representing the University	
First Place	10
Second Place	8
Third Place	6
Participation for an event	3
Inter University Events	
First Place	6
Second Place	5
Third Place	4
Participation for an event (Maximum up to 04 Marks)	2
Inter Faculty Events	
First Place	1.5
Second Place	1
Third Place	0.5
University Colors/ Best Athlete/ Player of the year	3
Post of President, Vice President, Secretary, Junior Treasurer, Editor of Sports Council	1/position/year



- **Other Achievements (Maximum 20 marks)** Maximum twenty marks shall be allocated for extracurricular activities other than sports.

Description		Marks
Post of President, Vice President, Secretary, Junior Treasure and Editor of Student Unions/Societies/Associations		1 position for year
Participation at the "Kavitha" Talent Show or Equivalent event	First Place	10
	Second Place	8
	Third Place	6
Participation for an Event	Final Round	4
University approved event /competition/Orator/Singing/Dancing/Poetry Writing/Scrip Writing etc.) (Solo or Group)		
University Level	First Place	5
	Second Place	4
	Third Place	3
Faculty Level	First Place	2
	Second Place	1.5
	Third Place	0.5
Recipient of Patent		8
University approved Event Organizing		0.5
Inter University Level Competition/Awards	First Place/Best Award	6
	Second Place	5
	Third Place	4
Approved University representation at International Forum / Event		5
Paper accepted/presented at any Conference/Symposia		3
Publication of Books / Holding of Individual Exhibition (Paintings/Arts/Handcrafts/etc.)		2
Contribution to official function of the University		0.5

### Special Note:

- If the overall score achieved by two or more candidates for the Vice Chancellor's Awards is identical, Special panel consisting Vice Chancellor, Deputy Vice Chancellor and Dean of the relevant Faculty shall reevaluate the candidates to select the best student

## 16 Student Service Facilities

There is a Student Affairs Branch with a Senior Assistant Registrar at the University to look after the needs of the students outside their courses. It is located in the second floor of the administration building. Many services such as registration of students, Mahapola scholarships, bursaries, student hostels and cafeterias are operated by the Student Affairs branch.

In addition, this branch coordinates two other important services, Student Counselling Service and Health Service.

### 16.1 Counselling Service Centre

The counselling centre is located in the Science Faculty Complex. Counselling service centre's mission is to provide services and programmes, which promote the personal development and psychological well being of students, and to encourage a university atmosphere which is conducive to growth and which maximizes students' educational attainments. Students have the opportunity to discuss their various mental, social, economical problems or any other matters which they face during their University education. Counsellors, who are Senior academics, offer their assistance, advice and guidance to those students in need. Each faculty has its own group of Student Counsellors. In addition, students also have the opportunity to discuss their problems with other academics.

#### Senior Student Counsellor of the University

Dr. Amila B Sirisena (Faculty of Management and Finance)

#### Deputy Senior Student Counsellor of the Faculty

Dr. S. Wanniarachchi

#### Student Counsellors of the Faculty of Science

Name	Department	Mobile No/Email Address
Dr. N.P. Dissanayake	Botany	0718209475 nandapd@bot.ruh.ac.lk
Dr. H.D. Jayasekara	Chemistry	0718254310 himali@chem.ruh.ac.lk
Dr. A.S. Ranaweera	Chemistry	0714445180 samantharan@chem.ruh.ac.lk
Dr. W.S. Hemalika	Chemistry	0714936125 hemalika@chem.ruh.ac.lk
Dr. W.M.A.K. De Silva	Physics	0766612348 desilva@phy.ruh.ac.lk
Dr. W.A. Indika	Computer Science	0717796910 waindika@dcs.ruh.ac.lk
Dr. N.M. Wickramage	Physics	0718194500 monohari@phy.ruh.ac.lk
Dr. Y.M.A.L.W. Yapa	Chemistry	lalithyapa@chem.ruh.ac.lk
Dr. E.J.K.P. Nandani	Mathematics	0703080345 nandani@maths.ruh.ac.lk
Mrs. W.P.S.N. Wijeweera	Zoology	surendi87nisha@gmail.com

## 16.2 Career Guidance Unit

### 16.2.1 Introduction

The Career Guidance Unit of the University of Ruhuna was set up in March 2000, to provide career guidance services to the undergraduates. Since then, the unit has implemented various programs to make the undergraduates aware of the employment opportunities available, the qualities expected by the employers, and the way of acquiring the skills and the knowledge necessary for responding to the job market needs. The unit wishes to build-up continuous links with the private sector as well the government institutions to facilitate productive interaction between the undergraduates and such institutions. The CGU assists undergraduate students to realize their competencies and creativity, and to provide them with appropriate trainings to enhance their employability and to guide them to make optimum decisions on educational and occupational choices in order to achieve the future goals of their personal life, academic and professional career in a challenging world of work. Every student is supposed to register with CGU at the time of university entrance and he/she can participate in the selected CGU programs on voluntary basis thereafter with consultation of the Faculty Academic Career Advisor. Such programs include regular soft skills development courses, Leadership trainings, talents enhancing programs, out bound trainings, career clubs, industry visits, internships, graduate placements etc. The CGU central office is located at the Wellamadama premises; however, programs are conducted at the faculty level and will be announced from time to time via CGU web and the faculty information dissemination systems.

### 16.2.2 Staff of Career Guidance Unit

This unit comprises of a Director, Faculty Career Advisors and Career Guidance Counsellors as mentioned below.

Director	Dr Nandasiri Keembiyahetti/Senior Lecturer BA (Peradeniya), M. Soc Sci (Nus-Singapore), PhD (Colombo) Tel. Office: 041-2222681, Ext: 2132, Mobile: 0715359388 E-mail: nandasiri@econ.ruh.ac.lk
Career Guidance Counsellor	Ms. Sujeewa Vidanagamage BA (Hons), MA (Sociology), PGD (Counseling), Dip. in Counselling(IPC), MPC Mobile: 071 4475666 E-mail: sujeewapt@gmail.com
	Mrs. Pubudu Mallawarachchi B.Sc. (Hons) (Ruhuna), Dip. in Counseling (Ruhuna), Industrial Training (Korea) Mobile: 071 8359365 E-mail: bpkcgu@gmail.com
	Mr. W.P. Nilanka Srinath BA(Hons)(Ruhuna), MA(BPU), MA(Kelaniya), Royal Pandith(OSS), PGD in Counseling(Colombo), PGD in Education(OUSL) Mobile: 071 4395787 Email: wpnilankasrinath@gmail.com
Computer Applications Assistant	
Office Assistant	Mr. H. Gamunu

## Faculty Career Advisors

Faculty of Agriculture	Dr. M.A.P.D.P. Wickramaratne / Senior Lecturer Department of Agricultural Economics Bsc. (Agri), MBA (Ruh), MBA (Colombo), PhD (Japan) Mobile: 071 8336908, E-mail: aruni@agecon.ruh.ac.lk
Faculty of Allied Health Sciences	Dr. Sujeewa Hettihewa / Senior Lecturer Department of Pharmacy PhD (Auckland, NZ), MPhil (Peradeniya), MSc (Nottingham, UK), BSc. Chemistry Honours, (Japura, SL)M.I.Chem.C (SL) Mobile: 071 1943078 E-mail: krishanthi2001@yahoo.com
Faculty of Engineering	Dr. Ruwan Gallage / Senior Lecturer Department of Mechanical & Manufacturing Engineering D Eng (Tokyo, Japan), M Eng (Tokyo, Japan), BSc Eng (Moratuwa, SL) Tel: 076 6450433 E-mail: rgallage@gmail.com
Faculty of Fisheries and Marine Sciences & Technology	Mrs. R.G.A. Iroshanie / Lecturer Department of Oceanography & Marine Geology B.Sc.(Hons) in Fisheries Biology (Ruhuna), M.Sc.(Bodo, Norway) Mobile: 071 7591192 E.mail: anushikagamage@gmail.com
Faculty of Humanities & Social Sciences	Dr. W.I.C.S. Gunasinghe/Senior Lecturer Department of Economics BA(Colombo), Msc (Adger Norway), Ph.D. (Griffith, Australia) Mobile: 071 9210168 Email: gunasinghe@econ.ruh.ac.lk
Faculty of Management & Finance	Mr. E.K. Jayampathi /Lecturer (Probationary) Department of management and Entrepreneurship BBA (Ruh, SL), MSc (Sjp, SL) Mobile: E.mail: jayampathi2k@gmail.com
Faculty of Medicine	Dr. L.B Lahiru Prabodha/Senior Lecturer Department of Anatomy MBBS, Mphil, Msc Mobile: E.mail: lahiruprabodha@med.ruh.ac.lk
Faculty of Science	Dr. N. Yapage / Senior Lecturer Department of Mathematics B.Sc. (Ruhuna, Sri Lanka), Ph.D.(UEC, Japan) Mobile: 077 9516475 E.mail: niha1@maths.ruh.ac.lk, yapagen@gmail.com
Faculty of Technology	Ms. W.M.C.S Jayaweera / Lecturer (Probationary) Department of Bio System Technology B.Sc. (Ruhuna, Sri Lanka) Mobile: 071 1371046 Email: champikajayaweera@yahoo.com

CGU Contact Details: Telephone - Office: 041 22222681 Ext: 2132

### 16.2.3 Activities of the Career Guidance Unit

Career Planning	Career Development	Skill Development
1. Soft skills and personality development 2. Workshop on CV writing & interview facing 3. How to plan your life 4. How to achieve your targets 5. Identify yourself and your friends 6. Good behavior & sex education for young university students 7. Job fair	1. Blossm your life (06 weeks program) 2. New trends of job market 3. How to succeed 4. "Oba Asirimathya" 5. How to become a leader 6. Positive attitudes	1. First Aid training 2. Table manners 3. Community Services 4. Leadership program 5. Educational Magazine 6. Telephone Skills 7. Communication Skills 8. Seven habits of higly effective people

## 16.3 University Medical Facilities

The medical center and the Dental Clinic are located in a building close to the Department of Physics. There is an also ayurvedic medical center located near Bachelors Quarters. These centers provides health care to staff and students.

### Medical Officers:

University Medical Officers	Dr. (Mrs) K.Rathnayaka
Dental Surgeon	Dr. (Mrs.) S. Atapattu
Ayurvedic Medical Officer	Dr. M. A. T. T. Wickramasinghe

Every student of the university at the first enrollment must face a medical test. The aim of this test is to determine whether the student has suitable health condition to continue the academic career without difficulties. If a student is found to be suffering from a severe decease, he/she is directed to Special clinics in the hospital for treatments. During the academic year, the medical centre is open for treatment for students as well as staff from 8.00 am to 5.00 pm on weekdays. All drugs are free of charge. If a prescribed drug is not available in the clinic, the University will reimburse the expenses.

### 16.3.1 Illness During Examination Period

If a student is unable to sit for the exam due to an illness he/ she should inform the University medical officer and examination branch immediately. The medical certificates obtained from outside medical officers should be submitted to the examinations branch within three days with the approval of the University medical officer.

Whenever necessary students should follow the above procedure in producing medical certificate for smooth functioning of their education during stipulated period of study.

## 16.4 Miscellaneous Facilities

### • Cafeterias (for students & Staff)

There are three cafeterias located in the Wellamadama University Complex.

### • Shops

- The 'World University Service' maintains a bookshop (WUS Book Shop), which stocks stationary goods.
- The University also maintains a co-operative store (SANASA) in university premises, and daily provisions can be bought from it.
- Facilities of Barbour Saloon and Shoe repair are also available inside the university.

### • Monthly Season Tickets

Ruhuna University students are able to buy monthly season tickets at concessionary rates for the train service and for the public bus service.

- **Postal Service**

Ruhuna University post- office is located opposite to the main entrance gate. It is open from Monday through Saturday from 8.00 am to 5.00 pm.

- **Banks**

Branches of Bank of Ceylon and People's Bank are located at the University premises. The usual banking hours apply to these branches.

## 17 Student Unions and Societies

### 17.1 Science Faculty Students' Union

According to the amended University act of 1988, Section 26, students of each faculty can form a Faculty Union comprised of all students of the faculty. The main objective of this union is to promote academic actions, to safeguard the rights of the student population, to work for the advancement and welfare of the students and the faculty.

### 17.2 Student Societies

In addition to the Faculty Union, there are other registered societies, which are affiliated to different departments.

- Nature Explorers' Society
- Science Faculty Kala Hawula
- Buddhist Society
- Scientific Martial Arts & Yoga Exercise society
- Botanical Society
- Zoological Society
- Birder's Club
- Physics Society
- Research Circle
- Chemical Society
- Photography Society
- Ruhuna University Mathematics and Statistics Society (RUMSS)
- Sports Club

## **18 Other Information**

### **18.1 The Cultural Centre**

This center functions in collaboration with the Ministry of Cultural Affairs. It consists of an Aesthetic Unit and a Research Unit.

Aesthetic Unit helps to promote aesthetic sensitivity, creative skills among the university population. The unit conducts classes on oriental music, western music, violin, dancing, cinematic study, literacy efficiency, drawing and sculpting from 4.00 p.m. to 6.00 p.m. on weekdays and from 9.00 a.m. to 4.00 p.m. at weekends. Research Unit researches and conserves the regional cultural features and heritage of national importance. It is further expected to undertake activities to conserve the regional folk arts and folklore, to collect and conserve the cultural features endemic to this region, to publish classical articles and make documentary films on the traditional performing arts of the South and the artistes of the South.

Mr. Jayantha Amarasinghe officiates as the coordinator of the center and Mr. Mahinda K. Udawela who has been appointed by the Cultural Ministry functions as Cultural Officer.

### **18.2 Resource Centre for Modern Languages**

Resource Centre for Modern Languages was established in April 2002 with the aim to provide students with opportunities to study various languages other than “Sinhala” and “English”. The activities of this centre are (coordinated & looked after by) a committee of academics, which includes a Coordinator ( Mr. N.A.D. Jayasinghe) and one representative from each Faculty of the University.

Presently, the Language centre conducts classes in the languages of French, German, Japanese, Tamil and Swedish for students with the help of resource persons available in the University academic community.

### **18.3 Employment opportunities for graduates**

#### **18.3.1 Temporary Demonstrator**

Almost all Departments recruit a considerable number of students as Temporary Demonstrators on completion of their final examination. These assignments normally last for three months up to two years. The selection is based on their performance at examinations as well as in the classes. Special attention is given to satisfactory attendance at lectures and practical classes and performance at English Examinations conducted by the English Language Teaching Unit of the University.

#### **18.3.2 Research Assistantships**

Graduates with satisfactory performance at academic programmes would have opportunities to obtain Research Assistantships depending on the facilities and grants available in different departments of the faculty. A limited number of Research Assistants will be allowed to proceed for postgraduate degrees such as M.Phil. and Ph.D.



## 19 Appendix - Administrative Officers of the University

### **Registrar**

Mrs. P.S. Kalugama, *B.A. (Econ) (Sp.) Hons. (SJP), M.A. (Edu) London, UK, MBA (RUH)*

### **Bursar**

Mr. A.M.A. Siriwardhana, *B.Sc. (SJP), Inter Mediate(ICASL)*

Deputy Bursar

## **Administrative/Finance Officers of Wellamadama Complex**

### **1. Legal & Documentations**

Mr. G.L. Erathna, *LL.B. (Sri Lanka) Attorney-At-Law, P.G. Dip. in Conflict Resolution (CMB)*

Deputy Registrar (Legal & Documentation)

### **2. General Administration**

Mrs. T.D.G. Pathirana, *B.Sc. (General) Hons. (RUH), PG Dip. in Business Management (CMB)*

Senior Assistant Registrar

Mr. E.G.Ajith Dhammika, *PG Dip. in Marketing Management (SJP), MBA(SJP)*

Assistant Registrar

### **3. Examinations**

Mrs. C. Seneviratne, *B.Sc. (General) Hons. (RUH), PDBA (RUH), Dip. in English (CMB)*

Deputy Registrar

Mrs. T.S.Nanayakkara, *PG Dip.in Information Managemenent (NILLIS)*

Assistant Registrar

### **4. Non Academic Establishment**

Mrs. K.G.C.A. Bandarathilake, *B.Sc. Management (Public) (Sp.) Hons. (SJP), ICASL , Executive Dip. in Accounting & Finance Part I (ICASL) ,PG Dip. in Business Management (CMB)*

Senior Assistant Registrar

### **5. Academic Establishment**

Mrs. H.G.N. Devika, *B.A. (KLN), MA (Sociology)(RUH)*

Senior Assistant Registrar

### **6. Distance and Continuing Education Unit**

Mrs.G.N.P.Mallika , *B.Sc. Management (Public Administration -External)(SJP)*

Assistant Registrar

### **7. Corporate Management Division**

Mrs.P.M.S.P.Yapa, *B.Sc.(Sp.) Hons.(RUH), MBA(RUH)*

Deputy Registrar

### **8. Salaries & Loan**

Mrs. K.V.R. Vidyaratne, *B.B.A. (Sp.) Hons (RUH), CBA (ICASL), MAAT, Dip. in English for Employment (RUH)*

Senior Assistant Bursar

### **9. Accounts**

Mr. De Zoysa, *D.L.R., B.Sc. (Sp.) Hons. Accounting (SJP), ACA*

Assistant Bursar

### **10. Payments** Mrs. D.V.L.Krishani, *B.B.A. (Sp.)(Accounting)(RUH), Strategic Level I (ICASL)*

Assistant Bursar

### **11. Supplies**

Mrs. B.H. Chintha, *B.Com. (Sp.) Hons. (KLN), PDBS (RUH), Dip. in English for Em-  
ployment (RUH)*

Senior Assistant Bursar

Miss. E.A.S.M. Perera, *B.B.Management Accountancy (Sp.) (KLN),CAB II (ICACL)*  
Assistant Bursar

**12. Internal Audit**

Mr. O.V.L.P. Anura, *BBA (Sp.) Hons. (RUH)*

Senior Assistant Internal Auditor

Mr. S.W. Kodithuwakku, *B.Com. (Sp.) (RUH), PG Dip. in ICASL*

Senior Assistant Internal Auditor

**13. Library**

Mrs. G.A.J. Hemmali

Senior Assistant Registrar (Library Service)

Mr. C.P.K. Edirisinghe, *B.A. (Stat) Hons. (SJP), PDBA (RUH)*

Senior Assistant Registrar (Library Service)

**14. International Affairs Unit & Internal Quality Assurance Unit**

Miss. M.I. Dilhani, *B.Sc. Agric.Hons. (RUH)*

Assistant Registrar

Mrs. C.D. Amarathunga, *BA (General)(KLN),PG Dip. in Writership & Communication (SJP)*

Assistant Registrar

**15. Student Affairs**

Mr. W.W.Anura, *B.A.Hons.(PDN), M.A. (CPDS) Tribhuwan, Nepal, Dip. in English for Employment (RUH), Dip.in Psychological Counseling (RUH)* Senior Assistant Registrar(Acting)

**16. Security Section**

Mr. H.N. Dias

Chief Security Officer

**17. Physical Education**

Mr. P.N. Weerasinghe, *B.Com (Sp.) (SJP), Dip. in Sports (SCHOOL OF SPORTS)*

Director of Physical Education

**18. Lands & Buildings**

Mr. S. Diyunuge, *B.Sc. (Eng.) Hons. (MRT), PG. Dip. (BSE), MIES, AMIESL*

Works Engineer

## **Administrative/ Finance Officers of Faculties**

**1. Faculty of Humanities & Social Sciences**

Mr. P.A. Piyal Renuka, *B.A. Statistics (SJP), P.G. Dip. in Comty Devt (CMB), PG Dip. in Business Administration(RUH)*

Deputy Registrar

**2. Faculty of Science**

Miss. K.D.De.S. Jayasekara, *B.Sc. (Zoology)(Sp.)Hons.(CMB)*

Assistant Registrar

**3. Faculty of Management & Finance**

Mr. K.G. Nalintha Kumara

Assistant Registrar

**4. Faculty of Fisheries & Marine Sciences and Technology**

Mrs. D.M.H.C. Dasanayake, *B.Sc.Hons in Business Information Technology(Uni.of Greenwich)*

Assistant Registrar

**5. Faculty of Graduate Studies**

Mr.W.W.Anura, *B.A.Hons. (PDN), M.A.(CPDS) Tribhuwan, Nepal, Dip. in English for Employment (RUH), Dip. in Psychological Counseling (RUH)*  
Senior Assistant Registrar

Miss. W.Dinushi Sirisena, *CIMA, B.Sc. in Business Management (NIBM)*  
Assistant Bursar

**6. Faculty of Agriculture**

Mrs. S.K.K. Mudalige, *B.Sc. Agric. Hons. (RUH), M.Sc. (PDN), Certificate in Human Resource Management (MASSEY), MBA (RUH)*  
Deputy Registrar

Miss. H. Pushpika Hewaratne, *P.B. Mgt (KLN), Dip in Accountancy (SLIATE), Dip in Com.Software (TECHNICAL EDUCATIONAL INSTITUTE), , Intermediate Level( ICASL)*  
Assistant Bursar

Mr. U.P. Belpagodagamage, *B.Sc. Agric. (RUH)*  
Farm Manager

Mr. R.J.K. Rajapakshe, *B.Sc. Agric. Hons. (RUH)*  
Curator (Landscape)

**7. Faculty of Engineering**

Mrs. G.H.C. Nadeeshani, *B.Sc.HRM(Sp.)Hons.(SJP),CIMA(Final)*  
Assistant Registrar  
Mrs. A.S.I. Fernando, *B.Com. (KLN), ACA*  
Assistant Bursar

Mr. A.G.K.M.S. Sriyantha, *B.Sc. (Eng.) (Production) (PDN)*  
Workshop Engineer

**8. Faculty of Medicine**

Mr. L.Isuru Kalpage, *B.Sc. (Finance) (Sp.) Hons.(SJP), Intermediate Level (ICASL)*  
Senior Assistant Registrar

Mrs. A. Anusha, *B.Sc. (Business Administration) (Sp.) (SJP), Final I (ICASL)*  
Senior Assistant Bursar

**9. Faculty of Technology**

Mrs. R.Lakmali Hettiarachchi, *BBA(Finance) (Sp.)(CMB), Business Level (ICASL)*  
Assistant Registrar

Mr.R.C. Katippearachchi, *B.Sc. Accounting (Sp.), AAT, ICASL (Intermediate Level)*  
Assistant Bursar

**10. Faculty of Allied Health Science**

Mrs. V.Hiroshini Piyadasa, *B.Sc. Hons. Agric(RUH)*  
Senior Assistant Registrar

Mrs. E.H. Manjula Ranasinghe, *B.Sc. Chemistry (Sp.) (KLN), M.Sc. in Analytical Chemistry (CMB)*  
Assistant Registrar

Miss. A.G.K. Chandraratne, *B.B. Management Accountancy (Sp.) (KLN),AAT (Passed Finalist ), Business Level (ICASL)*  
Assistant Bursar