University of Ruhuna
Faculty of Science
Matara, Sri Lanka

Student Handbook - 2022/2023

බබලන සිරි ලක දකුණේ
විරුවන් බිහි කළ දෙරණේ
පඬුවන් වොරුදුණු පොරණේ
සරසවියයි මේ රුහුණේ

විද්‍යා ශිල්ප කලා නැණ හරවත්
ලබමින් දන මන කරමින් පැණවත්
දෙස බස රැස සුරකින ඔද තෙදවත්
මිනිසුන් වෙමු ලෝ පසසන ගුණවත්

යුක්තිය ශක්තිය බව නිති සිහි කර
දැ ගොත් කුල මල පටු මත බිඳ හැර
නම රැක පරසිදු රෝහණ පුරවර
හිරු සඳු වෙමු ලක් සරසවි නිල'ඹර

ගී පද මාලා : මහාචාර්ය සුනිල් ආරියරත්න.
තනු නිර්මාණය සහ සංගීතය : ආචාර්ය පණ්ඩිත් ඩබ්.ඩී. අමරදේව.

University of Ruhuna
Faculty of Science
Student Handbook 2022/2023

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

1 University of Ruhuna **1**
- 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

2 Faculty of Science **7**
- 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

3 Academic Regulations and Procedures **10**
- 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

4 Faculty of Science Management Information System - (FOSMIS) **20**
- 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

5 Department of Botany **24**
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 BSc (General) Degree . . . 26
5.5 Course Units for BSc (Honours) Degree in Botany . . . 32
5.6 Credit Values . . . 39
5.6.1 BSc General Degree . . . 39
5.6.2 BSc (Honours) Degree in Botany . . . 39

6 Department of Chemistry **41**
6.1 Research Areas . . . 41
6.2 Head of the Department . . . 42
6.3 Members of the Academic Staff . . . 42
6.4 Course Units in Chemistry for BSc (General) Degree . . . 43
6.5 Course Units in Chemistry for BSc (Honours) Degree . . . 47
6.6 Credit Values . . . 51
6.6.1 BSc General Degree . . . 51
6.6.2 BSc Honours Degree in Chemistry . . . 51

7 Department of Computer Science **53**
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 BSc (General) Degree . . . 56
7.6 Course Units in BSc (Honours) Degree in Computer Science . . . 60
7.7 Credit Values . . . 67
7.7.1 BSc General Degree . . . 67
7.7.2 BSc (Honours) Degree in Computer Science . . . 68
7.8 ICT Course units of Bachelor of Science (General) Degree . . . 68
7.9 Bachelor of Computer Science (General) Degree . . . 69
7.9.1 Course units for Bachelor of Computer Science (General) Degree (BCS) 69
7.10 Bachelor of Computer Science Hons Degree . . . 76
7.10.1 Selection Criteria for the BCS Honours Degree Programme . . . 76
7.11 Credit Values . . . 80
7.11.1 Bachelor of Computer Science (General) Degree (BCS) . . . 80
7.11.2 BCS Honours Degree Programme . . . 81
7.12 Examinations - BCS Degree Programmes . . . 81
7.12.1 Attendance . . . 81
7.12.2 Examination Criteria . . . 81
7.12.3 Bachelor of Computer Science (General) Degree Requirements . . . 82

7.12.4 Minimum Requirement for the Completion of the Bachelor of Computer Science (Honours) Degree . . . 83
7.12.5 Option of reverting to BCS General Degree . . . 83
7.13 Other Services to the University Community . . . 84

8 Department of Mathematics 85
8.1 Introduction . . . 85
8.2 Research Areas . . . 85
8.3 Head of the Department . . . 85
8.4 Members of the Academic Staff . . . 86
8.5 Course Units offered for BSc (General) Degree . . . 87
8.6 BSc (Honours) Degree Programmes in Mathematics . . . 96
8.6.1 Course Units offered for BSc Honours Degree in Mathematics . . . 96
8.7 Credit Values . . . 101
8.7.1 BSc General Degree . . . 101
8.7.2 BSc (Honours) Degree in Mathematics . . . 103
8.8 BSc Honours Degree Programmes in Financial Mathematics and Industrial Statistics . . . 103
8.8.1 Introduction . . . 103
8.8.2 Detailed Syllabus for Financial Mathematics & Industrial Statistics . 103
8.9 Examinations - BSc Honours Degree Programmes in Financial Mathematics and Industrial Statistics . . . 113
8.9.1 Evaluation . . . 113
8.9.2 Attendance . . . 113
8.9.3 Grading . . . 114
8.9.4 Award of BSc Honours Degree in Financial Mathematics and Industrial Statistics . . . 114
8.9.5 Award of Classes . . . 115
8.10 Exit from the Degree Program . . . 115
8.10.1 Option for an exit with a two-year Higher Diploma in Science or a three-year BSc General Degree . . . 115
8.10.2 Two-year Higher Diploma in Financial Mathematics and Industrial Statistics . . . 115
8.10.3 Three-year BSc (General) Degree in Financial Mathematics and Industrial Statistics . . . 115
8.11 Credit Values . . . 116
8.11.1 BSc Honours in Financial Mathematics and Industrial Statistics Degree 116

9 Department of Physics 118
9.1 Research Areas . . . 118
9.2 Head of the Department . . . 119
9.3 Members of the Academic Staff . . . 119
9.4 Course Units in Physics for BSc (General) Degree . . . 120
9.5 Course Units in Physics for BSc (Honours) Degree . . . 123
9.6 Credit Values . . . 126
9.6.1 BSc General Degree . . . 126
9.6.2 BSc (Honours) Degree in Physics . . . 126

10 Department of Zoology **127**
10.1 Research Areas . . . 127
10.2 Head of the Department . . . 127
10.3 Members of Academic Staff . . . 127
10.4 Course Units in Zoology for BSc (General) Degree . . . 128
10.5 Course Units in Zoology for BSc (Honours) Degree . . . 133
10.6 Credit Values . . . 137
10.6.1 BSc General Degree . . . 137
10.6.2 BSc Honours Degree . . . 137

11 Optional Course Units (or FSCs) offered by the Faculty **138**
11.1 Optional Course Units offered in Semester I . . . 138
11.2 Optional Course Units offered in Semester II . . . 139

12 Learning Resources **141**
12.1 Library Facilities . . . 141
12.1.1 Introduction . . . 141
12.1.2 Staff of the Library . . . 141
12.1.3 Library Opening Hours . . . 142
12.1.4 Library Collections . . . 142
12.1.5 Library Resource Classification . . . 143
12.1.6 Library Catalogue . . . 143
12.1.7 Library Services . . . 143
12.1.8 Library Membership . . . 144
12.1.9 Use of the Library . . . 145
12.1.10 Contact information . . . 145
12.2 English Language Programmes . . . 145
12.2.1 Staff attached to the Faculty of Science . . . 145
12.2.2 English Language Courses offered by Faculty of Science . . . 145
12.2.3 Credit Values . . . 146

13 Sports and Recreation **147**
13.1 Physical Education Unit . . . 147
13.2 Staff of Physical Education Unit . . . 147
13.3 Sports Facilities . . . 147
13.4 Inter-Faculty and Inter-University Tournaments . . . 149
13.5 University Colors . . . 149

14 Examinations **150**
14.1 Bachelor of Science Degree Programmes . . . 150
14.1.1 The Bachelor of Science (General) Degree . . . 150
14.1.2 The Bachelor of Science (Honours) Degree . . . 150
14.1.3 Attendance . . . 150
14.1.4 Illness During Examination Period . . . 150
14.2 Examination Criteria . . . 150
14.2.1 Grades allocated for Course Units . . . 150
14.2.2 Evaluation Criteria for course units of BSc/BCS General and Honours degrees . . . 151
14.2.3 Pass in a Course Unit . . . 152

14.2.4 Examination Criteria on Mathematical Computing Course Units (IMT1b1β, IMT2b2β and IMT3b1β) in Industrial Mathematics . . . 152
14.2.5 Verification of Marks . . . 153
14.2.6 Bachelor of Science (General) Degree Examinations . . . 153
14.2.7 Award of Classes for BSc (General) Degree . . . 153
14.2.8 Bachelor of Science (Honours) Degree Examinations . . . 153
14.2.9 Award of Classes for BSc (Honours) Degree . . . 154
14.2.10 Option of reverting to BSc General Degree . . . 154
14.3 Other requirements for the completion of a Degree . . . 154
14.3.1 Attendance at Practical Course Units: . . . 154
14.3.2 Release of Final Results . . . 154
14.4 Fees . . . 155
14.4.1 Fees Levied for Registration for a Degree Programme . . . 155
14.4.2 Examination Fees . . . 155

15 Gold Medals and Awards **156**
15.1 Gold Medals . . . 156
15.2 Annual Student Awards . . . 156
15.2.1 Dean's Awards and Dean's List for Overall Performance . . . 156
15.2.2 The Vice Chancellor's Awards and Vice Chancellor's List for Overall Performance . . . 157
15.2.3 Application procedure . . . 157
15.2.4 Eligibility requirements . . . 157
15.2.5 Selection Criteria . . . 157

16 Student Service Facilities **159**
16.1 Counselling Service Centre . . . 159
16.2 Career Guidance Unit . . . 160
16.2.1 Introduction . . . 160
16.2.2 Staff of Career Guidance Unit . . . 160
16.2.3 Activities of the Career Guidance Unit . . . 162
16.3 University Medical Facilities . . . 162
16.4 Miscellaneous Facilities . . . 163

17 Student Unions and Societies **164**
17.1 Science Faculty Students' Union . . . 164
17.2 Student Societies . . . 164

18 Other Information **165**
18.1 The Cultural Centre . . . 165
18.2 Resource Centre for Modern Languages . . . 165
18.3 Employment opportunities for graduates . . . 165
18.3.1 Temporary Demonstrator . . . 165
18.3.2 Research Assistantships . . . 165

19 Appendix - Administrative Officers of the University **166**

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 and 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 2022, undergraduate population of the nine faculties of University of Ruhuna was 13029 (Table 1).

Table 1: Distribution of students among the nine faculties (as at 30.06.2022).

Name of the Faculty	**No. of Students**
Agriculture	936
Allied Health Sciences	990
Engineering	2280
Fisheries and Marine Sciences & Technology	552
Humanities and Social Sciences	3087
Management and Finance	2744
Medicine	1560
Science	2425
Technology	1299
Total undergraduate student population of the University	**15873**

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.

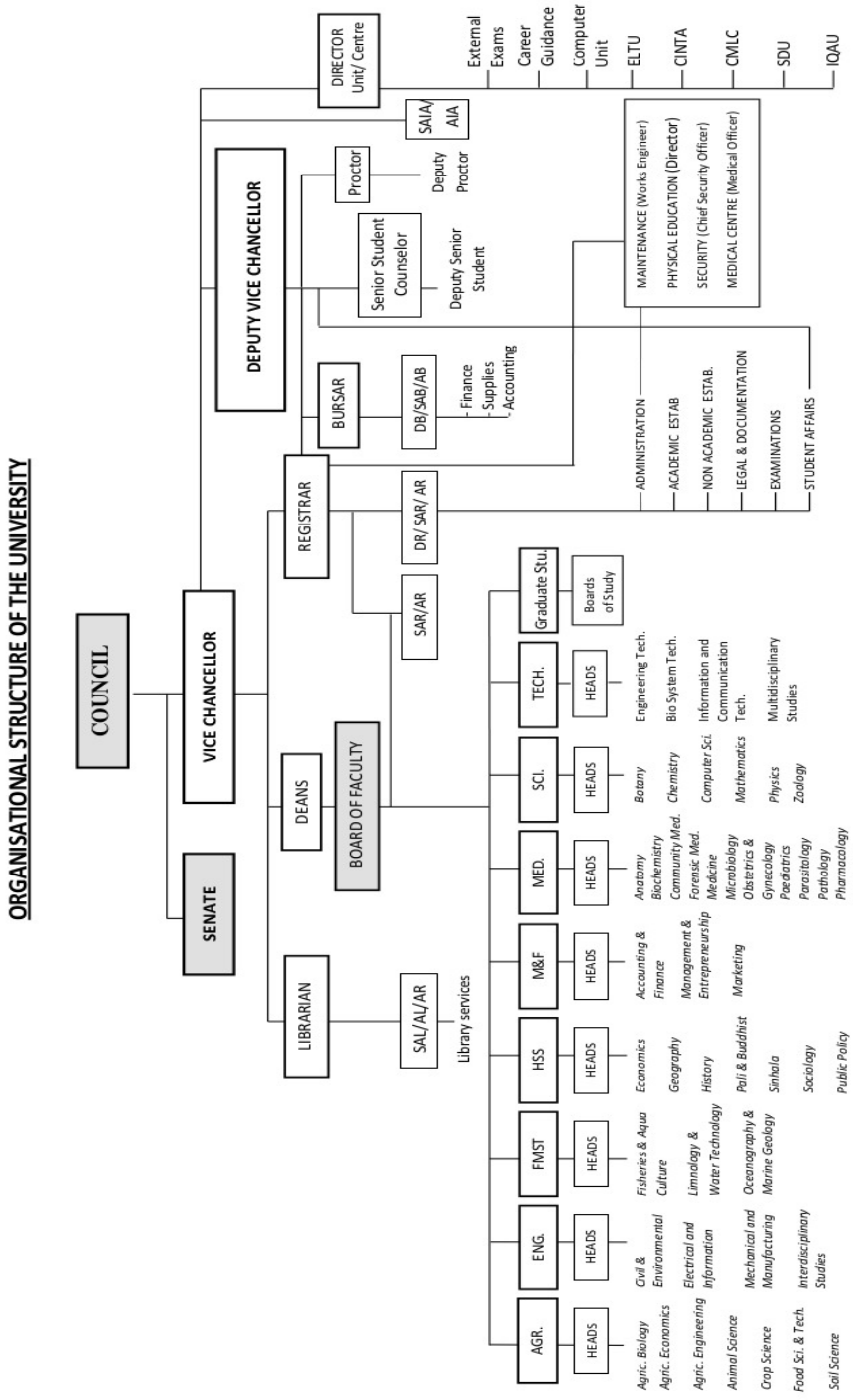
Traveling from Colombo to Matara can be made either by train or buses. There are only a limited number of trains but buses are available every half an hour through the normal route or expressway. The journey through normal route takes about four hours from Colombo while one and half hours through Southern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

1.3 Officers of the University

Chancellor	*Venerable Akuratiye Nanda Nayaka Thero*
Vice-Chancellor	*Senior Professor T.S.D. Amarasena* *MBBS (Ruhuna), DCH(Col.),* *MD(Paed-Col.), DCH(Syd.)*
Deputy Vice-Chancellor	*Prof. E. P. S. Chandana* *BSc (Ruhuna, SL), MPhil (Ruhuna, SL),* *PhD (Kyoto, Japan)*
Dean/Agriculture	*Senior Professor S. D. Wanniarachchi* *BSc Agric(Ruhuna), MSc (Guelph, Canada),* *PhD (Guelph, Canada)*
Dean/Graduate Studies (Actg.)	*Senior Professor P. M. C. S. De Silva* *BSc(Ruhuna), M.Phill (Bergen,Norway),* *PhD (Amesterdam,The Netherlands)*
Dean/Science	*Prof.(Mrs.) D. H. N. Munasinghe* *BSc (Ruhuna, SL)* *phD (Deakin, Australia)*
Dean/Medicine	*Senior Professor T. P. Weerarathna* *MBBS(Ruhuna),MD (Col), FCCP,* *FRCP(Edin),FACP*
Dean/Fisheries and Marine Sciences & Technology	*Prof. K. H. M. A. Deepananda* *BSc (Hons) in Zoology (Ruhuna, SL),* *MSc (Bremen, Germany),* *PhD (Kelaniya, SL)*
Dean/Humanities & Social Sciences	*Prof. Upali Pannilage* *PhD (Ruhuna), MPhil (Ruhuna),* *PGDip (Colombo),* *BA (Hons) (Ruhuna)*
Dean/Allield Health Sciences	*Prof. K. G. Imendera* *BDS (Pera), PhD (Japan)*
Dean/Management & Finance	*Dr. M. K. Wanniarachchige* *PhD (APU,Japan), MBA (APU,Japan),* *BBA(Ruh.SL)*
Dean/Engineering	*Dr. H. C. Ambawatte* *PhD (Russia), MSc (Russia), MSAE (Japan),* *FISITA (UK), FIAESL, MSLEMA,* *MASASL, MSLAAS*

Dean/Technology	*Prof. P. K. S. C. Jayasinghe* *PhD(Tokyo University of Agric. and Technology, Japan,* *MSc(Ibaraki,University, Japan)*
Librarian	*Mr. Nimal Hettiarachchi* *BBSc(Honuors, Ruhuna SL),* *MSSc(Lib & Inf. Science,Kelaniya, SL)*

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 faculties 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.
Faculty of Allied Health Sciences University of Ruhuna Karapitiya, Galle. 80000, Sri Lanka.	

1.5.2 Telephone and Fax Numbers of the University

	Telephone	**Fax**
Wellamadama Complex	+94(0)41222681-2 +94(0)412222683	 +94(0)412227001-4
Faculty of Agriculture	+94(0)412292200	+94(0)412292384
Faculty of Allied Health Science	+94(0)912232896	+94(0)912232896
Faculty of Engineering	+94(0)912245765	+94(0)912245762
Faculty of Fisheries and Marine Science & Technology	+94(0)412227026	+94(0)412227026
Faculty of Humanities and Social Sciences	+94(0)412227010	+94(0)412227010
Faculty of Management & Finance	+94(0)412227015	+94(0)412227015
Faculty of Medicine	+94(0)912234730	+94(0)912222314
Faculty of Science	+94(0)412222701	+94(0)412222701
Faculty of Technology	+94(0)413006130	+94(0)413006130

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	12001
Office	12004
Deputy Vice Chancellor	12002
Office	12006
Registrar	12003
Office	12008
Dean, Faculty of Fisheries	16000
and Marine Sciences & Technology	
Senior Assistant Registrar	16001
Dean, Faculty of Science	14000
Assistant Registrar	14001
Dean, Faculty of Humanities	13000
and Social Sciences	
Assistant Registrar	13001
Dean, Faculty of Management & Finance	15000
Assistant Registrar	15001
Dean, Faculty of Technology	60000
Assistant Registrar	60001
Dean, Faculty of Graduate Studies	12400
Assistant Registrar	12401
Librarian	12300
Bursar	12050
Senior Assistant Bursar (Finance)	12053
Assistant Bursar (Finance)	12057
Assistant Bursar (Supplies)	12065
Deputy Registrar (General Administration)	12014
Deputy Registrar (Examinations)	12026
Assistant Registrar (Student Affairs)	12040
Senior Assistant Registrar (Academic Establishment)	12035
Senior Assistant Registrar (Non-Academic Establishment)	12031
Engineer	12080
Director, Physical Education	12125
Medical Officer	12200
Carrier Guidance Unit	12145
Chief Security Officer	12150
	12151

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 (BSc) and Bachelor of Computer Science (BCS) General Degrees of three-year duration and BSc and BCS 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 MSc, MPhil and PhD All the departments possess well-equipped laboratories and other infrastructure facilities for teaching and research work. At present, the Faculty admits 250 students for Biological Science, 300 students for the Physical Science, 100 students for Computer Science and 50 for Financial Mathematics and Industrial Statistics 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

Dean *Prof.(Mrs.) D. H. N. Munasinghe* *BSc (Ruhuna, SL),* *PhD (Deakin, Australia)*	(041) 251-4000	dhnm@zoo.ruh.ac.lk	14000
Assistant Registrar *Mrs. S. Sharaniha*	(041) 251-4001	office@sci.ruh.ac.lk s.saranika@gmail.com	14001

Mrs. D.C.B.M. Kumari	Senior Staff Management Assistant
Mrs. K.D.L.H. Jayarathna	Instructor in Computer Technology (Gr.II)
Mrs. S. Palliyaguru	Management Assistant (Gr. I)
Mr. BAD. Wanigarathna	Management Assistant (Gr. I)
Mr. N.R.G. Munasinghearachchi	Management Assistant (Gr. I)
Mrs. H.M.N.S. Dias	Management Assistant (Gr. III)
Mrs. H.R. Nayana Kumari	Management Assistant (Gr. III)
Mr. H.L.D.S. Chandana	Works Aide (Gr.I)
Mrs. D.I. Rathnayake	Works Aide (Gr.I)
Mr. R.G. Janaka Chaminda	Works Aide (Gr.III)
Mr. K.W.J.N. Kumara	Works Aide (Gr.III)

2.4 Degree Programmes

Currently the Faculty of Science offers BSc General (3 year) and BSc Honours (4 year) Degrees in biological and physical science streams and Bachelor of Computer Science (BCS) General and Honours Degree programmes and Bachelor of Science Honours Degree in Financial Mathematics and Industrial Statistics. 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 BSc General Degree and a BSc 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
BSc General Degree	90	5
BSc Honours Degree	120	6
BCS General Degree	90	5
BCS Honours Degree	120	6

2.5.2 Accreditation

BSc 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.

General academic calendar of the Faculty of Science			
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	4	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
Computer Science	Computer Science subjects	CSC
Financial Mathematics and Industrial Statistics	Industrial Statistics	MIS
	Financial Mathematics	MFM
	Mathematics/Finance/Computing	MSF

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**
Theory Course Units:	15 contact hours	1
e.g.	30 hour Course Unit	2
	45 hour Course Unit	3
Practical Course Units:	30-45 hour Course Unit	1
	60-90 hour Course Unit	2
Projects:	30-45 hour Project	1
Combined Course Units: e.g.		
30 theory hours and 45	practical hours together	3
15 theory hours and 45	practical hours	2
30 theory hours and 22.5	practical hours	2.5

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 BSc (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, MIS: Industrial Statistics, MFM: Financial Mathematics, MSF: Statistical Finance, FSC: Supplementary Course Units
3	Level III	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, δ : 1.25, α : 1.5, 2, β : 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 b - Both Semesters
Sixth character:	Number given by the department	4 - Fourth course unit
Seventh character:	Credit value	3 - Three credits, β- 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. Foundation Course in Information Technology (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 BSc Level I & II											
BSc Level I						BSc 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
CHE1131	C	C	C		Pr	CHE2131	C	C	C		Pr
CHE1212	C	C	C		Th	CHE2212	C	C	C		Th
CHE1222	C	C	C		Th	CHE2222	C	C	C		Th
CHE1231	C	C	C		Pr	CHE2231	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
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	Pr	FSC215α	O	O	O	O	Pr
MAT1142	C	C	C	C	Th	FSC224α	O	O	O	O	Th+Pr
						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
O: Optional Course Units						ZOO2262	O	O	O	O	Th+Pr
C: Compulsory Course Units						ICT2b13	O	O	O	O	Pr
ICT2b13 (CCIT) - For selected students who passed ICT1b13 exam											

Pathways available for Biological Science Stream for BSc 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
Physics	PHY3114		C	C	C	Th	PHY3232, PHY3242,
	PHY3121		C	C	C	Pr	PHY3252, PHY3262,
							PHY3272,PHY3282

Pathways available for Biological Science Stream for BSc Level III							
	Semester - I						Semester - II
Subjects	Course Unit	BS1	BS2	BS3	BS4	Th/Pr	Optional Course Units
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							MAT324β, MAT325β, MAT326β, IMT323β, IMT324β, AMT324β
Computer Science							COM3252, COM3232
FSC Course Units (Optional)	FSC3112, FSC3122 FSC3132, FSC3bP2						FSC3212, FSC3222, FSC3232
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 BSc Level I									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
MAT111β	C	C	C	C	C	C	C	C	Th
MAT112δ	C	C	C	C	C	C	C	C	Th
MAT113δ	C	C	C	C	C	C	C	C	Th
MAT121β	C	C	C	C	C	C	C	C	Th
MAT122β	C	C	C	C	C	C	C	C	Th
IMT111β	C	C							Th
IMT121β	C	C							Th
IMT122β	C	C							Th
IMT1b2β	C	C							Project
AMT111β				C	C	C			Th
AMT112β				C	C	C			Th
AMT121β				C	C	C			Th
AMT122β				C	C	C			Th
CHE1112	C		C	C				C	Th
CHE1122	C		C	C				C	Th
CHE1131	C		C	C				C	Pr
CHE1212	C		C	C				C	Th
CHE1222	C		C	C				C	Th
CHE1231	C		C	C				C	Pr
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 BSc Level I									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
COM1112						C	C	C	Th
COM1123						C	C	C	Pr
COM1213						C	C	C	Th
COM1223						C	C	C	Pr
ICT1b13	C	C	C	C	C				Pr

Pathways available for Physical Science Stream for BSc Level II									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
MAT211β	C	C	C	C	C	C	C	C	Th
MAT212β	C	C	C	C	C	C	C	C	Th
MAT221β	One of these options must be taken (C)								Th
MAT225β									Th
									Th
MAT222δ	C	C	C	C	C	C	C	C	Th
MAT224δ	C	C	C	C	C	C	C	C	Th
IMT211β	C	C							Th
IMT2b2β	C	C							Project
IMT221β	C	C							Th
IMT223β	One of these options must be taken (C)								Th
IMT224β									Th
									Th
AMT211β				C	C	C			Th
AMT212β				C	C	C			Th
AMT221β				C	C	C			Th
AMT223β	One of these options must be taken (C)								Th
AMT224β									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		C	C		C		C		Th
PHY2b22		C	C		C		C		Pr
PHY2214		C	C		C		C		Th
COM2113						C	C	C	Pr
COM2122 *						O	O	O	Th
COM2213						C	C	C	Pr
COM2223						C	C	C	Th
*COM2122 is compulsory for the students who wish to follow BSC Hons (Comp Sc) Degree Programme									
FSC215α - Optional									Pr
FSC224α - Optional									Th+Pr
PHY2112 - Optional									Th
PHY2222 - Optional									Pr

Pathways available for Physical Science Stream Level III - Semester I									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Th/ Pr
MAT311β	C	C	C	C	C	C	C	C	Th
MAT312β	One of these options must be taken(C)								Th
MAT313β									Th
IMT3b1β	C	C							Project
IMT312β	One of these options must be taken(C)								Th
IMT313β									Th
AMT311β			Only one of these options can be taken(C)						Th
AMT312β									Th
AMT313β			One of these options must be taken(C)						Th
AMT314β									Th
COM3113						C	C	C	Th
COM3122						O	O	O	Th
COM3b33						C	C	C	Pr
COM3142						O	O	O	Th+Pr
COM3152						O	O	O	Th
COM3162						O	O	O	Th
CHE3112	O		O	O				O	Th+Pr
CHE3122	O		O	O				O	Th+Pr
CHE3132	O		O	O				O	Th+Pr
PHY3114		C	C		C		C		Th
PHY3121		C	C		C		C		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
MAT321β	O	O	O	O	O	O	O	O	Th
MAT322β	O	O	O	O	O	O	O	O	Th
MAT323β	O	O	O	O	O	O	O	O	Th
MAT324β	O	O	O	O	O	O	O	O	Th
MAT325β	O	O	O	O	O	O	O	O	Th
MAT326β	O	O	O						Th
IMT321β	O	O	O	O	O	O	O	O	Th
IMT322β	O	O	O	O	O	O	O	O	Th
IMT323β	O	O	O	O	O				Th
IMT324β	O	O	O	O	O	O	O	O	Th
AMT321β	O	O	O	O	O	O	O	O	Th
AMT322β	O			O		O		O	Th
AMT323β	O	O	O	O	O	O	O	O	Th
AMT324β	O	O	O	O	O	O	O	O	Th
COM3213						O	O	O	Th+Pr
COM3222						O	O	O	Th
COM3232						O	O	O	Th+Pr
COM3252						O	O	O	Th

Pathways available for Physical Science Stream Level III - Semester II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Th/Pr
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+Pr
FSC Course Units (Optional)									FSC3212 FSC3222 FSC3232
Any other Course Unit that may be approved by the Faculty									
Industrial Mathematics is not offered together with Applied Mathematics or Computer Science.									

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. (This is NOT applicable for the BSc Honours in Financial Mathematics and Industrial Statistics Degree Program).

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
Bikkhu	Walauwatta Bikkhu Hostel	90
Male	Meddawatta Boys' Hostel	270
	Eliyakanda Old Boys' Hostel	62
	Eliyakanda New Boys' Hostel	396
Female	Wellamadama 01 Girls Hostel	94
	Wellamadama 02 Girls' Hostel	424
	Wellamadama 03 Girls' Hostel	414
	Eliyakanda Old Girls' Hostel	171
	Eliyakanda New Girls' Hostel	396
	Pamburana 02 Girls' Hostel	80

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

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 BSc General Degree and BSc Honours Degree programmes. In addition to this, research facilities are offered to those students seeking postgraduate qualifications such as MSc, MPhil and PhD 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 compostiny.
- 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

Prof. K.A.S Kodikara
BSc (Ruhuna, SL), MSc (VUB, Belgium), PhD (VUB, Belgium)

5.3 Members of the Academic Staff

Designation	Name	Specialization
Senior Professors	Senior Prof. S. Abeysinghe BSc (Ruhuna, SL) MSc (Wageningen, Netherlands) PhD (Brussels, Belgium)	Molecular biology Crop protection
	Senior Prof. (Mrs.) P. D. Abeysinghe BSc (Ruhuna, SL) MSc, PhD (VUB,Brussels, Belgium)	Molecular biology Plant Systematics
Professors	Prof. K. Masakorala BSc (Ruhuna, SL) MSc (Plymouth, UK) PhD (USTB, Beijing, China)	Environmental Science Environmental Toxicology Bioremediation
	Prof. W. G. S. Manel Kumari BSc (Ruhuna, SL), MSc (Peradeniya, SL) MSc (Wageningen, The Netherlands) PhD (Queensland, Australia)	Plant Virology Microbiology
	Prof. K.A.S. Kodikara BSc (Ruhuna, SL) MSc (VUB, Belgium) PhD (VUB, Belgium)	Plant Ecology
Senior Lecturers	Dr. (Mrs.) N. P. Dissanayaka BSc (Peradeniya, SL) PhD (Reading, UK)	Plant Physiology Weed Biology
	Dr. T. G. Dayananda BSc (Ruhuna, SL) MSc, PhD (Kyushu, Japan)	Molecular Phylogeny Population Genetics
	Dr. (Mrs.) K. K. G. U. Hemamali BSc (Ruhuna, SL) MSc, PhD (Kyushu, Japan)	Molecular Plant Breeding Population Genetics
	Dr. R. D. A. Gunasekara BSc (Ruhuna, SL) MSc (Ghent, Belgium) PhD (Peradeniya)	Phycology, Plant Ecology

Designation	Name	Specialization
Probationary Lecturers	Ms. S.Y.S.D. De Silva BSc (Colombo, SL) (Reading for phD)	Plant Taxonomy
Temporary Lecturers	Dr. Jayani Perera BSc (Ruhuna, SL) MSc (Montpellier, France) phD (Belfast, UK)	Plant Physiology
	Mr. D. D. N. Sripal BSc (Ruhuna, SL) (Reading for phD)	Plant Taxonomy

5.4 Course Units in Botany for BSc (General) Degree

BSc 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 (Cyanobateria), The domain Archaea; diversity and interested features, The domain Eukarya: Vegetative and reproductive diversity of the algae; Chlorophyceae, Xanthophyceae, Phaeophyceae, Rhodhophyceae 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%

BSc 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 deferent 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%

BSc 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 microscope, 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%

BSc 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%

BSc 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) *Optional 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) *Optional*
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) *Optional 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)
Optional Prerequisites: BOT2131
Genome organization of prokaryotes and eukaryotes, chromosome structure and function, organelle gene organization, Recombination, DNA repair, Gene expression, Post-transcriptional modifications, Mechanism of protein synthesis and protein structures, Transposons and their practical applications.
Evaluation methods: End semester examination: 70%, Continuous assessments: 30%

BOT3191: Weed Biology (12 Lecture hrs + 06 Practical hrs) *Optional 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%

BSc Level III - Semester II

BOT3212: Wood Science (20 Lecture hrs + 21 Practical hrs) *Optional 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) *Optional 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) *Optional 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) *Optional 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) *Optional 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 (15 Lecture hrs) *Optional 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

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

BOT3271: Genetic Engineering and Biotechnology (15 Lecture hrs) *Optional 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 practical records: 30%

BOT3282: Plant Breeding (25 Lecture hrs + 15 Practical hrs) *Optional 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) *Optional 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 BSc (Honours) Degree in Botany

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)
Historical development, Microbial evolution and biodiversity, Interactions among microbial population, Interactions between microorganisms and plants, Microbial interactions with animals, Development of microbial communities, Microorganisms in their natural habitats, Quantitative assessment of microbial populations, Physiological adaptations of microorganisms to environmental conditions, Biogeochemical cycling, Biotechnological aspects of microbial ecology
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)
Optional 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) *Optional 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) *Optional 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 Markove 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, Allelo chemicals in plants, Enzyme catalyzed reactions in plant cells, Plant responses to changing environment (physiological and anatomical responses and biochemical responses (different alleochemical 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%

5.6 Credit Values

5.6.1 BSc General Degree

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
BOT1112: Plant Diversity, Unity and Evolution	30		2		2
BOT1121: Scientific Approach and Biometrics	15		1		1
BOT1131: Plant Anatomy	15		1		1
BOT1141: Botany Practical I		45		1	1
BOT1212: Genetics	30		2		2
BOT1221: Plant Systematics	15		1		1
BOT1231: Plant Ecology	15		1		1
BOT1241: Botany Practical II		45		1	1
BOT2112: General Microbiology	30		2		2
BOT2121: Plant Pathology	15		1		1
BOT2131: Molecular Biology	15			1	1
BOT2141: Botany Practical III		45		1	1
BOT2212: Plant Physiology and Biochemistry	30		2		2
BOT2221: Environmental Science	15		1		1
BOT2231: Soil- Plant Relationships	15		1		1
BOT2241: Botany Practical IV		45		1	1
BOT3112: Advanced Plant Ecology	20	21	1.3	0.7	2
BOT3122: Horticulture, Floriculture and Landscaping	20	21	1.3	0.7	2
BOT3132: Advanced Microbiology	20	21	1.3	0.7	2
BOT3142: Advanced Plant Pathology	15	30	1	1	2
BOT3162: Forestry	20	15	1.5	0.5	2
BOT3172: Food Technology	20	21	1.3	0.7	2
BOT3182: Advanced Molecular Biology	20	21	1.3	0.7	2
BOT3191: Weed Biology	12	06	1.6	0.5	2
BOT3212: Wood Science	20	21	1.3	0.7	2
BOT3222: Plant Tissue Culture	20	21	1.3	0.7	2
BOT3232: Advanced Plant Physiology	25	15	1.5	0.5	2
BOT3242: Advanced Environmental Science	20	21	1.3	0.7	2
BOT3251: Plant Virology	15		1		1
BOT3261: Economic Botany	15		1		1
BOT3271: Genetic Engineering and Biotechnology	15		1		1
BOT3282: Plant Breeding	25	15	1.5	0.5	2
BOT3292: Plant Ecophysiology	25	15	1.5	0.5	2

5.6.2 BSc (Honours) Degree in Botany

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
BOT4012: Quantitative Plant Ecology	25	15	1.5	0.5	2
BOT4022: Horticulture, Floriculture and Landscaping	25	15	1.5	0.5	2
BOT4032: Microbial Ecology	25	15	1.5	0.5	2
BOT4042: Applied Microbiology	30		2		2
BOT4052: Advanced Plant Pathology	20	21	1.3	0.7	2
BOT4062: Advanced Molecular Biology	25	15	1.5	0.5	2
BOT4072: Economic Botany & Entrepreneurship	30		2		2
BOT4082: Forestry & Forest Management	30	30	1.3	0.7	2
BOT4092: Food Technology	25	15	1.5	0.5	2
BOT4102: Plant Cell and Tissue Culture	25	15	1.5	0.5	2
BOT4112: Weed Biology and Management	25	15	1.5	0.5	2

Course Unit	**Duration (hrs)**		**Credits**		Total
	Theory	Practical	Theory	Practical	
BOT4122: Genetic Engineering & Biotechnology	30		2		2
BOT4132: Advanced Plant Physiology	25	15	1.5	0.5	2
BOT4142: Advanced Environmental Science	25	15	1.5	0.5	2
BOT4152: Advanced Plant Virology	25	15	1.5	0.5	2
BOT4162: Wood Science & Technology	25	15	1.5	0.5	2
BOT4172: Techniques in Plant Breeding	25	15	1.5	0.5	2
BOT4192: Advanced Plant Systematics	25	15	1.5	0.5	2
BOT4202: Ecotoxicology	25	15	1.5	0.5	2
BOT4212: Biostatistics	30	30	1.3	0.7	2
BOT4222: Molecular Evolution and Phylogenetic	25	15	1.5	0.5	2
BOT4232: Plant Ecophysiology	25	15	1.5	0.5	2
BOT4242: Seed Physiology and Technology	20	21	1.3	0.7	2
BOT4282: Bioinformatics	20	21	1.3	0.7	2
Total Theory Credits					48
Practical, Soft skills & Research					
BOT4182: Practical Skills in Botany I	75hrs				2
BOT4252: Practical Skills in Botany II	75hrs				2
BOT4292: Practical Skills in Botany III	75hrs				2
BOT4262: Scientific Report Writing, Seminars & Industrial Training					2
BOT4276: Research Project					6
Total Practical Soft skills & Research Credits					14
Total Botany Credits					62
Total Required Credits from Special Degree Course					60

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 BSc 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 MPhil and PhD 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 BSc Honours Degree and for postgraduate degrees in Chemistry. In addition to the above the departmenthas a well-equipped equipment room (UV-vis, FTIR, GC, HPLCetc.) and two computer rooms with network facilities and a language laboratory. The computer facility is being used for computer-assisted learning in Chemistry. The department offers number of optional course units in Level III with an objective to enhance the employment opportunities of Chemistry graduates of University of Ruhuna.

6.1 Research Areas

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

- Computational Chemistry
- Environmental chemistry
- Environmental pollution
- Food Chemistry
- Functional Foods and Nutraceuticals
- Green synthesis of nanocomposites and their applications
- Homogeneous catalysis
- Industrial Chemistry
- Material Chemistry and Rubber Technology
- Nanomaterials and their applications
- Nanotechnology
- Natural Products Chemistry
- Pharmocognosy
- Polymer chemistry
- Production of value added chemicals from renewable sources
- Purification of waste water by advanced oxidation processes
- Waste to wealth

6.2 Head of the Department

Prof. Chinthaka S. Gangabadage
BSc (Ruhuna, SL), PhD (Radboud University Nijmegen, The Netherlands)

6.3 Members of the Academic Staff

Designation	Name	Specialization
Emeritus Professor	Emeritus Professor H.M.M.K.Pathirana BSc (University of Sri Lanka, Vidyodaya) PhD(Aston in Bham, UK)	Inorganic Chemistry Organometallic Chemistry Environmental Chemistry Green Chemistry
Senior Professor	Senior Prof. V.P. Bulugahapitiya BSc (Ruhuna, SL) PhD(Fribourg, Switzerland)	Organic Chemistry
Chair Professor	Prof. J.W. Hewage BSc (Ruhuna, SL) PhD (Maine, USA)	Physical Chemistry
Professor	Prof. L.A. Panamgama BSc (P'deniya, SL) PhD (WITS, RSA)	Polymer Chemistry
	Prof. S. Wanniarachchi BSc(Ruhuna, SL), PhD(Marquette, USA)	Inorganic Chemistry
	Prof. W.S.Hemalika BSc(Ruhuna, SL), PhD (Marquette,USA)	Organic Chemistry
	Prof. N.K. Kalutharage BSc (Ruhuna, SL), PhD (Marquette,USA)	Inorganic Chemistry
	Prof. Chinthaka S. Gangabadage BSc (Ruhuna, SL), PhD (Radboud University Nijmegen, The Netherlands)	Biophysical Chemistry
Senior Lecturer Grade I	Dr. M. Edussuriya MSc, PhD (Moscow, Russia)	Physical Chemistry
	Dr. A.S. Ranaweera BSc (USJP, SL), PhD (MSU, USA)	Inorganic Chemistry
	Dr. Y.M.A.L.W. Yapa BSc (Ruhuna, SL), PhD (Toledo, USA)	Organic Chemistry
	Dr. H.J. Sampath BSc(Ruhuna, SL), PhD (Marquette,USA)	Inorganic Chemistry

Designation	Name	Specialization
Senior Lecturer Grade II	Dr. H.C. Manawadu BSc (Colombo, SL), PhD (KSU, USA)	Organic Chemistry
	Dr. H.D. Jayasekera BSc (Ruhuna, SL), PhD (Marquette,USA)	Organic Chemistry
	Dr. M.S. Kodikara BSc (Ruhuna, SL), PhD (ANU, Australia)	Physical Chemistry
	Dr. C.N. Rathnaweera BSc (Colombo, SL) PhD (MSU, USA)	Physical Chemistry
	Dr. W.K.K.D. Siriwardana BSc (Colombo, SL) PhD (MSU, USA)	Analytical Chemistry
Lecturer (Probationary)	Mr. L.S.N.S. Lamahewage BSc (Kelaniya, SL) (On Leave)	Reading for PhD in USA
	Mr. Y.C.Y. Sudusinghe BSc (USJP, SL) (On Leave)	Reading for PhD in USA

6.4 Course Units in Chemistry for BSc (General) Degree

BSc 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%

CHE1131: Practical Inorganic Chemistry-I
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, dichrsomate titrations.
Evaluation methods: Continuous Assessment : 30% , Semester End Examination : 70%

BSc 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. Raoults 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%

CHE1231 : Practical Organic Chemistry-I
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%

BSc 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 ($^{1}H-$, $^{13}C-$, $^{31}P-$, $^{19}F-$) 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 Chrsomatography, Distillation Methods, Sublimation, Extraction of Natural products.
Evaluation methods: Continuous Assessment : 30% , Semester End Examination :70%

BSc 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 Electroanlytical 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}H NMR, ^{13}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%

BSc 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%

BSc 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%

NOTE : Students are required to earn 24 credits to claim the Chemistry subject. Continuous assesments 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.*)

6.5 Course Units in Chemistry for BSc (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.

CHE4114 : Advanced Inorganic Chemistry-I (60 Lecture hrs)
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

CHE4123: Reactive Intermediates & Advanced Organic Reaction Mechanisms (45 Lecture hrs)
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

CHE4132 : Quantum Chemistry and Molecular Spectroscopy (30 Lecture hrs)
Quantum Chemistry (12L), Molecular Spectroscopy (10 L), Photochemistry (08L)
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4142: Laboratory and Quality Management (30 Lecture hrs)
Chemometry (10 L), Quality Control & Quality Assurance (10L), Laboratory and Quality Management (10L)
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4152: Laboratory Inorganic Chemistry (90 hrs)
Semimicro qualitative analysis, Gravimetric analysis, Chromatography, Titrametric analysis.
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4162: 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%

CHE4213: Advanced Organic Chemistry I (45 Lecture hrs)
Structure determination of organic molecules using spectroscopy (20L), Natural Products Chemistry (25L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4223: Topics in Advanced Physical Chemistry (45 Lecture hrs)
Advanced Thermodynamics (11L), Statistical Thermodynamics (12 L), Advanced Kinetics (12L), Advanced Electrochemistry (10L)
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4233 : Advanced Analytical Chemistry-I(45 Lecture hrs)
Principles of Instrumentation (10L), Electroanalytical Chemistry (20L), Chromatography (15L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4242 : Advanced Analytical Chemistry II (30 Lecture hrs)
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

CHE4252 : Environmental Chemistry (30 Lecture hrs)
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

CHE4262 : Laboratory Organic Chemistry (90 hrs)
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%

CHE4272: 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

CHE4314: Advanced Inorganic chemistry-II (60 Lecture hrs)
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 (45 Lecture hrs)
Advanced Stereochemistry (08L), Organic Synthesis (20L), Advanced Heterocyclic Chemistry (08L), Carbohydrate Chemistry (09L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4333: Solid State and Surface Chemistry (45 Lecture hrs)
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

CHE4342: Advanced Biochemistry (30 Lecture hrs)
Peptides, Proteins, Nucleic acids (15L), Metabolisms of Biomolecules (08L), Enzymology, Mechanism of enzyme action (07L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4352: Computational Chemistry (23 Lecture hrs + 15 Practical hrs)
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

CHE4362: Industrial Chemistry and Technology (30 Lecture hrs)
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

CHE4371: Laboratory Biochemistry (45hrs)
Practical Biochemistry and Practical Food chemistry
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4411: Current Topics in Chemistry
Self study on the current topic provided by the staff.
Evaluation method: End Semester Written Examination

CHE4422: Essay and 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

CHE4436: 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

CHE4442: Forest Products and Textile Industry (30L)
Wood Adhesion and Adhesives (15L), Textile Chemistry (15 L)
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4452: Biomolecular NMR (30 Lecture hrs)
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

CHE4462: Medicinal Chemistry and Drug Development (30 Lecture hrs)
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

CHE4472: Biological Chemistry (30 Lecture hrs)
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 (30 Lecture hrs)
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

6.6 Credit Values

6.6.1 BSc General Degree

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
CHE1112: General Chemistry and Basic Concepts in Analytical Chemistry	30		2		2
CHE1122: Fundamentals in Organic Chemistry	30		2		2
CHE1131: Practical Inorganic Chemistry-I		45		1	1
CHE1212: Descriptive Inorganic Chemistry I	30		2		2
CHE1222: Physical Chemistry I	30		2		2
CHE1231: Practical Organic Chemistry-I		45		1	1
CHE2112: Descriptive Organic Chemistry and Spectroscopy	30		2		2
CHE2122: Physical Chemistry II	30		2		2
CHE2131: Practical Inorganic and Organic Chemistry II		45		1	1
CHE2212: Descriptive Inorganic Chemistry II	30		2		2
CHE2222: Physical and Analytical Chemistry	30		2		2
CHE2231: Practical Physical Chemistry and Spectroscopy		45		1	1
CHE3112: Industrial Chemistry I	20	21	1.3	0.7	2
CHE3122: Analytical Chemistry	20	21	1.3	0.7	2
CHE3132: Biochemistry	20	21	1.3	0.7	2
CHE3212: Environmental Chemistry	20	21	1.3	0.7	2
CHE3222: Industrial Polymer Chemistry	20	21	1.3	0.7	2
CHE3232: Pharmaceutical Chemistry	20	21	1.3	0.7	2
Total					32

6.6.2 BSc Honours Degree in Chemistry

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
CHE4114: Advanced Inorganic Chemistry-I	60		4		4
CHE4123: Reactive Intermediates & Advanced Organic Reaction Mechanisms	45		3		3
CHE4132: Quantum Chemistry & Molecular Spectroscopy	30		2		2
CHE4142: Laboratory and Quality Management	30		2		2
CHE4152: Laboratory Inorganic Chemistry		90		2	2
CHE4162: Laboratory Physical Chemistry		90		2	2
CHE4213: Advanced Organic Chemistry -I	45		3		3

Course Unit	**Duration (hrs)**		**Credits**		Total
	Theory	Practical	Theory	Practical	
CHE4223: Topics in Advanced Physical Chemistry	45		3		3
CHE4233: Advanced Analytical Chemistry-I	45		3		3
CHE4242: Advanced Analytical Chemistry-II	30		2		2
CHE4252: Environmental Chemistry	30		2		2
CHE4262: Laboratory Organic Chemistry		90		2	2
CHE4272: Laboratory Analytical Chemistry		90		2	2
CHE4314: Advanced Inorganic Chemistry-II	60		4		4
CHE4323: Advanced Organic Chemistry - II	45		3		3
CHE4333: Solid State and Surface Chemistry	45		3		3
CHE4342: Advanced Biochemistry	30		2		2
CHE4352: Computational Chemistry	23	15	1.5	0.5	2
CHE4362: Industrial Chemistry & Technology	30		2		2
CHE4371: Laboratory Biochemistry		45		1	1
CHE4411: Current Topics in Chemistry	Self Study				1
CHE4422: Essay & Seminar	Self Study				2
CHE4436: Research Project					6
Special Topics (CHE4442, CHE4452, CHE4462, CHE4472, CHE4482)	30		2		2
Industrial placement (4-6 weeks): This is a requirement for the completion of the degree					
Total					60

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 BSc General Degree programme) in Computer Science for the BSc General Degree programme for 120 students per batch and offers BSc Honours Degree Programme in Computer Science.

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. S. M. Vidanagamachchi
B.Sc. in Comp. Sci. (UCSC, SL) Ph.D. in Comp. Eng. (P'deniya, SL)

7.3 Members of Academic Staff

Designation	Name	Specialization
Professor	Prof. W. A. Indika BSc (Kelaniya, SL) MSc (Kelaniya, SL) PhD (UCSC, SL)	Knowledge Representation, Ontology, Semantic Web, Ontology Engineering, Mobile Applications
Senior Lecturer	Mr. S. A. S. Lorensuhewa BSc (Colombo, SL) MSc (Zhejiang, China)	Computer Applications, Text Mining and Text Classification Data Mining, Rule Extraction and Knowledge Representation, Applications of Machine Learning Techniques
	Dr. J. A. Jeewanie BSc (Kelaniya, SL) MSc (Keele, UK) PhD (Tilburg, Netherland) (On Leave)	Conceptual Modelling, Process Mining, Service-oriented Computing, Value Oriented Service Identification, Model driven Business-IT alignment methods
	Dr. Tharaka Ilayperuma BSc (Kelaniya, SL) Ph.L (Sweden) PhD (Sweden) (On Leave)	Business Modelling, Goal Modelling and Service Modelling for the purpose of Information systems development
	Dr. Thusangi Wannige BSc (Colombo, SL) MPhil (Colombo, SL) PhD (Lincoln, New Zealand)	Computational Systems Biology, Bioinformatics, Modelling and simulation, computer vision
	Dr. S. M. Vidanagamachchi BSc in Comp. Sci. (UCSC, SL) PhD in Comp. Eng. (P'deniya, SL)	Embedded Systems, Reconfigurable Computing, Machine Learning, Bioinformatics
	Ms. T.D. Gilmini Geethika BSc(Hons)(Peradeniya, SL) MSc (UCSC, SL) MPhil (USJP, SL)	Knowledge Engineering, Business Process Modeling and Ontology Business Rule Modeling with Application to Problems in Healthcare Domain
	Mr. K.R. Wijeweera BSc (Peradeniya, SL) MPhil (Peradeniya, SL) (On Study Leave)	Computational Geometry
	Ms. M. A. L. Kalyani BSc (Colombo, SL) Ph.L. (Uppsala, Sweden)	Static and Dynamic Load, Balancing algorithms MPI implementations, Grid Computing
Lecturer	Mr. K. D. C. G. Kapugama BCS (Ruhuna, SL) Reading for PhD (Monash, Australia) (On Study Leave)	Data Mining, Text Mining

Designation	Name	Specialization
Probationary Lecturer	Mr. L.L. Gihan Chathuranga BSc (Sabaragamuwa, SL)	Machine Learning, Artificial Neural Networks, Artificial Intelligence, Data mining
	Mr. K.A.T.S. Jayathilaka BSc Engineering (Hons) (Moratuwa, SL) MSc in CS (Moratuwa, SL)- Reading	Computer Science and Engineering, Machine Learning
	Ms T.C. Weerakoon BSc (Special) (SUSL, SL) MSc (UCSC, SL)-Reading	Data Mining, Machine Learning, Computer Vision
	Ms. Binuri Raigamkorale BSc (Special) (Kelaniya, SL) MSc(Moratuwa, SL)-Reading	Deep Learning, Business Intelligence & Data Analytics
	Ms. T.D.K. Marambe BSc(Special)(UWU, SL)	Ontological Engineering, Semantic Web Technologies
	Ms. M.S.H. Peiris BSc (Hons) in Computer Science (EUSL)	Machine Learning, Medical Image Processing

7.4 Members of the Academic Support Staff

Academic Support Staff Members	
Designation	**Name**
Programmer Cum Systems Analyst	Mr. B.H. Saranapala BSc (Ruh, SL) , MSc (UCSC, SL)
	Mr. A. P. Luwishewa BSc (Ruh, SL) , MSc (UCSC, SL)
Instructor in Computer Technology	Ms. P.B.N.K. De Silva BSc (Ruh, SL)
	Mr. U.V. Malawara Arachchi BSc (Ruh, SL) , PG Dip IT (UCSC, SL) , MSc(SMU, South Korea)
	Ms. W.P. Priyanthi BSc (Ruh, SL)
	Mr. R. Wickramaratne BSc (Ruh, SL) , MSc (Moratuwa, SL)
	Mr. C.L. Wimalaratne BSc (Ruh, SL) , MSc(Moratuwa, SL)
	Ms. G.K. Mabula BSc (Ruh, SL) , MSc (UCSC, SL)
	Mr. L.W. Wellakkage BSc in Computer Engineering (NTUU-KPI, Ukraine) , MSc in Computer Engineering (NTUU-KPI, Ukraine)
	Mr. G.M.T. Ranjana BSc (Ruh, SL)
	Ms. W.K. Shajith BSc (Ruh, SL), Postgraduate Dip. in ISM(Colombo,SL)
	Ms. H.G.S. Priyangani BSc (Ruh, SL)

7.5 Course Units in Computer Science for BSc (General) Degree

BSc Level I - Semester I

COM1112: Basic Concepts of Computer Science (30 Lecture hrs) *(Core)*
Overview of computer systems (e.g.: evolution, classification and functions of computer systems), Basic components of the computer system (e.g.: processor, memory, secondary storage, I/O devices), Explain and apply arithmetic operations of binary number system including conversions among number systems, Apply Boolean algebra and Kmaps to minimize Boolean expressions, Design logic circuits for given requirements and recognize the universality of NAND and NOR gates, Identify memory types, their specialties, and issues with system performance, Explain functionalities of CPU components and describe elements, types of a CPU instruction and processing steps, Compare and contrast several addressing modes, Data communication and computer networks (eg: LAN, WAN, MAN, network topologies, network transmission media), The Internet, Communication over Internet, Computer security and maintenance (e.g.: security threats, attacks, ethical use of computers)
Evaluation Method : Continuous Assessment and/or End Semester Examination

COM1123: Programming Techniques (30 Lecture hrs + 30 Practical hrs) *(Core)*

Introduction to programming methodology and problem-solving strategies, Algorithm development using pseudo code, Basic program structure and the Integrated Development Environment (Essential program structure, Documentation and standard programming practices, Integrated development environment(IDE) Editing, Compilation, Execution and Debugging), Program Development using a higher-level programming language such as C, Basic input and output, Variables and Expressions, Library functions, Standard programming practices for variables and assignments, Decision structures, Loop Structures, Input and output using files, Simple data structures, Functions, IntrThe mode of Assessment/Evaluation of these Computer Science Course Units in BSc (General) Degree would be physical and/or online mode.oduction to the Object-Oriented Approach, Practical assignments aligned with different lessons of the courses.
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)

BSc Level I - Semester II

COM1213: Internet Programming and Web Technologies (30 Lecture hrs + 45 Practical hrs) *(Core)*
The basic principles of client/server computing, Distinguished characteristics of client/server systems and application areas, Comparison of two-tier versus three-tier client/server solutions, Web programming model, Interactive web, Benefits and limitations of client-side web programming, Byte code versus scripting, Basic concepts and development based on Java applet / JavaScript / dynamic HTML (DHTML), Approaches to server-side programming. Benefits and limitations of server-side web programming, Development framework for server-side programming based on PHP / Servlet / JSP, Web application development, Development of a web application using synchronous and asynchronous techniques, Web Development using PHP, MySQL, Sessions and Cookies, Practical assignments aligned with different lessons of the course.

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)

COM1223: File Organization & Database Management Systems (30 Lecture hrs + 30 Practical hrs) *(Core)*
File Organization: Introduction to file organization, Storage devices, Disk parameters, Record structure and design, Indexes, Hashing, **Database Management Systems:** Introduction & Definitions, DBMS Architecture, Data models, DBMS languages, ER model concepts, Relational model concepts, ER-to-relational mapping, Functional dependencies and normalization process, Relational algebra, Relational calculus, Database security and authorization, Practical using MySQL, Practical assignments aligned with different lessons of courses.
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)

BSc Level II - Semester I

COM2113: Object Oriented System Development (30 Lecture hrs + 30 Practical hrs) *(Core)*
Fundamental concepts in object orientation: introduction, class and object, generalization and practical uses of generalization, object interaction with message passing, polymorphism, origins of object orientation, object-oriented languages, Modelling: introduction to models and diagrams, difference between models and diagrams, introduction to UML, models in UML, Software development process: what is a development process, iterative and incremental software development, important artifacts developed in object oriented software development process, Process modeling with UML activity diagrams, Requirements and Use cases: Business and system use cases, documenting requirements by using use cases, brief and fully dressed formats in use case modeling, use case diagrams and notations, operation contracts, describing use cases using UML activity diagrams, Modelling structure: class diagrams, attributes and state of a class, links and associations, multiplicity, operations, identifying classes and developing class diagrams, Modelling behavior: interaction diagrams, communication and sequence diagrams, Modeling object interaction using communication/sequence diagrams, Use case realization: realizing use cases by using communication/sequence diagrams and class diagrams, Practical assignments aligned with different lessons of the course.
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)

COM2122: Software Engineering (30 Lecture hrs) (**Optional*)
Introduction to Software Engineering, Activities and Characteristics of Software Processes, Software Process Models, Requirement Analysis and Specification, System Modelling.
Evaluation Method: Continuous Assessment and/or End Semester Examination
* COM2122 is compulsory for the students who wish to follow BSC Hons (Comp Sc) Degree Programme.

BSc Level II - Semester II

COM2213: Data Communications and Computer Networks (30 Lecture hrs + 30 Practical hrs) *(Core)*
Introduction to Computer Networks (Application of Computer Networks, Network Hardware, Network Software, OSI Model, Internet Model), Physical Layer (Transmission Media, Wireless Transmission, Communication Satellites, High-speed Digital Access- DSL, Cable Modem, Multiplexing- FDM, WDM, TDM), Data Link Layer (Data Link Layer Design Issue-Framing, Error and Flow Control, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols), Medium Access Control (MAC) Sub layer (Multiple Access Protocols, LANs topologies and protocols, Ethernet, Wireless LANs, Data Link Layer Switching Hubs, bridges, switches, routers, and gateways), Network Layer (Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithm, Quality of Service (QoS), Internetworking, Network Layer in the Internet, Development in Internet Protocols), Transport Layer (Internet Transport Protocols TCP and UDP, Performance Issues), TEST-II one class period, Application Layer (Fundamentals of the Session and Presentation Layers, Domain Name System (DNS), E-mail, File Transfer Protocol, WWW and Multimedia, Practical assignments aligned with different lessons of the course
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)

COM2223: Data Structures and Algorithms (30 Lecture hrs + 30 Practical hrs) *(Core) Pre-requisite: COM1123*
Simple numerical algorithms, Sequential and binary search algorithms, Worst case quadratic sorting algorithms (selection, insertion), Worst or average case sorting algorithms (quicksort, heap sort, merge sort), Stacks and Queues, Linked Lists, Trees, Binary trees, Binary search trees, Common operations on binary search trees such as insert, delete, iterate over tree, Graphs and graph algorithms, Representations of graphs (e.g., adjacency list, adjacency matrix), Depth and breadth-first traversal, Hash tables, including strategies for avoiding and resolving collisions, Practical assignments aligned with different lessons of the course
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)

BSc Level III - Semester I

COM3113: Operating Systems (30 Lecture hrs + 30 Practical hrs) *(Core)*
Introduction and overview, Processes and threads, CPU Scheduling, Deadlocks, Memory management, File System implementation, Practical assignments aligned with different lessons of the course.
Evaluation Method: Practical Examination and End Semester Examination 70% (Student must obtain at least 35% from the theory paper and the 30% from the practical paper)

COM3122: Data Mining (30 Lecture hrs) *(Optional)*
Basic concepts of data mining, Data pre-processing techniques, Classification, Prediction, Clustering, Association rules, Concept of data warehousing with special emphasis on architecture and design
Evaluation Method: Continuous Assessment and/or End Semester Examination

COM3b33: Computer Group Project (60 Practical hrs) *(Core)*
Project proposal preparation, Requirements gathering, System design and database design, Implementation, Testing and evaluation, Deployment/Present to the client, Final report preparation, Presentation and demonstration to the internal panel
Evaluation Method: Attendance (0-10%), Final Presentation (20-25%), Final Product (30-40%), Final Report (30-40%), Individual Contribution (5-15%)

COM3142: Internet Services and Protocols (15 Lecture hrs + 30 Practical hrs) *(Optional)*
Introduction, Network and System Administration, Internet Protocols, Application Services and how they are configured, maintained and repaired, Practical Session: this course should give students a practical understanding of the services which are found in Internet Protocols such as DNS server, Web server, Proxy server, Email server, etc., Practical assignments aligned with different lessons of the course.
Evaluation Method: Continuous Assessment and/or End Semester Examination

COM3152: Professional Practices and Issues in IT (30 Lecture hrs) *(Optional)*
Social context of computing, Growth and control of the Internet, Accessibility issues including legal requirements, Context-aware computing, Ethical argumentation theories and decision-making, Moral assumptions and values, The nature of professionalism including care, attention and discipline, fiduciary responsibility, and mentoring, Professional certification, codes of ethics, conduct, and practice, Accountability, responsibility and liability, Intellectual property, privacy and civil liberties, Digital rights management, Copyrights, patents, trade secrets, trademarks and Plagiarism, Foundations of the open source movement, Philosophical foundations of privacy rights, Legal foundations of privacy protection and technology-based solutions for privacy protection, Professional written and verbal communication with stakeholders.
Evaluation Method: Continuous Assessment and/or End Semester Examination

COM3162: Human Computer Interaction (30 Lecture hrs) *(Optional)*
Background and motivation for HCI, Human factors, Theoretical foundations: theories, models, principles, standards, guidelines, Interface design elements, Interface design: methods and principles, Interface design: data gathering and task analysis, Evaluating interfaces: heuristic evaluation, GOMS, Interaction styles, Evaluation Data & Empirical Data, Lo-fi Prototyping, Colour, Vision & Perception, Controls, widgets, icons & symbols, Usability and Accessibility, Interaction devices, Future of HCI
Evaluation Method: Continuous Assessment and/or End Semester Examination

BSc Level III - Semester II

COM3213: Multimedia Technologies (30 Lecture hrs. & 30 Practical hrs.) (Optional)
Introduction to multimedia technologies, Audio and video basics, Multimedia compression techniques and standards, Multimedia Authoring Tools, Multimedia advanced coding and media object production, Multimedia Integration and presentation, Practical assignments aligned with different lessons of the course
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)

COM3222: Emerging Software Technologies (30 Lecture hrs.) (Optional)
Technology Hype Cycle (Gartner), Case study on a selected software technology with respect to hype cycle, Big Data, Cloud Computing, Edge Computing, Virtual Reality, Augmented Reality, Blockchain, IoT, Smart devices, Artificial Intelligence, Natural Language Processing, NoSQL databases, Comparing and contrasting parallel technologies such as cloud technologies with respect to their usability, pricing and proven track record of the corresponding proprietor, Career path guidance for different technological areas in the software industry.
Evaluation Method: Continuous Assessment and/or End Semester Examination

COM3232: Visual Programming (30 Lecture hrs) *(Optional)*
Introduction to .NET, Conditional Logic, Loops, Adding menus to forms, Debugging the code, Arrays, Events
Evaluation Method: Continuous Assessment and/or End Semester Examination

COM3252: E-Commerce (30 Lecture hrs)*(Optional)*
Introduction to E-Commerce, E-Commerce Business Models and Concepts, E-Commerce payment types, Basic Functions of an E Commerce site, E-Commerce site Designing factors, Development life cycle, Client-server architecture, Web server hardware and software, E-Commerce software packages and suites, Usage analysis and site management, Security aspects on client computers and service computers, Security issues of E-Commerce.

MAT225: Mathematical Statistics I (*Optional) refer to course unit details under the Department of Mathematics.
* MAT225 is compulsory for the students who wish to follow BSC Hons (Comp Sc) Degree Programme.

Note:

- The mode of delivery of the Computer Science Course Units in BSc (General) Degree: physical and/or virtual.
- Evaluation mode for Computer Science Course Units in BSc (General) Degree: physical and/or virtual.

7.6 Course Units in BSc (Honours) Degree in Computer Science

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

Level III - Semester I

CSS3113: Operating Systems (30 Lecture hrs + 30 Practical hrs) *(Core)*
Introduction and overview, Processes and threads, CPU Scheduling, Deadlocks, Memory management, File System implementation, Practical assignments aligned with different lessons of the course.
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)

CSS3123: Computer Graphics (30 Lecture hrs + 30 Practical hrs) (Core) Pre-requisite: COM1123
Computer Graphics Hardware, Introduction to Computer Graphics and OpenGL, Basic Programming Techniques using OpenGL, 2D Graphics, Colour Systems and Shading, 3D Graphics I Transformation and Viewing, 3D Graphics II Objects Modelling and Visible Surface Detection, Lighting, Surface Rendering, Basic Ray Tracing Algorithms, Applying Ray Tracing Techniques
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)

CSS3132: Professional Practices and Issues in IT (30 Lecture hrs) *(Core)*
Social context of computing, Growth and control of the Internet, Accessibility issues including legal requirements, Context-aware computing, Ethical argumentation theories and decision-making, Moral assumptions and values, The nature of professionalism including care, attention and discipline, fiduciary responsibility, and mentoring, Professional certification, codes of ethics, conduct, and practice, Accountability, responsibility and liability, Intellectual property, privacy and civil liberties, Digital rights management, Copyrights, patents, trade secrets, trademarks and Plagiarism, Foundations of the open source movement, Philosophical foundations of privacy rights, Legal foundations of privacy protection and technology-based solutions for privacy protection, Professional written and verbal communication with stakeholders.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3142: Advanced Software Engineering (30 Lecture hrs) *(Core) Pre-requisite: COM2122*
Model-driven engineering and UML, Secure design principles and patterns in software design, Coding Practices and standards: techniques, idioms/patterns, mechanisms for building quality programs, Testing fundamentals and test-case generation, Building security into the software development lifecycle, Software quality assurance, Reuse-based Software Engineering, Component-based Software Engineering, Distributed Software Engineering, Cloud Computing and Aspect-oriented Software Engineering, Software maintenance, Software measurements and metrics, CASE tools, Software development team management
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3152: Human Computer Interaction (30 Lecture hrs) *(Core)*
Background and motivation for HCI, Human factors, Theoretical foundations: theories, models, principles, standards, guidelines, Interface design elements, Interface design: methods and principles, Interface design: data gathering and task analysis, Evaluating interfaces: heuristic evaluation, GOMS, Interaction styles, Evaluation Data & Empirical Data, Lo-fi Prototyping, Colour, Vision & Perception, Controls, widgets, icons & symbols, Usability and Accessibility, Interaction devices, Future of HCI
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3162: Parallel and Distributed Systems (30 Lecture hrs) *(Core)*
Shared and Distributed Memory architectures, Distributed System design, Distributed Algorithms, Communication and Synchronization, Distributed File Systems, Fundamentals of Parallelism, Parallel Decomposition, Parallel architectures, Performance and Scalability of

Parallel Systems
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3172: Data Mining (30 Lecture hrs) *(Optional)*
Basic concepts of data mining, Data pre-processing techniques, Classification, Prediction, Clustering, Association rules, Concept of data warehousing with special emphasis on architecture and design.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3182: E-Commerce (30 Lecture hrs) *(Optional)*
Introduction to E-Commerce, E-Commerce Business Models and Concepts, E-Commerce payment types, Basic Functions of an E-Commerce site, E-Commerce site Designing factors, Development life cycle, Client-server architecture, Web server hardware and software, E-Commerce software packages and suites, Usage analysis and site management, Security aspects on client computers and service computers, Security issues of E Commerce.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3192: Internet Services and Protocols (15 Lecture hrs + 30 practical hrs) *(Optional) Pre-requisite: COM2213*
Introduction, Network and System Administration, Internet Protocols, Application Services and how they are configured, maintained and repaired, Practical Session: this course should give students a practical understanding of the services which are found in Internet Protocols such as DNS server, Web server, Proxy server, Email server, etc., Practical assignments aligned with different lessons of the course.
Evaluation Method: Continuous Assessment and/or End Semester Examination

MAT313β: Mathematical Statistics II (30 Lecture hrs + 15 Tutorial hrs) *(Optional) Pre-requisite: MAT225β* **refer to course unit details under the Department of Mathematics**

MSP3193: Bayesian Inference and Decision Theory (45 Lecture hrs) *(Optional)*
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.
Evaluation Method: Continuous Assessment 20% and Semester End Theory Examination 80%

Level III - Semester II

CSS3212: Software 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 human resource management, Project procurement management, Project integration management.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3223: Software Development Project (60 Practical hrs) *(Core)*
Project proposal preparation, Requirements gathering, System design and database design, Implementation, Testing and evaluation, Deployment/Present to the client, Final report preparation, Presentation and demonstration to the internal panel.
Evaluation Method: Attendance (0-10%), Final Presentation (20-25%), Final Product (30-40%), Final Report (30-40%), Individual Contribution (5-15%)

CSS3232: Data and Network Security (30 Lecture hrs) *(Core) Pre-requisite: COM2213*

Introduction to Computer Security and Cryptography, Message Authentication Code, Symmetric Key Encryption, Asymmetric Key Encryption, Key Distribution, Java Cryptography, Network Security, Web Security, Firewalls and Intrusion Detection Systems, Virus and other malicious codes, Email and Document Security, Electronic Payments
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3242: Advanced Database Management (30 Lecture hrs) *(Core) Pre-requisite: COM1223*
Introduction: File structures and organization, Indexing, B+ tree structure, Query processing, Query optimization, Transaction management, Database recovery, Concurrency control techniques, Transaction support
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3252: Advanced Data Structures and Algorithms (30 Lecture hrs) *(Core) Pre-requisite:COM2223*
Advanced data structures (Fibonacci heaps), Balanced trees (splay trees, treaps), String-based data structures and algorithms, Network flows (Ford-Fulkerson algorithm), Linear Programming (simplex method, interior point algorithms), Number-theoretic algorithms, Geometric algorithms, Randomized algorithms, Stochastic algorithms, Approximation algorithms
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS3252: CSS3262: Digital Image Processing (15 Lecture hrs + 30 Practical hrs) *(Optional)*
Introduction and digital image fundamentals, Image enhancement in the spatial domain, Image enhancement in the frequency domain, Colour image processing, Morphological image processing, Image segmentation, Representation and description, Mini-Group Project
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)

CSS3272: Emerging Software Technologies (30 Lecture hrs) *(Optional)*
Technology Hype Cycle (Gartner), Case study on a selected software technology with respect to hype cycle, Big Data, Cloud Computing, Edge Computing, Virtual Reality, Augmented Reality, Blockchain, IoT, Smart devices, Artificial Intelligence, Natural Language Processing, NoSQL databases, Comparing and contrasting parallel technologies such as cloud technologies with respect to their usability, pricing and proven track record of the corresponding proprietor, Career path guidance for different technological areas in the software industry
Evaluation Method: Continuous Assessment and/or End Semester Examination

IMT321β: Applied Algebra (Algebraic Data Encryption and Decryption Methods) (45 Lecture hrs) *(Optional) Pre-requisite: MAT111β, MAT211β, MAT221β*
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, Golay code.
Evaluation Method: Continuous Assessment 20% and Semester End Theory Examination 80%

Level IV Semester I

CSS4112: Research Methodology (30 Lecture hrs) *(Core)*
Introduction to scientific research, Reading and recording, Critiquing research papers, Planning and conducting research, The research process, Types of computing research and computing research methods, Research ethics and plagiarism, Data collection and analysis, Communicating research findings, Simple Latex for academic writing, Referencing and citation guides
Evaluation Method: Verb tense activity 5-15%, Two-page concept paper 5-35%, Data analysis assessment 5-20% and Quiz 5-40%

CSS4026: Individual Research Project *(Core)*
Preparation of Research Proposal, Conducting literature survey, Preparation of Interim Report, carrying out the research, Compiling thesis, Preparing a paper to publish in a local/international conferences or a journal
Evaluation Method: Defend the Project Proposal 10%, Interim progress report 15%, Publication 15% and Final report/presentation 60%

CSS4132: High Performance Computing (20 Lecture hrs + 10 Practical hrs.) *(Optional)*
Fundamentals of Parallelism, Parallel Decomposition, Parallel algorithm design, Parallel architectures, Parallel programming patterns, Programming shared-memory architectures, Programming distributed-memory architectures, Performance evaluation of parallel programs.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS4143: Machine Learning (30 Lecture hrs + 30 Practical hrs) *(Optional)*
Introduction to Machine Learning, Linear Regression with one variable, Linear Regression with multiple variables, Linear Algebra Review, Logistic Regression, Regularization, Neural Networks: Representation and Learning, Support Vector Machines, Supervised Learning and Unsupervised Learning, Dimensionality Reduction, Anomaly Detection, Large Scale

Machine Learning, Applications
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS4152: Enterprise Modelling (30 Lecture hrs) *(Optional)*
Strategic role of enterprise modelling, enterprise modelling process and enterprise modelling perspectives, Goal Modelling, available goal modelling techniques, Business Motivation Model as a goal modelling technique, Business rules, business rules and requirements, different expression levels, relationship between business rules model and other models (goal, process and concepts models), Concepts Model, relating concepts model to other models, Business Modelling, business value networks, business modelling ontologies, business modelling using e 3 value modelling method, Process Modelling, Process modelling languages, Process modelling using EPC, Methods for specification and verification of business processes, Basic workflow concepts, Workflow modelling using Petri nets, coloured petri nets, petri nets with time, basic routing constructs in petri nets, Workflow analysis, symptoms of a problematic workflow, qualitative (reachability analysis) and quantitative analysis (Resource utilization, Number of cases in progress, Waiting time, System time).
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS4162: Computer Vision (30 Lecture hrs) *(Optional) Pre-requisite: COM3133*
Geometric Camera Models and calibration, Light and Shading, Color perception and representation, Linear filters, Image-based modelling and rendering, Detecting objects in images, Tracking strategies, Segmentation and clustering, Image classification.
Evaluation Method: Continuous Assessment and/or End Semester Examination

Level IV Semester II

CSS4212: Research Seminar (30 Lecture hrs) *(Core)*
Writing a Critique: What is a critique?, How to write a critique?, Structure of a critique, Literature Review: Selecting Literature, Bibliographic Management, Software Tools, Studying Literature, Objectives of literature review, Structure of a survey paper, Research Communication: Scientific Method and Communication Path, Templates for different scientific communication modes.
Evaluation Method: Continuous Assessment

CSS4222: Compilers and Automata Theory (30 Lecture hrs) *(Core)*
Compiler design introduction, Phases of compiler, lexical analysis, syntax analysis, Regular Expressions; Operations on Regular expressions, Finite Automata and Regular Expressions, Conversion from FA and regular expressions, Deterministic Finite Automata (DFA); Minimization of DFA, Non-Deterministic Finite Automata (NDFA), Equivalence of Deterministic and Non-Deterministic Finite Automata, Equivalence between DFA,NFA, NFA-, Context-Free Grammars, Parse Trees; Ambiguity in Grammars and Languages, Standard Forms; Chomsky Normal Forms, Greibach normal Forms, Minimization of CFGs
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS4232: Artificial Intelligence (30 Lecture hrs) *(Optional)*
Introduction to Artificial Intelligence (AI), Agents and Environment, Problem Solving, Search Algorithms, Hill Climbing and Genetic Algorithms, Propositional Logic, First Order Logic, Game Playing, Natural Language Processing (NLP), Machine Learning: Introduction and Methods, Computer Vision and Deep Learning
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC4242: Service Oriented Computing (30 Lecture hrs) *(Optional)*
Introduction to Introduction to Service Oriented Computing, Introduction to Service Oriented Architecture, Principles of Service Oriented Architecture, Service classification, Enterprise Service Bus, Introduction to web services, Web Service Architecture SOAP, WSDL, Web Service Description, SOA Governance
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS4252: Formal Methods and Software Verification (30 Lecture hrs) *(Optional)*

Review of Sets, Relations, Functions and Related Matters, Review of Propositional Logic, and Logical Arguments, Introduction to Predicate Calculus, Concepts of Programming Language, Proof of Correctness, Hoare Logic, Formal Methods, Use of Z-Notation for various aspects of program constructs and Verification
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS4262: Reconfigurable Computing (30 Lecture hrs) *(Optional) Pre-requisite: COM1112, COM1123*
Introduction to reconfigurable computing, FPGA architecture and basic logic elements of FPGA, Hardware Definition Languages (AHDL, VHDL and Verilog), Concurrent, behavioural and structural description of FPGAs, Reconfigurable computing design methodologies, Sequential circuits, Finite State Machines, Parametric coding, Application Acceleration Using Reconfigurable Computing, Digital System Design Introduction and Hardware Software Co-design, Heterogeneous Computing.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSS4272: Knowledge Engineering (30 Lecture hrs) *(Optional)*
Introduction to Knowledge Management, Knowledge Representation using Ontologies, Ontology Design, Ontology Implementation, Ontology Validation and Evaluation, Ontology Maintenance, Semantic Web (Ontologies in Semantic Web), Introduction to Protg, Design a small ontology to a real world problem in an application domain, Assignments and Tutorials.
Evaluation Method: Continuous Assessment 30% and Semester End Theory Examination 70%

CSS4282: Bioinformatics (30 Lecture hrs) *(Optional)*
Introduction to Bioinformatics, Archives and Information Retrieval, Pairwise sequence Alignment algorithms: Dot Plots. Simple Alignments, The Needleman and Wunsch Algorithm, Introduction to semi- global alignments, local sequence alignments and algorithms, BLAST, FASTA algorithm, Multiple sequence alignment and algorithms: Introduction to multiple sequence alignments, Greedy approach, Star alignment approach and ClustalW algorithm, Hidden Markov models development and related algorithm development, 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 and related algorithms: Secondary Structure, Tertiary and Quaternary Structure, Tools for Modelling Protein Folding, MicroRNA data and analysis methods/algorithms, Introduction to drug discovery and ligand docking algorithms.
Evaluation Method: Continuous Assessment 30% and Semester End Theory Examination 70%

CSS4296: Industrial Training/Industry Project *(Core)*
Students are required to select supervisor/s and submit a completed registration form at the beginning of the course unit
Evaluation Method: Report 30%, Novation Diary 20% and Presentation/Viva - 50%
*CSS4296: Non-GPA 6 credits and minimum 3 months required.

Note: The completion date of the degree programme is the submission date of final report of CSS4296 (Industrial Training/ Industry Project)

7.7 Credit Values

7.7.1 BSc General Degree

Course Unit	**Duration (hrs)**		**Credits**		Total
	Theory	Practical	Theory	Practical	
COM1112: Basic Concepts of Computer Science Computer Science	30		2		2
COM1123: Programming Techniques	30	30	2	1	3
COM1213: Internet Programming and Web Technologies	30	45	2	1	3
COM1223: File Organization & Database Management Systems	30	30	2	1 1	3
COM2113: Object Oriented System Development	30	30	2	1	3
COM2122: Software Engineering	30		2		2
COM2213: Data Communications and Computer Networks	30	30	2	1	3 [1]
COM2223: Data Structures and Algorithms	30	30	2	1	3
COM3113: Operating Systems	30	30	2	1	3
COM3122: Data Mining	30		2		2
COM3b33: Computer Group Project		60		3	3
COM3142: Internet Services and Protocols	15	30	1	1	2
COM3152: Professional Practices and Issues in IT	30		2		2
COM3162: Human-Computer Interaction	30		2		2
COM3213: Multimedia Technologies	30	30	2	1	3
COM3222: Emerging Software Technologies	30		2		2
COM3232: Visual Programming	15	30	1	1	2
COM3252: E-Commerce	30		2		2

[1]* COM2122 and MAT225 is compulsory for the students who wish to follow BSC Hons (Comp Sc) Degree Programme

7.7.2 BSc (Honours) Degree in Computer Science

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
CSS3113: Operating Systems	30	30	2	1	3
CSS3123: Computer Graphics	30	30	2	1	3
CSS3132: Professional Practices and Issues in IT	30		2		2
CSS3142: Advanced Software Engineering	30		2		2
CSS3152: Human-Computer Interaction	30		2		2
CSS3162: Parallel and Distributed Systems	30		2		2
CSS3172: Data Mining	30		2		2
CSS3182: E-Commerce	30		2		2
CSS3192: Internet Services and Protocols	15	30	1	1	2
MAT313β: Mathematical Statistics II	30	15T	2	0.5	2.5
MSP3193: Bayesian Inference and Decision Theory	45		3		3
CSS3212: Software Project Management	30		2		2
CSS3223: Software Development Project		90		3	3
CSS3232: Data and Network Security	30		2		2
CSS3242: Advanced Database Management	30		2		2
CSS3252: Advanced Data Structures and Algorithms	30		2		2
CSS3262: Digital Image Processing	15	30	1	1	2
CSS3272: Emerging Software Technologies	30		2		2
IMT321β: Applied Algebra	30	15T	2	0.5	2.5
CSS4112: Research Methodology	30		2		2
CSS4026: Individual Research Project					6
CSS4132: High-Performance Computing	30		2		2
CSS4143: Machine Learning	30	30	2	1	3

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
CSS4152: Enterprise Modelling	30		2		2
CSS4162: Computer Vision	30		2		2
CSS4212: Research Seminar	30		2		2
CSS4222: Compilers and Automata Theory	30		2		2
CSS4232: Artificial Intelligence	30		2		2
CSC4242: Service Oriented Computing	30		2		2
CSS4252: Formal Methods and Software Verification	30		2		2
CSS4262: Reconfigurable Computing	30		2		2
CSS4272: Knowledge Engineering	30		2		2
CSS4282: Bioinformatics	30		2		2
CSS4296: Industrial Training/Industry Project					Non GPA 6

7.8 ICT Course units of Bachelor of Science (General) Degree

The department conducts a Foundation Course in Information Technology (ICT1b13) for all the students, in the BSc 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 a Certificate Course in Information Technology (ICT2b13/CCIT). The students who pass ICT1b13 and ICT2b13 course units are awarded certificates by the department.

ICT1b13: Foundation Course in Information Technology (90 Practical hrs)
Computer basics, Operating systems, Introduction to computer networks, Introduction to the internet, Word processing application, Spreadsheet application, Presentation applica-

tion, Database (MS Access), Computer programming basics
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 the Foundation Course in Information Technology (ICT1b13) in order to release the final results of the BSc Degree.
Evaluation Method: ontinuous Assessments 40% and End Semester Examination (Level I Semester II) 60%
Note: Continuous Assessments 40 Marks (

- Students are assessed based on three practical assessments in Level 1 Semester I. If a student completes all three assessments, only two assessments with best marks are counted towards the final grade of the course unit.
- 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 fails 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 10 marks out of 40 marks (25%) from the continuous assessments component, he/she must do at least two continuous assessments in the following year.
- Refer to Section 14.2.2 for more details

)

ICT2b13: Certificate Course in Information Technology (CCIT) (90 Practical hrs)
Linux operating system, Database management system using SQL, Web development, Computer networks, Visual programming, Graphics and Multimedia.
Evaluation Method: End Semester Examination 70% and Practical Examination 30% (Student must obtain at least 35% from the theory paper and the 30% from the practical paper to obtain a C grade or above)

7.9 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.

7.9.1 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.

BCS 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: Continuous Assessment and/or End Semester Examination

CSC1113: Programming Techniques (30 Lecture hrs + 30 $\approx$ 45 Practical hrs) *(Core)*

Fundamentals of Computing, Data concepts in C: Constants, Variables, Expressions, Operators, and operator precedence in C, Statements: Declarations, Input-Output Statements, Compound statements, Selection Statements, Conditions, Logical operators, Precedence, Repetitive statements, While, construct, Do-while, Construct, For construct, Data types, Arrays. Strings. Multidimensional arrays and matrices, Pointers, Structures in C, File input-output in 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)

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)*
Software development life cycle: introduction, what is a life cycle?, generic phases in SDLC and important artifacts created in these phases, Business as a work system: work system principles, system and sub system, representing business as a system of integrated interacting set of components, importance of aligning business and IT, System stakeholders: major players of systems development such as system owners, users, business analysts, designers, programmers, systems analysts, project managers, etc., different roles of a systems analyst, skills required in a systems analyst, how systems analyst bridges communication gap between business and technical worlds, Project management; importance of project management and causes of failed projects, major aspects of project management such as planning, scheduling and controlling, Project management tools and techniques such as PERT and Gannet charts, developing work breakdown structure, System analysis and design approaches: traditional and modern approaches such as Object oriented, agile RAD, etc, Fact finding techniques: different fact finding techniques, using fact finding techniques to elicit requirements, requirements management, Elicit requirements using fact finding techniques, Data Flow Diagrams:

concepts and notations for data flow modelling, modelling existing system using data flow diagrams, balancing of DFDs and information, determining legal and illegal data flows, developing data flow diagram for a given business case. Data Modelling: what is data modelling, system concepts for data, modelling such as entities, attributes, relationships, and multiplicity, normalization.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC1153: Laboratory Assignments (15 Lecture hrs & 60 $\approx$ 90 Practical hrs) *(Core)*

Operating Systems (System utilities of Linux, Windows Installation, Advanced System utilities of Windows, Linux Installation), Word Processing using Office and Latex, Data Analytics using Open Office and (Basic) R/Python, Networking and applications, Computer Security, Internet Services and Google Applications and CMS, Computer Hardware and Specifications, image and video editing
Evaluation Method: 100% End Semester Examination (30% from the MCQ paper and 70% from the practical paper) OR 70% End Semester Examination and 30% Continuous Assignment / Assignments

AMT112β: Mathematical Foundation of CS (30 Lecture hrs + 15 Tutorial hrs) *(Core)* refer to course unit details under the Department of Mathematics

MAT112δ Differential Equations (15 Lecture hrs + 7 Tutorial hrs) *(Core)* refer to course unit details under the Department of Mathematics

MAT113δ: Introductory Statistics (15 Lecture hrs + 8 Tutorial hrs) *(Core)* refer to course unit details under the Department of Mathematics

BCS Level I - Semester II

CSC1213: Database Management Systems (30 Lecture hrs + 45 Practical hrs) *(Core)*

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) Pre-requisite: CSC1113*
Analysis of Algorithms, Sorting Algorithms, Searching Algorithms, Stacks and Queues, Lists, Linked Lists, Trees, Binary trees, AVL trees and Red Black trees, Graphs and Hash Tables
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 to Software Engineering, Activities and Characteristics Software Processes, Software Process Models, Requirement Analysis and Specification, System Modeling, Software Design (Design Principles and Architectural Design), Software Testing, CASE tools, Software Maintenance, Measurements and Metrics
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC1242: Object Oriented System Development (30 Lecture hrs) *(Core)*
Fundamental concepts in object orientation: introduction, class and object, generalization and practical uses of generalization, object interaction with message passing, polymorphism, origins of object-orientation, object-oriented languages, Modelling: introduction to models and diagrams, differences between models and diagrams, introduction to UML, models in UML, Software development process: what is a development process, iterative and incremental software development, Unified Process as an Object-oriented software development process, Key artifacts developed in the Unified Process: Use Cases, Class Diagrams and Sequence Diagrams, Requirements and Use cases: Business and system use cases, documenting requirements by using use cases, brief and fully dressed formats in use case modelling, use case diagrams and notations, operation contracts, describing use cases using UML activity diagrams, Modelling structure: class diagrams, attributes and state of a class, links and associations, multiplicity, operations, identifying classes and developing class diagrams, Modelling behaviour: interaction diagrams, communication and sequence diagrams, Modelling object interaction using communication/sequence diagrams, Use case realization: realizing use cases by using communication/sequence diagrams and class diagrams
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC1251: Computer Laboratory (45 Lecture hrs) *(Core)*
Working with Matrices, Data input and output, Plotting and visualization, M-Files, Basic statistics and data analysis, Working with Polynomials, Building graphical user interfaces
Evaluation Method: Continuous Assessment and/or End Semester Examination

MAT121β: Algebra (30 Lecture hrs. & 15 Tutorial hrs.) (Core) refer to course unit details under the Department of Mathematics

MAT122β: Calculus (30 Lecture hrs. + 15 Tutorial hrs.) *(Core)* refer to course unit details under the Department of Mathematics

BCS Level II - Semester I

CSC2113: Data Communication and Computer Networks (30 Lecture hrs. and 45 Practical hrs.) *(Core)*
Introduction to data communications and computer networks, network models, data and signals, data transmission, transmission, impairment, error detection and correction, multiplexing, logical addressing vs physical addressing, switching, routing, network and transport layer protocols, application layer, network security, Network Hardware, UTP cables, standards and structured cabling, IP addressing, subnet mask, default gateway, DNS server, Packet analysis and Network testing tools, Router and VLAN Configuration, DHCP, Remote login, Inter-VLAN Routing, ACL Configuration
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 + 30 ≈ 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 + 30 ≈ 45 Practical hrs) *(Core)*
Introduction and overview, Processes and threads, CPU Scheduling, Deadlocks, Memory management, File System implementation, Process synchronization, Virtual memory management, Protection and security, I/O systems
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 + 30 ≈ 45 Practical hrs) *(Core)*
Introduction and digital image fundamentals, Image enhancement in the spatial domain, Image enhancement in the frequency domain, Colour image processing, Morphological image processing, Image segmentation, Representation and description, Line drawing algorithms, Circle drawing algorithms, Geometric Transformations, Filling algorithms, Line clipping 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)

AMT212β: Computational Mathematics (30 Lecture hrs + 15 Tutorial hrs) *(Core)*
refer to course unit details under the Department of Mathematics

MAT211β: Linear Algebra I (30 Lecture hrs + 15 Tutorial hrs) *(Core)* refer to course unit details under the Department of Mathematics

PHY2112: Electronics (30 Lecture hrs) *(Core)* refer to course unit details under the Department of Physics

BCS Level II - Semester II

CSC2213: Rapid Application Development (30 Lecture hrs + 30 ≈ 45 Practical hrs) *(Core)*
Introduction to Rapid Application Development, Issues in Rapid Application Development, Project Estimation, Object Oriented Programming with C#, Introduction to Design Patterns, Decorator Pattern, Proxy Pattern, Factory Method Pattern, Singleton Pattern

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) Pre-requisite: CSC1122*
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

CSC2233: Internet Programming (30 Lecture hrs + 30 ≈ 45 Practical hrs) *(Core) Pre-requisite: CSC113α*
Supporting the operation of organizations: Server-Side Scripting, PHP arrays, PHP functions, String Manipulation Functions, Forms & Database, PHP MySQLi, Session & cookies, Web Designing Process, UI and UX, XML, JQuery & AJAX, Web Development frameworks
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) Pre-requisite: CSC1213*
Introduction: File structures and organization, Indexing, B+ tree structure, Query processing, Query optimization, Transaction management, Database recovery, Concurrency control techniques, Transaction support
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: Continuous Assessment and/or End Semester Examination

CSC2263: Multimedia and Video Production (30 Lecture hrs + 30 ≈ 45 Practical hrs) *(Optional)*
Introduction to multimedia technologies, Audio and video basics, Multimedia compression techniques and standards, Multimedia Authoring Tools, Multimedia advanced coding and media object production, Multimedia Integration and presentation.
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)

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: Continuous Assessment and/or End Semester Examination

MAT225β: Mathematical Statistics I (Core) refer to course unit details under the Department of Mathematics

PHY2222: Electronics (Optional) refer to course unit details under the Department of Physics.

FSC224α: Physical Fitness and Health Management (Optional) refer to course unit details under FSC course units.

BCS Level III - Semester I

CSC3113: Group Projects (120 Practical hrs) *(Core)*
Project proposal preparation, Requirements gathering, System design and database design, Implementation, Testing and Evaluation, Deployment/Present to the client, Final report preparation, Presentation and demonstration to the internal panel.
Evaluation Method: Attendance (0-10%), Final Presentation (20-25%), Final Product (30-40%), Final Report (30-40%), Individual Contribution (5-15%)

CSC3122: e-Commerce and Professional Practice (30 Lecture hrs) *(Optional)*
Supporting the operation of organizations: Introduction, Motivation factors to e-Commerce, Classifying e-Commerce business types, Business Models and e-Commerce, Business Strategies, Technology Infrastructure for e-commerce, Designing e-Commerce Web Site, Security in e-Commerce site, Legal and Ethical Issues in e-Commerce, Professional Practices
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC3132: Data Warehousing and Data mining (30 Lecture hrs) *(Optional)*
Introduction to data mining and data warehousing, Basic concepts of data mining, Data pre-processing techniques, Classification, Prediction, Clustering, Association rules, Concept of data warehousing, Data Warehousing: architecture and design.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC3142: Internet Services and Protocols (15 Lecture hrs + 30 $\approx$ 45 Practical hrs) *(Optional) Pre-requisite: CSC2113*
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: Continuous Assessment and/or End Semester Examination

CSC3172: Distributed Systems (30 Lecture hrs) *(Optional)*
Introduction to Distributed Systems, Communication in Distributed Systems, Synchronization in Distributed Systems: Clock synchronization, Mutual, Exclusion, Election algorithms, Deadlocks, Scheduling in Distributed Systems, Distributed File Systems, P2P systems, Fault Tolerance, Distributed Systems in Practice
Evaluation Method: Continuous Assessment and/or End Semester Examination

FSC3122: Accounting (30 Lecture hrs) *(Optional)* refer to course unit details under FSC course units.

FSC3112 Management (30 Lecture hrs) *(Optional)* refer to course unit details under FSC course units.

MAT313β: Mathematical Statistics II (30 Lecture hrs + 15 Tutorial hrs) *(Optional)* refer to course unit details under the Department of Mathematics.

BCS 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: Report 30%, Novation Diary 20% and Presentation/Viva - 50%**

Note: The mode of delivery of the Course Units in BCS (General) Degree: physical and/or virtual. Evaluation mode for BCS (General) Degree: physical and/or virtual.

7.10 Bachelor of Computer Science Hons Degree

A limited number of students are selected to follow the Bachelor of Computer Science Hons 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.

7.10.1 Selection Criteria for the BCS Honours Degree Programme

The Department of Computer Science shall announce the number of students to be enrolled into the Bachelor of Computer Science Honours Degree Programme at the beginning of Semester II of every academic year considering, the available computing and human resources at the department.

A) A student shall be eligible to apply at the completion of the Level III of Bachelor of Computer Science Degree Programme, if he/she has

   i. followed course units aggregating to a minimum of 90 credits, and

   ii. earned overall Grade Point Average (GPA) of 2.5 or more from all the course units followed, and

   iii. earned a GPA of 3.00 or more from the core course units of Computer Science excluding CSC3216 - Industrial Training course unit, and

   iv. obtained grades of C or better aggregating to a minimum 70% of credits from Core Course Units of Mathematics and Physics, and

   v. obtained grades of C or better for CSC3216 - Industrial Training and CSC3113 - Group Project course units, and

   vi passed English Proficiency Level I and Level II.

B) The students shall be selected for the BCS Hons degree programme based on the merit list prepared according to the Grade Point Average (GPA) of all the degree course units that the students have followed.

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

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

C) The decision of the Faculty Board on the selection shall be final and conclusive.

Bachelor of Computer Science Honours Degree - Semester I

CSC4112: Research Seminar (30 Lecture hrs) *(Core)*
Writing a Critique: What is a critique?, How to write a critique?, Structure of a critique, Literature Review: Selecting Literature, Bibliographic Management, Software Tools, Studying Literature, Objectives of literature review, Structure of a survey paper, Research Communication: Scientific Method and Communication Path, Templates for different scientific communication modes
Evaluation Method: Continuous Assessment

CSC4122: Research Methodology (30 Lecture hrs) *(Core)*
Introduction to scientific research, Reading and recording, Critiquing research papers, Planning and conducting research, The research process, Types of computing research and computing research methods, Research ethics and plagiarism, Data collection and analysis, Communicating research findings, Simple Latex for academic writing, Referencing and citation guides
Evaluation Method: Continuous Assessment

CSC4133: Neural Networks (45 Lecture hrs) *(Core)*
Introduction to Artificial Neural Networks, Multi-Layer Perceptrons, Back-Propagation Algorithm, ANNs using Tools, Pre-Processing Techniques, Feature Extraction & Selection algorithms, Nave 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

CSC4152: Enterprise Modelling (30 Lecture hrs) *(Core)*
Strategic role of enterprise modelling, enterprise modelling process and enterprise modelling perspectives, Goal Modelling, available goal modelling techniques, Business Motivation Model as a goal modelling technique, Business rules, business rules and requirements, different expression levels, relationship between business rules model and other models (goal, process and concepts models), Concepts Model, relating concepts model to other models, Business Modelling, business value networks, business modelling ontologies, business modelling using e^3 value modelling method, Process Modelling, Process modelling languages, Process modelling using EPC, Methods for specification and verification of business processes, Basic workflow concepts, Workflow modelling using Petri nets, coloured petri nets, petri nets with time, basic routing constructs in petri nets, Workflow analysis, symptoms of

a problematic workflow, qualitative (reachability analysis) and quantitative analysis (Resource utilization, Number of cases in progress, Waiting time, System time).
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC4162 - Data Mining for Business Intelligence (30 Lecture hrs) *(Core)* **Prerequisite: CSC3132**
Introduction to Business intelligence, Introduction to data mining, Supervised and unsupervised learning, Classification and predictive techniques, Data Partitioning, Dimension reduction using PCA, Classification Methods: Classification techniques, Introduction to Bayes Theorem and Formula and, Naive Bays, K- nearest neighbour, Regression analysis, Clustering, Evaluate the performance classification and predictive methods
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC4172: High Performance Computing (30 Lecture hrs) *(Core) Pre-requisite: CSC 3172*
Parallel algorithms: synchronous and asynchronous algorithms; parallel programming patterns, Introduction to HPC architectures: Flynn taxonomy, shared memory and distributed memory architectures: GPGPU, Parallel programming patterns, Programming shared-memory architectures with OpenMP, Programming distributed-memory architectures with MPI, Performance evaluation of parallel programs, scheduling and Load Balancing.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC4182: Bioinformatics (30 Lecture hrs) *(Core)*
Introduction to Bioinformatics, Archives and Information Retrieval, Pairwise sequence Alignment algorithms: Dot Plots. Simple Alignments, The Needleman and Wunsch Algorithm, Introduction to semi- global alignments, local sequence alignments and algorithms, BLAST, FASTA algorithm, Multiple sequence alignment and algorithms: Introduction to multiple sequence alignments, Greedy approach, Star alignment approach and ClustalW algorithm, Hidden Markov models development and related algorithms, 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 and related algorithms: Secondary Structure, Tertiary and Quaternary Structure, looTs for Modelling Protein Folding, MicroRNA data and analysis methods/algorithms, Introduction to drug discovery and ligand docking algorithms.
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC4046: Individual Research project *(Core)*
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%, Manuscript Preparation 15%, Final report/presentation 60%

Bachelor of Computer Science (Honours) Degree - Semester II

CSC4212: Compilers and Theory of Computation (30 Lecture hrs) *(Core)*
Compiler design introduction, Phases of compiler, lexical analysis, syntax analysis, Regular Expressions; Operations on Regular expressions, Finite Automata and Regular Expressions, Conversion from FA and regular expressions, Deterministic Finite Automata (DFA);

Minimization of DFA, Non-Deterministic Finite Automata (NDFA). Equivalence of Deterministic and Non-Deterministic Finite Automata, Equivalence between DFA,NFA, NFA-, Context-Free Grammars, Parse Trees; Ambiguity in Grammars and Languages, Standard Forms; Chomsky Normal Forms, Greibach normal Forms, Minimization of CFGs, Push-down Automata (PDA), Deterministic and Non-Deterministic (PDA); Formal definition of NPDA, Transition functions of NPDA; NPDA Execution, Accepting Strings with NPDA; Equivalence of PDAs and CFG, The Turing Machine, Programming Techniques for Turing Machines; Formal definition of TMs, Top-Down Parsing, LL(1) parse table, Recursive decent pars, Bottom-up parsing LR parsing, Abstract Syntax Trees, Lex & Flex, Yacc
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC4222: Service Oriented Computing (30 Lecture hrs) *(Core)*
Introduction to Introduction to Service Oriented Computing, Introduction to Service Oriented Architecture, Principles of Service Oriented Architecture, Service classification, Enterprise Service Bus, Introduction to web services, Web Service Architecture SOAP, WSDL, Web Service Description, SOA Governance
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC 4232: Formal Methods and Software Verification (30 Lecture hrs) *(Optional)*

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: Continuous Assessment and/or End Semester Examination

CSC4242: Artificial Intelligence (30 Lecture hrs) *(Core)*
Introduction to Artificial Intelligence (AI), Agents and Environment, Problem Solving, Search Algorithms, Hill Climbing and Genetic Algorithms, Propositional Logic, First Order Logic, Game Playing, Natural Language Processing (NLP), Machine Learning: Introduction and Methods, Computer Vision and Deep Learning
Evaluation Method: Continuous Assessment and/or End Semester Examination

CSC4262: Knowledge Engineering (30 Lecture hrs) *(Optional)*
Introduction to Knowledge Management, Knowledge Representation using Ontologies, Ontology Design, Ontology Implementation, Ontology Validation and Evaluation, Ontology Maintenance, Semantic Web (Ontologies in Semantic Web), Introduction to Protg, Design a small ontology to a real world problem in an application domain
Evaluation Method: Continuous Assessment and/or End Semester Examination

Note: The mode of delivery of the Course Units in BCS Hons Degree: physical and/or virtual. Evaluation mode for BCS Hons Degree: physical and/or virtual.

7.11 Credit Values

7.11.1 Bachelor of Computer Science (General) Degree (BCS)

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
CSC1122: Computer Systems I	30		2		2
CSC1113: Programming Techniques	30	$30 \approx 45$	2	1	3
CSC113α: Internet Services and Web Development	15	22.5	1	0.5	1.5
CSC1142: System Analysis and Design	30		2		2
CSC1153: Laboratory Assignments	15	$60 \approx 90$	1	2	3
AMT112β: Mathematical Foundation of CS	30	15T	2	0.5	2.5
MAT112δ: Differential Equations	15	7T	1	0.25	1.25
MAT113δ: Introductory Statistics	15	8T	1	0.25	1.25
CSC1213: Database Management Systems	30	$30 \approx 45$	2		2
CSC1223: Data Structures and Algorithms	30	$30 \approx 45$	2	1	3
CSC1233: Software Engineering	45		3		3
CSC1242: Object Oriented System Development	30		2		2
CSC1251: Computer Laboratory		45		1	1
MAT121β: Algebra	30	15T	2	0.5	2.5
MAT122β: Calculus	30	15T	2	0.5	2.5
CSC2113: Data Communication and Computer Networks	30	$30 \approx 45$	2	1	3
CSC2123: Object Oriented Programming	30	$30 \approx 45$	2	1	3
CSC2133: Operating Systems	30	$30 \approx 45$	2	1	3
CSC2143: Computer Graphics and Image Processing	30	$30 \approx 45$	2	1	3
AMT212β: Computational Mathematics	30	15T	2	0.5	2.5
MAT211β: Linear Algebra I	30	15T	2	0.5	2.5
PHY2112: Electronics	30		2		2
CSC2213: Rapid Application Development	30	$30 \approx 45$	2	1	3
CSC2222: Computer System II	30		2		2

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
CSC2233: Internet Programming	30	$30 \approx 45$	2	1	3
CSC2242: Advanced Database Management	30		2		2
CSC2252: Project Management	30		2		2
CSC2263: Multimedia and Video Production	30	$30 \approx 45$	2	1	3
CSC2272: Data and Network Security	30		2		2
MAT225β: Mathematical Statistics I	30	15T	2	0.5	2.5
PHY2222: Electronics	30		2		2
FSC224α: Physical Fitness and Health Management					1.5
CSC3113: Group Projects		120		3	3
CSC3122: e-Commerce and Professional Practice	30		2		2
CSC3132: Data Warehousing and Data mining	30		2		2
CSC3142: Internet Services and Protocols	15	$30 \approx 45$	1	1	2
CSC3172: Distributed Systems	30		2		2
FSC3122: Accounting	30		2		2
FSC3112: Management	30		2		2
MAT313β: Mathematical Statistics II	30	15	2	0.5	2.5
CSC3216: Industrial Training					6

T - Tutorials

7.11.2 BCS Honours Degree Programme

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
CSC4112: Research Seminar	30		2		2
CSC4122: Research Methodology	30		2		2
CSC4133: Neural Networks	45		3		3
CSC4152: Enterprise Modelling	30		2		2
CSC4162: Data Mining for Business Intelligence	30		2		2
CSC4172: High-Performance Computing	30		2		2
CSC4182: Bioinformatics	30		2		2
CSC4046: Individual Research project					6
CSC4212: Compilers and Theory of Computation	30		2		2
CSC4222: Service-Oriented Computing	30		2		2
CSC4232: Formal Methods and Software Verification	30		2		2
CSC4242: Artificial Intelligence	30		2		2
CSC4262: Knowledge Engineering	30		2		2

7.12 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 departments 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.

7.12.1 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).

7.12.2 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.

7.12.3 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) a minimum of 90 credits

(b) grades of C or better aggregating to a minimum of 60% credits of Computer Science CCUs

(c) grades of C or better aggregating to a minimum of 60% credits of Mathematics CCUs

(d) grades of C or better aggregating to a minimum of 60% credits of OCUs

(e) a grade C or better for Industry Based Project/Industry Placement course unit

(f) 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 Classes

A student who has satisfied conditions given above is eligible for an award of a Class 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

(i) a minimum Overall Average of 3.70 and

(ii) 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

(i) 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 LevelI and Level II examinations in order to release the final results of the Bachelor of Computer Science degree.

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

7.12.4.1 A student shall be eligible for the award of the Bachelor of Computer Science Honours Degree if he/she has obtained

(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, and

(b) 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

(c) a grade not inferior to C for the fourth year Individual Research Project, and

(d) grade of C or better to a minimum of 70% credits from the fourth year course units, and

7.12.4.2 A student shall obtain a grade of C or better for the English Proficiency Level I, Level II and Level III for releasing results of his/her degree

Award of Classes

A student who has fulfilled all the conditions given above shall be awarded a Class, 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 Classs 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

(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

7.12.5 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 a Class for the Bachelor of Computer Science (General) Degree if he/she has completed the requirements within frst 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.

7.13 Other Services to the University Community

The Department of Computer Science offers many Computer and Information Technology related service origi- nally 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 nun-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 BSc 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 a 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 diffrential 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

Senior Professor Professor L.A.L.W.Jayasekara
BSc (Kelaniya, SL), MSc in Information Systems (Kyushu, Japan), PhD in Statistics (Kyushu, Japan)

8.4 Members of the Academic Staff

Designation	Name	Specialization
Senior Professor	Professor L.A.L.W.Jayasekara BSc (Kelaniya, SL) MSc in Information Systems (Kyushu, Japan) PhD in Statistics (Kyushu, Japan)	Statistics
Professor & Chair	Professor P.A. Jayantha BSc (Kelaniya, SL), MSc in Industrial Mathematics (Sri J'Pura, SL) PhD (QUT Australia)	Numerical Methods for Partial Differential Equations, Computer Programming
Professor	Prof. B.G.S.A Pradeep BSc (Ruhuna, SL) MSc (Peradeniya, SL) PhD (USTB, China)	Mathematical Biology, Delay Differential Equations
Senior Lecturer Grade I	Mrs. K.C.N. Shanthidevi BSc (Sri J'Pura, SL), MSc (Hiroshima, Japan)	Functional Analysis, Semigroup Theory and their Applications in Population Dynamics using Approximation Theory.
	Mrs. S.D.L. Geeganage BSc (Colombo, SL), Dip. in Statistics (Sri J'Pura, SL) MPhil in Mathematics (Sri J'Pura, SL)	Parametric estimations of mixtures of probability models, Numerical Techniques
	Dr. M.K. Abeyratne BSc (Kelaniya, SL) Dip. in Statistics (Sri J'Pura, SL) MSc in Industrial Mathematics (Kaiserslutern, Germany) PhD (Kaiserslutern, Germany)	Partial Differential Equations, Numerical Methods in PDEs, BVPs in Elasticity Theory, Finite Element Methods.
	Dr. L.W. Somathilake BSc (Kelaniya, SL), MPhil (Ruhuna, SL) PhD (Ruhuna, SL)	Nonlinear PDEs (reaction diffusion systems), Semigroup theory, Computational PDEs, Mathematical & Computational Biology
	Dr. N. Yapage BSc (Ruhuna, SL) PhD (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
	Dr. W.A.R. De Mel BSc (Kelaniya, SL) MPhil (Ruhuna, SL) M.S. (SHSU, USA) M.S. (MST, USA) PhD (MST, USA)	Parametric and Nonparametric Methods in Survival Analysis, Recurrent Events, Applied Stochastic Processes, Financial Mathematics, Financial Time Series and Actuarial Science
Senior Lecturer Grade II	Dr. D. M. Samarathunga BSc (Peradeniya, SL) PhD (Wayne State, USA)	Operations Research, Mathematical Programming.
	Dr. K. D. Prasangika BSc (Ruhuna, SL) MPhil (Ruhuna, SL) PhD (CCNU, China)	Statistics, Categorical Data Analysis, Meta Analysis, Time Series Analysis, Bayesian Inference
	Dr. A.W.L. Pubudu Thilan BSc (Ruhuna, SL) BIT(Dip) (Colombo, SL) M.S. (MST, USA) MPhil (Ruhuna, SL) PhD (Queensland, Australia)	Optimal experimental design, Bayesian design, Ecological modelling Adaptive design, Bayesian computational algorithms
	Dr. M.C.S. Fernando BSc (Ruhuna, Sri Lanka) MSc in Technimathematics (LUT, Lappeenranta, Finland) PhD(TU Kaiserslautern, Germany)	PDE constraint optimal control problems Numerical methods for PDEs Free boundary value problems
	Dr. E.J.K.P. Nandani BSc (Ruhuna, SL) MPhil (Ruhuna, SL) PhD (WIPM, UCAS, China)	Applied Mathematics Artificial Neural Networks Mathematical Physics

Designation	Name	Specialization
Senior Lecturer Grade II	Dr. H. L. Jayetileke BSc (Ruhuna, SL) MSc (Colombo, SL) PhD (Queensland, Australia)	Regression Analysis, Longitudinal Data Analysis, Bias Reduction Techniques, Machine Learning
Lecturer	Mrs. K.G.P.Hansani BSc(Ruhuna, SL) MPhil (Ruhuna, SL)	Applied Mathematics Numerical Modeling and Simulation
Probationary Lecturer	Mrs. S.D.M. Dilshani BSc (Ruhuna, SL) MSc (Moratuwa, SL) Reading for MPhil in Ruhuna	Categorical Data Analysis, Meta Analysis
	Mr. L.T. Wedage BSc(Ruhuna, SL)	(On study leave)

8.5 Course Units offered for BSc (General) Degree

Mathematics

BSc Level I - Semester I

MAT111β: Vector Analysis (30 Lecture hrs + 15 Tutorial hrs)

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)

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)

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 Bio Science Students (30 Lecture hrs) Only for students following Biological Science Stream *-(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!/na! nb! ,The Boltzman Distribution.)
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

BSc Level I - Semester II

MAT121β: Algebra (30 Lecture hrs + 15 Tutorial hrs)

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%

MAT122β: Calculus (Real Analysis) (30 Lecture hrs + 15 Tutorial hrs)
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%

BSc Level II - Semester I

MAT211β: Linear Algebra (30 Lecture hrs + 15 Tutorial hrs)
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%

MAT212β: Real Analysis-I (30 Lecture hrs + 15 Tutorial hrs)
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%

BSc Level II - Semester II

MAT221β: Number Theory (30 Lecture hrs + 15 Tutorial hrs)
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%

MAT222δ: Real Analysis-II (15 Lecture hrs + 7 Tutorial hrs)
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%

MAT224δ: Geometry (15 Lecture hrs + 8 Tutorial hrs)
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%

MAT225β : Mathematical Statistics-I (30 Lecture hrs + 15 Tutorial hrs) - *Prerequisite MAT113δ*
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%

BSc Level III - Semester I

MAT311β: Group Theory (30 Lecture hrs + 15 Tutorial hrs)
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%

MAT312β: Real Analysis-III (30 Lecture hrs + 15 Tutorial hrs)
Non Linear Analysis: Functions from $\mathbb{R}^n$ to $\mathbb{R}^m$, Open balls and Open sites, 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%

MAT313β: Mathematical Statistics-II (30 Lecture hrs + 15 Tutorial hrs) -
Optional for students following Mathematics, Prerequisite: MAT225β
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%

BSc Level III - Semester II

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

Industrial Mathematics

BSc Level I - Semester I

IMT111β: Classical Mechanics-I (Dynamics) (30 Lecture hrs + 15 Tutorial hrs)
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%

IMT1b2β: Mathematical Computing (15 Lecture hrs + 60 Practical hrs)
Introduction to computer systems and its historical development, contribution from mathematicians (e.g.

Libnietz, Boole, Pascal, Babage, Turing, von Neumann),numerical computation and mechanical computing devices; General overview of: computer architecture, hardware, software and liveware, 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**

BSc Level I - Semester II

IMT121β: Classical Mechanics-II (Statics) (30 Lecture hrs + 15 Tutorial hrs)

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%

IMT122β : Mathematical Modelling-I (30 Lecture hrs + 15 Tutorial hrs) - *Prerequisite MAT112δ*

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, Pharmokinetics, Economics, Engineering, Special topics in modelling.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

BSc Level II - Semester I

IMT211β: Classical Mechanics-III (Fluid Dynamics) (30 Lecture hrs + 15 Tutorial hrs)

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%

IMT2b2β : Mathematical Computing (15 Lecture hrs + 60 Practical hrs)

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 programing, 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**

BSc Level II - Semester II

IMT221β:Mathematical Modelling-II (30 Lecture hrs + 15 Tutorial hrs) - *Prerequisite IMT122β*

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%

IMT223β: Applied Probability (Information Theory)(30 Lecture hrs + 15 Tutorial hrs) *-Optional for students following Industrial Mathematics*

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%

IMT224β: Applied Statistics-I (30 Lecture hrs + 15 Tutorial hrs) *-Optional for students following Industrial Mathematics*

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%

BSc Level III - Semester I

IMT3b1β : Industrial Mathematics Project (90 Project hrs)

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

IMT312β : Mathematical Modelling-III (30 Lecture hrs + 15 Tutorial hrs) *-Optional for students following Industrial Mathematics*

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%

IMT313β : Applied Statistics-II (30 Lecture hrs + 15 Tutorial hrs) *-Optional for students following Industrial Mathematics, Prerequisite IMT224β*

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-Walis, H-test.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

BSc Level III - Semester II

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

Applied Mathematics

BSc Level I - Semester I

AMT111β : Classical Mechanics-I (Dynamics) (30 Lecture hrs + 15 Tutorial hrs) Refer IMT111β under Industrial Mathematics for details.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

AMT112β: Mathematical Foundation of Computer Science (30 Lecture hrs + 15 Tutorial hrs)
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%

BSc Level I - Semester II

AMT121β: Classical Mechanics-II (Statics) (30 Lecture hrs + 15 Tutorial hrs)
Refer IMT121β under Industrial Mathematics for details.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

AMT122β: Mathematical Modelling-I (30 Lecture hrs + 15 Tutorial hrs) Refer IMT122β under Industrial Mathematics for details.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

BSc Level II - Semester I

AMT211β : Classical Mechanics-III (Fluid Dynamics) (30 Lecture hrs + 15 Tutorial hrs) Refer IMT211β under Industrial Mathematics for details.

AMT212β: Computational Mathematics (30 Lecture hrs + 15 Tutorial hrs)
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%

BSc Level II - Semester II

AMT221β: Mathematical Modelling-II (30 Lecture hrs + 15 Tutorial hrs) Refer IMT221β under Industrial Mathematics for details.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

AMT223β: Applied Probability (Information Theory) (30 Lecture hrs + 15 Tutorial hrs) *Optional for students following Applied Mathematics*
Refer IMT223β under Industrial Mathematics for details.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

AMT224β: Applied Statistics-I (30 Lecture hrs + 15 Tutorial hrs) *Optional for students following Applied Mathematics*
Refer IMT224β under Industrial Mathematics for details.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

BSc Level III - Semester I

AMT311β: Numerical Analysis (30 Lecture hrs + 15 Tutorial hrs); *Optional for students following Applied Mathematics, and not allowed with AMT312β*
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%

AMT312β: Mathematical Modelling III (30 Lecture hrs + 15 Tutorial hrs); *Optional for students following Applied Mathematics, and not allowed with AMT311β*
Refer IMT312β under Industrial Mathematics for details.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

AMT313β: Mathematical Methods in Physics and Engineering-I (30 Lecture hrs + 15 Tutorial hrs); *Optional for students following Applied Mathematics, Prerequisite IMT223β*
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%

AMT314β: Applied Statistics-II (30 lecture hrs + 15 Tutorial hrs); *Optional for students following Applied Mathematics, Prerequisite AMT224β*
Refer IMT313β under Industrial Mathematics for details.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

BSc 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

MAT321β: Functional Analysis (30 Lecture hrs + 15 Tutorial hrs), *Prerequisite MAT211β*
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, Hann-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%

MAT322β: Complex Variables (30 Lecture hrs + 15 Tutorial hrs)
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%

MAT323β: Differential Geometry and Tensor Analysis (30 Lecture hrs + 15 Tutorial hrs)
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%

MAT324β: Mathematical Models in Ecology (30 Lecture hrs + 15 Tutorial hrs)

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%

MAT325β: Introductory Econometrics (30 Lecture hrs + 15 Tutorial hrs), *Prerequisite MAT211β*

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%

MAT326β: Mathematical Foundation of Computer Science (30 Lecture hrs + 15 Tutorial hrs), *Optional 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%

MAT327β: Introduction to Financial Mathematics (30 Lecture hrs + 15 Tutorial hrs)

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%

IMT321β: Applied Algebra (Algebraic Data Encryption & Decryption Methods) (30 Lecture hrs + 15 Tutorial hrs), *Prerequisites MAT111β, MAT211β, MAT221β*

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%

IMT322β: Computational Fluid Dynamics (30 Lecture hrs + 15 Tutorial hrs)

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%

IMT323β: Theory and Applications of Neural Networks (30 Lecture hrs + 15 Tutorial hrs), *Prerequisite: IMT2b2β 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, Baysian 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%

IMT324β: Statistics with Computer Applications (30 Lecture hrs + 15 Tutorial hrs), *Prerequisite MAT225β,MAT313β ,AMT314β, IMT313β*

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%

AMT321β: Electro-magnetic Theory (30 Lecture hrs + 15 Tutorial hrs), *Op. (Credit Value 2.5)*

Electrostatic field equations, electrostatic potential, boundary value problems, magnetostatic 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%

AMT322β: Theory of Special Relativity (30 Lecture hrs + 15 Tutorial hrs), *Optional for students not following Physics*

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 Riemanian 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%

AMT323β: Mathematical Quantum Mechanics (30 Lecture hrs + 15 Tutorial hrs)

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%

AMT324β: Basic Statistics and Data Analysis (30 Lecture hrs + 15 Tutorial hrs), *Optional 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 BSc (Honours) Degree Programmes in Mathematics

Introduction The department offers two streams in the BSc 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 BSc Honours Degree in Mathematics

Level I - Semester I

MSP311β: Group Theory (30 Lecture hrs + 15 Tutorial hrs)

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%

MSP312β: Real Analysis-III (30 Lecture hrs + 15 Tutorial hrs)

Non Linear Analysis: Functions from $\mathbb{R}^n$ to $\mathbb{R}^m$, Open balls and Open sites, 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%

MSP313β: Mathematical Statistics-II (30 Lecture hrs + 15 Tutorial hrs)

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%

MSP3144: Mathematical Methods in Physics and Engineering-II(60 Lecture hrs)

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

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%

MSP316β: Applied Statistics-II (30 Lecture hrs + 15 Tutorial hrs)

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-Walis, H-test.

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

MSP3174: Topology (60 hrs)

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)

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)

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%

MSP3b9β Mathematical Computing (90 Project hrs)

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 programing, 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 I - Semester II

MSP321α: Advanced Group Theory (23 hrs)
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%

MSP322α: Real Analysis-IV (23 hrs)
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%

MSP323β: Complex Variables (30 Lecture hrs + 15 Tutorial hrs)
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%

MSP324α: Complex Analysis (23 hrs)
Review of elementary complex analysis topics from vector analysis: Morera's Theorem, Liouville's Theorem, Rouche'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, Rouche'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)
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)
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 slop 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)
Unit tangent vector, Principal normal, binormal vector and curvature of a curve, Serrate-ferret 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 Carton equations, The Ricci Tensor and the Einstein Tensor.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

MSP3283 Statistical laboratory (45 hrs) Analysing data with Computers using 'R' software package.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

MSP3292:Applied Statistics III (30 hrs)

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%

Level II - Semester I

MSP4114 Ring & Field Theory (60 hrs)

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

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

$$\text{Final Mark} = \text{M1} \times 15\% + \text{M2} \times 25\% + \text{M3} \times 60\%$$

MSP4134 Functional Analysis (60 hrs)

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, Liner 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)

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% and End of Semester Examination: 60%

MSP4153: Special topics in Statistics (e.g. Multivariate Data Analysis) (60 hrs)

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%

MSP4164: Analytical and Numerical Methods for PDEs (60 hrs)

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)

(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)

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)

(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)

(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)

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)

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))

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 2×2 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)

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)

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%

8.7 Credit Values

8.7.1 BSc General Degree

L - Lectures and T - Tutorials

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
MAT111β: Vector Analysis	30L + 15T		2.5		2.5
MAT112δ: Differential Equations	15L + 7T		1.25		1.25
MAT113δ: Introductory Statistics	15L + 8T		1.25		1.25
MAT1142: Mathematics for Bio Science Students	30		2		2
IMT111β: Classical Mechanics-I	30L + 15T		2.5		2.5
IMT1b2β: Mathematical Computing	15	60		2.5	2.5
AMT111β : Classical Mechanics-I (Dynamics)	30L + 15T		2.5		2.5
AMT112β: Mathematical Foundation of Computer Science	30L + 15T		2.5		2.5
MAT121β : Algebra	30L + 15T		2.5		2.5
MAT122β: Calculus (Real Analysis)	30L + 15T		2		2.5
IMT121β: Classical Mechanics-II (Statics)	30L + 15T		2.5		2.5
IMT122β : Mathematical Modelling-I	30L + 15T		2.5		2.5
AMT121β: Classical Mechanics-II(Statics)	30L + 15T		2.5		2.5
AMT122β: Mathematical Modelling-I	30L + 15T		2.5		2.5
MAT211β: Linear Algebra	30L + 15T		2.5		2.5
MAT212β: Real Analysis-I	30L + 15T		2.5		2.5
AMT211β /IMT211β: Classical Mechanics-III (Fluid Dynamics)	30L + 15T		2.5		2.5
IMT2b2β: Mathematical Computing	15	60	2.5		2.5
AMT212β: Computational Mathematics	30l + 15T		2.5		2.5
MAT221β: Number Theory	30L + 15T		2.5		2.5
MAT222δ: Real Analysis-II	15L + 7T		1.25		1.25
MAT224δ: Geometry	15L + 8T		1.25		1.25
MAT225β: Mathematical Statistics-I	30L + 15T		2.5		2.5
IMT221β/AMT221β: Mathematical Modelling-II	30L + 15T		2.5		2.5
IMT223β/ AMT223β: Applied Probability (Information Theory)	30L + 15T		2.5		2.5
IMT224β/ AMT224β: Applied Statistics-I	30L + 15T		2.5		2.5
MAT311β: Group Theory	30L + 15T		2.5		2.5
MAT312β: Real Analysis-III	30L + 15T		2.5		2.5
MAT313β: Mathematical Statistics-II	30L + 15T		2.5		2.5
IMT3b1β : Industrial Mathematics Project		90		2.5	2.5
IMT312β/ AMT312β : Mathematical Modelling-III	30L + 15T		2.5		2.5
IMT313β/ AMT314β : Applied Statistics-II	30L + 15T		2.5		2.5
AMT311β: Numerical Analysis	30L + 15T		2.5		2.5
AMT313β: Mathematical Methods in Physics and Engineering-I	30L + 15T		2.5		2.5
MAT321β: Functional Analysis	30L + 15T		2.5		2.5
MAT322β: Complex Variables	30L + 15T		2.5		2.5
MAT325β: Introductory Econometrics	30L + 15T		2.5		2.5
MAT326β: Mathematical Foundation of Computer Science	30L + 15T		2.5		2.5
MAT327β: Introduction to Financial Mathematics	30L + 15T		2.5		2.5
IMT321β: Applied Algebra (Algebraic Data Encryption & Decryption Methods) &	30L + 15T		2.5		2.5
IMT322β: Computational Fluid Dynamics	30L + 15T		2.5		2.5
IMT323β: Theory and Applications of Neural Networks	30L + 15T		2.5		2.5
IMT324β: Statistics with Computer Applications	30L + 15T		2.5		2.5
AMT321β: Electro-magnetic Theory	30L + 15T		2.5		2.5
AMT322β: Theory of Special Relativity	30L + 15T		2.5		2.5
AMT323β: Mathematical Quantum Mechanics	30L + 15T		2.5		2.5
AMT324β: Basic Statistics and Data Analysis	30L + 15T		2.5		2.5

8.7.2 BSc (Honours) Degree in Mathematics

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
MSP311β: Group Theory (MAT311β)	30L + 15T		2.5		2.5
MSP312β: Real Analysis-III (MAT312β)	30L + 15T		2.5		2.5
MSP313β: Mathematical Statistics-II (MAT313β)	15L + 8T	1.25			1.25
MSP3144: Mathematical Methods in Physics and Engineering-II (AMT313β)	60		2		2
MSP316β: Applied Statistics-II (IMT313β)	30L + 15T		2.5		2.5
MSP3174: Topology	60		4		4
MSP3184: Numerical Methods with Applications	60		4		4
MSP3193 Bayesian Inference and Decision Theory	45		3		3
MSP3b9β: Mathematical Computing (IMT2b2β)		75		2.5	2.5
MSP321α: Advanced Group Theory	23		1.5		1.5
MSP322α: Real Analysis-IV	23		1.5		1.5
MSP323β: Complex Variables (MAT322β)	30L + 15T		2.5		2.5
MSP324α: Complex Analysis	23			1.5	1.5
MSP3254: Measure Theory with Applications	60		4		4
MSP3263: Regression Analysis	45		3		3
MSP3274: Differential Geometry and Tensor Analysis	60		4		4
MSP3283: Statistical laboratory	30		2		2
MSP3292: Applied Statistics-III	30		2		2

8.8 BSc Honours Degree Programmes in Financial Mathematics and Industrial Statistics

8.8.1 Introduction

Modern financial markets are quickly developing not only as a result of technological advancements, but also, and probably more importantly, as a result of the seamless integration of mathematical and statistical techniques into problem solving. Sri Lankan financial market is also growing at a rate comparable to international markets, thus, higher educational institutions are expected to offer more academic and research programs in related fields that will produce intellectual force capable of making optimal decisions and solving problems in related areas. As the only government university in the Southern region, we have understood our responsibility to cater the needs of the country in the fast-developing fields of finance and insurance. Accordingly, the Department of Mathematics offers a new four-year undergraduate honours degree programme in Financial Mathematics and Industrial Statistics.

8.8.2 Detailed Syllabus for Financial Mathematics & Industrial Statistics

BSc Level I -SemesterI

MIS1112: Basic Statistics in Industry (20 Lecture hrs + 20 Practical hrs)

Introduction to Statistics: Population and sample, Types of data, Sources of Data, Descriptive Statistics, Inferential statistics. **Descriptive Statistics:** Organizing and summarizing Univariate data: Displaying data with tables and graphs, Displaying numerical data, summarizing data with statistics, describing a distribution.

Summarizing relationships between variables: Scatterplots, correlation, Least squares regression, Relationships among categorical data.

Minitab package

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS1122: Introduction to Probability and Distributions (30 hrs)

Introduction to Statistics: Brief introduction of Population, Sample, Descriptive Statistics, Probability Theory, Inferential Statistics; **Probability:** Probability definitions; counting rules, permutations and combinations, finite sample space, events, probability rules, conditional probability, independence, multiplication rule, Bayes theorem; **One dimensional random variables:** Probability density function and probability (mass) function, cum. distribution function, expected value, variance, associated theorems, and moment generating function, distribution of functions of random variables; **Discrete distributions:** Uniform, Bernoulli, Binomial, Poisson, Hypergeometric, Negative Binomial and their applications; **Continuous distributions:** Uniform, Exponential, Normal and their Applications; Central limit theorem (without

proof) and applications.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM1112: Computing for Finance 1 (60 hrs)

Introduction: Overview, Common Excel Errors, Systematic Design Methods, Auditing; Data Organization, Data Analysis, Data Formatting, Data Collaboration, Data Management, Basic Financial Arithmetic and Cash Flows, Basic Statistics.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF1113: Calculus I (45 hrs)

Elementary Logic: Mathematical logic including logical equivalences and Quantifiers, Methods of Mathematical proofs. **Set Theory and Functions:** Basic set theory, injective, surjective, bijective functions.**The Real Number System:** Extend axiom, Field axioms, Order axiom, Modulus, Inequalities, Upper and Lower bounds, Least upper bound (supremum) and Greatest lower bound (infimum), Completeness axiom.Sequences: Introducing sequences, Convergence of sequences and related theorems, Subsequences and related results, Monotone sequences, Monotone convergence theorem. **Limits and Continuity of Functions:** Limit of functions, Epsilon terminology, Related theorems, Continuity of functions at a point and in an interval, Basic consequences of continuity. **Differentiability and Applications:** Differentiable functions, Rules of differentiation, Related theorems, Rolles Theorem, Mean Value Theorems and Consequences, Maxima, Minima and Critical points of real valued functions, LHospital Rule, Applications in Business and Economics.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM1122: Operational Research I (25 Lecture hrs + 10 Practical hrs)

Linear Programming: Examples and Modelling with LP, Geometric View of LP; **The Simplex Method:** Simplex Algorithm, Revised Simplex Algorithm, Two-Phase Simplex Method; **Duality in LP:** ual Linear Programs, Properties and applications of Duality, Dual Simplex Algorithm; **LP Models in Finance:** Asset/Liability Cash Flow Matching, Asset Pricing and Arbitrage. **Integer Linear Programming:** Integer Programming Models, Formulating Integer Programs, Cutting Plane Algorithms, Branch and Bound Algorithm; **ILP Models in Finance:** Constructing an Index Fund
Practical Component: A few modelling computation tools and software: Excel Solver, AMPL, and Mat Lab will be introduced.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM1132: Financial Management (30 hrs)

Introduction to Financial Management, Time value of money, Cost of capital and valuation of capital, Capital investment decisions, Risk, return and portfolio theory, Working capital management, Capital structure theories, Dividend theories and policies, Financial and operating leverage, Emerging issues in financial management.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF1123: Programming Techniques (30 Lecture hrs + 30 Practical hrs)

Introduction to programming methodology and problem solving strategies, Algorithm development using pseudo code, Basic program structure and the Integrated Development Environment (Essential program structure, Documentation and standard programming practices, Integrated development environment(IDE) Editing ,Compilation, Execution and Debugging), Program development using a higher level programming language such as C, Basic input and output, Variables and Expressions, Library functions, Standard programming practices for variables and assignments, Decision structures, Loop Structures, Input and output using files, Simple data structures, Functions, Introduction to the Object Oriented Approach.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

BSc Level I - Semester II

MIS1213: Mathematical Statistics (45 hrs)

Joint Distributions: Joint probability distributions, Joint Cumulative Distribution functions, Conditional Distribution functions, Independence and Expectations, Expectation and Variance of linear functions of random variables, Joint Moment Generating functions and Joint moments, Covariance and correlation coefficients. **Distribution of functions of random variables:** Cumulative Distribution Function technique, Moment generating functions technique, Transformation technique. **Order Statistics**, **Sampling distributions:** Random sample, Statistic, Sample moment, Sample mean, Sample variance, Sampling Distributions related to the Normal Distribution. The Distribution of sample mean, Laws of Large numbers,

Central Limit theorem and the applications. **Other distributions:** Chi-square Distribution, F Distribution, Student-t-Distribution.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS1222: Statistical Computing (R or Python software) (60 hrs)
Summarizing, analysing and representing univariate, bivariate and multivariate data sets with computers using 'R' and SPSS
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM1213: Financial Mathematics I (45 hrs)
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, Makeham's 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: 40% and End of Semester Examination: 60%

MFM1222: Introduction to Economics (30 hrs)
Theory of Production, Production in the Long-run, Theory of Cost, Derivation of Supply and Demand, Elasticity of Demand and Supply, Determination of Market Price in Perfect Competition, Determination of Output, Revenue and Profit, mperfect Competition, Macro Economics: The Business Cycle and National Income, Inflation and Taxation, Introduction to Factor Market, Basic concepts of Project Appraisals.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF1212: Numerical Analysis I (20 Lecture hrs + 20 Practical hrs)
Introduction to MATLAB, matrices and vectors and their manipulations, basics of plotting using MATLAB, MATLAB script and function files using loops, conditions and cases, if-then-else statements, logical operations, call functions, arrays/vectors/matrices, plotting and visualization of data, Use of MATLAB programming in solving problems numerically. Numerical methods in solving nonlinear equations of one variable: Methods of Bisection, Newton's and Fixed Point Iteration, including error estimates, Implementation of each method using MATLAB. Curve fittings, Interpolation: Newton, Lagrange and their error bounds Cubic Splines, Study of implementations via available MATLAB commands. Approximations, least squared methods (both linear and quadratic), Implementations. Numerical Differentiation and Integration: Numerical quadrature, Trapezoidal and Simson's rule with their composite forms, Newton Cotes Formulae, Error Analysis, Study of available MATLAB codes for each and writing new codes.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF1222: Operational Research II (30 hrs)
Goal Programming: Examples and Modelling with Goal Programming, Goal Programming Algorithms; The Weights Method, The pre-emptive Method, Goal Programming Applications in Financial Management. **Game Theory:** Two Person Zero-Sum Games, The Maximin, Minimax Principle, Games with and without Saddle Points, Dominance Property, Graphical and Algebraic Methods for Solving Games, Fundamental Theorem of Game Theory, Games Theory Models In Finance.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF1233: File organization & Database Management Systems (30 Lecture hrs + 30 Practical hrs)
File organization : Introduction to file organization, Storage devices, Disk parameters, Record structure and design, Indexes, Hashing Database.
Management Systems: Introduction & Definitions, DBMS Architecture, Data models, DBMS languages, ER model concepts, Relational model concepts, ER-to-relational mapping, Functional dependencies and normalization process, Relational algebra, Relational calculus, Database security and authorization Practical using MySQL.
Method of Evaluation: End of Semester Examination: 100%

BSc Level II - Semester I

MIS2113: Inferential Statistics (45 hrs)

Point estimation: The method of moments, The method of Maximum Likelihood, Properties of point estimation: Unbiasedness, Efficiency, Consistency, Sufficiency; Exponential family, Cramer-Rao Inequality, Rao-Blackwell Theorem., Minimum Variance Unbiased Estimation. **Interval Estimation:** Confidence Intervals for the mean and variance, **Test of Hypotheses:** Introduction, Simple Hypothesis, Composite Hypothesis, Critical Region, Types of Error, Power function, Size of test, Simple Likelihoodratio Test, Most powerful Test, Neyman-Pearson lemma, Generalized Likelihood-ratio test, Uniformly Most Powerful test. **Hypothesis testing for mean and variance of the normal population.**

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS2122: Sampling Techniques and Survey Designs (20 Lecture hrs + 20 Practical hrs)

Planning of a survey, Questionnaire design, Problems arising in execution of a survey, Census and samples, The principal steps in a sample survey, The role of sampling theory. The probability and non probability sampling.

The simple random sample, Estimating population mean, variance, total and proportion, Variances of estimates, The finite population correction, Confidence limits, Estimation of a ratio, Sample size determination, Stratified random sampling, Properties of estimates, Proportional allocation, Neymann allocation, Optimum allocation of cost. Relative precision of stratified random and simple random sampling. Systematic sampling, Linear systematic sampling and circular systematic sampling. Quata sampling, Cluster sampling, multistage sampling.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF2112: Calculus II (30 hrs)

Infinite series: Infinite series with positive terms, Alternating series and there convergence. Convergence of series of functions, Power series, Taylor Series. **Integration:** Application of integration, areas, volumes, arc length and surfaces of revolution. Integration of transcendental functions and applications of force of interest and force of death. Construction and properties of the Reimann integral.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM2112: Mathematical Economics (30 hrs)

Relationship between Mathematics and Economics, Introduction to Linear and Non-Linear functions, Equilibrium Analysis, The Derivatives and Rules of Differentiation, Economics Applications of Derivatives, Integrations, Economics Applications of Integrations, The Fundamentals of Matrices and their use in Economics.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF2122: Research Methodology (30 hrs)

Research Paradigm and Methodology : Searching the Literature, Research Designs, Data Collection, Quantitative Data Analysis, Qualitative Data Analysis, Writing up the Research, Making Presentation, Research Ethics.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF2132: Linear Algebra (30 hrs)

Matrices and Determinants: Definitions, Operations on Matrices, Properties and criterion for a matrix to be invertible. **Systems of Linear Equations:** Operations on system of linear equations. Echelon form, Rank, Consistency, Homogeneous and non-homogeneous systems, Elimination and Iterative methods. **Vector Spaces:** Linearly independent and spanning sets, bases, dimension, subspaces. **Linear Transformations:** Definition, Kernel and Image of a linear transformation. Matrix of a linear transformation, Change of Basis. **Diagonalization:** Eigen values and Eigenvectors, Invarient spaces, Matrix diagonalization. **Bilinear Forms:** Inner products, Norms, Cauchy-Schwartz inequality. **Orthonormal Systems:** The Gram-Schmidt process.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM2123: Financial Mathematics II (45 hrs)

Derivative Security, Hedging, Bid-ask spread, Short Sale of Stock, Long Position in Stock, Forward Contract, Spot Price, Stock Index, Cash Settlement, Long, Short and Payoff , Profit for Forward, Zero Coupon Bond Profit, Call and Put Option, In the money, At the money, Out of the money option, Options in Insurance Floor Strategy, Cap Strategy, Covered Call, Put-Call Parity, Synthetic Forward, Spread, Bull Spread, Bear Spread, Collar, Hedging with Zero Cost Collar, Straddle, Strangle

Prepaid Forward Price, Arbitrage Pricing, Forward Contract on Stock, Pricing Forward Premium, Synthetic

Stock, Cost of Carry, Lease Rate, Futures Contracts, Market to Market, S&P 500 Future Contract, Margin Spot Rate, Forward Interest Rate, Zero-Coupon Bonds, Implied Forward Rate Swap. Oil, Swap Payment, Dealer as Swap Counterparty, Swap Rate R, Swap Curve
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

BSc Level II - Semester II

MIS2213: Regression Analysis (40 Lecture hrs + 10 Practical hrs)

Introduction: Correlation analysis, regression and model building, use of regression, role of the computer. **Correlation Analysis:** Population Correlation coefficient and sample correlation coefficient. Hypothesis testing for population correlation coefficient. **Simple Linear Regression:** simple linear regression model, least-square estimation of the parameters, hypothesis testing on the slop 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. **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: 50% and End of Semester Examination: 50%

MIS2223: Survival Analysis (40 Lecture hrs + 10 Practical hrs)

Introduction, Right Censoring, Distribution of Time to Event, Survival Function, Mean Survival Time, Median Survival Time, p^{th} Quantile of Survival Time, Mean Residual Life Time, Hazard Function, Cumulative Hazard Function, Common Parametric Models in Survival —Analysis, Exponential, Weibull and Gamma Distributions.
Right Censoring, Calendar Time, Patient Time, Life Table or Actuarial Estimator of Distribution of Time to Event, Delta Method, Estimate of the variance of Life Table Estimator, Nelson-Aalen Estimator of Cumulative Hazard Function, Kaplan Meier Estimation for Distribution of Time to Event, Greenwood's Formula for the Variance of the Life-Table Estimator, Asymptotic Distributions of Nelson-Aalen Estimator and Kaplan-Meier Estimator, Confidence Intervals for above two Estimators, Other Types of Censoring,Likelihood and Censored Survival Data, Review of Parametric Maximum Likelihood Estimation, Score Equation, Fisher Information Matrix and Observed Information Matrix, Wald Test, Likelihood Ratio Test, Likelihood and Likelihood Estimation for Censoring Survival Data, R codes for Estimation and Plotting Kaplan-Meier Estimator.
Method of Evaluation: Continuous assessments: 50% and End of Semester Examination: 50%

MFM2213: Financial Mathematics III (Market Models and Risk Management in Discrete Time) (45 hrs)

Review: Stocks and Stock Indices, Dividends, Prepaid Forward Prices and Forward Prices, Arbitrage Opportunities, Call and Put Options, Put-Call Parity for European Options. **Risk-neutral valuation in Discrete-time:** One-Period Binomial Tree, Arbitraging a mispriced Option, Risk-Neutral Probabilities, Multi-period Binomial Tree, Risk-neutral Formula Based on a Two-Period Binomial Tree, Pricing American Options, Constructing a Binomial Tree with known Volatility, Options on Stock Indexes, Currencies, Futures Contracts, True Probabilities, Pricing with true probabilities, State Prices, Pricing using state Prices, Trinomial Tree Model, The relation between State Prices and Other Valuation Methods. **Greek Letters and Elasticity:** Delta, Gamma and Theta, Properties of Greek Letters, The Approximations related to Greek Letters, Greek Letters of a Portfolio of Derivatives, Vega, Rho and Psi, Mean Return and Volatility of a Derivative, Elasticity of a Derivative, Financial interpretation of Elasticity, Option elasticity of a Portfolio, Greek Letters for Binomial Trees.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF2212: Calculus III (30 hrs)

Multidimensional Spaces: Closed sets, Open sets, Limit points in Rn. Functions in multidimensional spaces, Limits and continuity. **Vector valued Functions:** Differentiation and integration, Tangent and normal vectors, Arc length and curvature. **Functions of several Variables:** Limits and continuity, Partial derivatives and differentiability, Chain rule, Directional derivatives and gradients, Extrema of functions of two variables and applications, Lagrange multipliers. **Multiple Integration:** Double integrals and volumes. Change of variable and polar coordinates, Triple integrals. **Vector Analysis:** Vector fields, Line integrals, Conservative vector fields, Greens theorem, Surface integrals, Divergence theorem, Stokes theorem.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM2222: Computing for Finance II (30 Lecture hrs + 40 Pactical hrs)

Swaps: Definition, How swaps save money, Advantages of swaps, Terminating interest rate swaps, implicit credit risk, Valuation, Cross currency swap, worked example, Swaptions. **Forward interest rates:** Definitions, Example forward rates, Hedging principles, Forward rate agreement, Yield curves. **Futures:** Benefits, Clearinghouse operation, Bond futures, Hedging mechanisms, Hedging examples. **Foreign exchange:** Risk, Spot rates, Longer dates, Equivalence, Comparisons and arbitrage. **Options:** Underlying asset, Call and Put options, Covered call, Insurance using a stock and a long put, Pricing models, Greeks.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF2223: Numerical Analysis II (30 Lecture hrs + 30 Pactical hrs)

Solving Linear systems: Matrix notation, Direct methods, Gauss and Jordan eliminations, LU decomposition techniques.Iterative Methods - Theorems related to convergence of iterative sequences and convergence criteria, Jacobi, Gauss Seidel, implement the numerical solution for solving large linear systems of equations using existing MATLAB functions/codes. **Numerical solutions of ordinary differential equations (ODE):** Numerical Methods for initial value problems, Euler (explicit and implicit) and Modified Euler methods, RungeKutta method. Higher order Taylor expansion for solving ordinary differential equations and Higher order Differential equations. Implement the numerical solution algorithms via MATLAB for solving initial value problems using available functions in MATLAB. **Numerical solutions of partial differential equations:** Parabolic type, Elliptic type, Hyperbolic type using finite difference methods. Implementations of Finite Difference Schemes via MATLAB for boundary value problems associated to Partial Differential Equations.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS2231: Case Study I (10 Lecture hrs + 20 Pactical hrs + 45 Independent Learning hrs)

Students will be provided the opportunities to learn about statistics based research projects as real world applications with proper guidance. Guide the students to practice for solving real world problems using the statistics as a tool and report writing and presentation.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

BSc Level III - Semester I

MFM3113: Financial Time Series (30 Lecture hrs + 30 Pactical hrs)

Financial Time Series and Their Characteristics: Asset Returns, Distributional Properties of Returns. **Linear Time Series and Its Applications:** Stationary, Correlation and Autocorrelation Function, White Noise and Linear Time Series, Simple Autogressive Models, Simple Moving-Average Models, Simple ARMA Models, Unit-Root Nonstationarity, Seasonal Models. **Conditional Heteroscedastic Models:** Characteristics of Volatility, Structure of a model, The ARCH model, The GARCH models, The Integrated and the Exponential GARCH models, The Stochastic Volatility Model. **Nonlinear Models and Their Applications:** Nonlinear Models, Nonlinear Tests, Modelling and Forecasting. **Continuous-Time Models and Their Applications:** Some Continuous-Time Stochastic Processes, Black-Scholes Formulas, Stochastic Integrals. **Extreme Values, Quantile Estimation, and Value at Risk:** Value at Risk, Riskmetrics, An Econometric Approach to VaR Calculation, Quantile Estimation, Extreme Value approach to VaR.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS3113: Design and Analysis of Experiments (30 Lecture hrs + 30 Pactical hrs)

Experimental Principles and Basic Statistics, Analysis of Variance (ANOVA), Completely Randomized Design (CRD) and Randomized Complete Block (RCB) Design, Latin Square (LS) and Factorial Experiments, Comparison of Multiple Treatment Means and Other Mean Comparisons, Power and Sample Size, Assumptions and Data Transformation, Missing Values, Comparing Regression Lines and Analysis of Covariance, Analysis of Counts Non-Parametric Methods, Random Effects Models, Mixed Models and Nested Effects, Split Plot Designs and Repeated Measures Designs.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM3123: Life Insurance (45 hrs)

The Economics of Insurance: Introduction, Utility Theory, Insurance and Utility, Elements of Insurance, Optimal Insurance. **The Individual Risk Models for a Short Term:** Models for Individual Claim Random variables, Sums of Independent Random Variables, Applications to Insurance. **Survival Distribution and Life Table:** Probability for the Age-at-Death, The Survival function, Time-until-Death for a Person Age x, Curtate-Future-Lifetimes, Force of mortality, Life tables, Other Life table characteristics,

Assumptions for fractional Ages. **Life Insurance:** Insurances Payable at the Moment of Death-Level Benefit, Endowment, Deferred, Varying Benefit Insurance, Insurances Payable at the end of the year of death, Relationships between Insurances Payable at the Moment of Death and the End of the Year of Death. **Life Annuities:** Continuous and Discrete life annuities, Life annuity with m-thly payments. **Benefit Premiums:** Fully Continuous and Discrete Premiums, True m-thly Premiums, Apportionable Premiums, Accumulation-Type Benefits. **Benefit Reserves:** Fully continuous and Discrete Reserves, Other Formulas for fully continuous Benefit Reserves, Benefit Reserves Based on a Semicontinuous Basis and true m-thly Benefits.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM3133: Financial Mathematics IV (Market Models and Risk Management in Continuous Time) (45 hrs)

Review: The random walk model, Standard Brownian Motion, Arithmetic Brownian Motion, Geometric Brownian Motion, Stochastic Differential equations, Ito's Lemma, An Integral Representation, Differentiation Rule for Stochastic Integrals, Solutions of Three SDES, Variations of Brownian Motions. **Modelling Stock Price Dynamics:** A review of the lognormal distribution, Modelling stock prices with GBM, stock Prices Dynamics under the Black-Scholes Framework, Lognormality of Stock Prices. **Introduction to the Black-Scholes Formula:** Binary Options, The Black-Scholes formulas for options, Applying the pricing formula for other assets, Options on stock with discrete dividends. **Risk Management Technique:** Delta-hedging a Portfolio, Understanding the Profit from a hedged Portfolio, Self-financing Delta-hedged Portfolio, Rebalancing the hedge Portfolio, The Boyle-Emanuel formula, Gamma Neutrality, Risk-neutral valuation. **General Properties of Options:** Different Strike prices, Bounds for Option Prices, Different times to Expiration, Early Exercise for American Options.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM3142: Operational research III (30 hrs)

Nonlinear Programming: *Single-variable Optimization:* Optimality Criteria, Direct Search Methods Algorithms, Gradient-based methods algorithms, *Multivariable Optimization:* Optimality Criteria, Direct Search Methods Algorithms, Gradient-based methods algorithms, *Constrained Optimization:* Kuhn-Tucker Conditions, Transformation methods, Direct Search and linearized search techniques. **Quadratic Programming:** Optimality Conditions, Interior Point Methods. **NLP and QP Models in Finance.**
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS3122: Non-Parametric Statistics (20 Lecture hrs + 20 Practical hrs)

Non parametric tests: Kolmogorov Smirnov tests, One sample sign test, One sample runs test, Two sample runs test, Mann Whitney U test, Two sample sign test, Wilcoxon Match pairs sign rank test, Kruskal-Wallis H Test, Friedman rank sum test. The normal approximations for these tests. **Chi Square tests:** Goodness of fit test, Contingency tables for testing independence.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF3112: Decision Theory (30 hrs)

Arguments with Sets and Venn diagrams: Sets, Venn diagrams, data analysis; **Decision Theory and Group Decisions:** Under uncertainty - various views and the study of risk. Utility Theory Introduction: Uncertainty, Expected Utility, Interference curve, Indifference curves and risk aversion, Utility functions, Pratts risk aversion measurement; **Utility maximization:** The Budget constraint, Maximization using Lagrangian multiplier, Cobb-Douglas Utility function, Expenditure function.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM3151: Case Study II (10 Lecture hrs + 20 Practical hrs)

Students will be provided the opportunities to learn about statistics based research projects as real world applications with proper guidance. Guide the students to practice for solving real world problems using the Financial Mathematics as a tool and report writing and presentation.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

BSc Level III - Semester II

MIS3212: Bayesian Inference (25 Lecture hrs + 10 Practical hrs)

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.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS3222: Multivariate Data Analysis (20 Lecture hrs + 20 Practical hrs)

Multivariate data and multivariate statistics: Introduction, Types of data, Basic multivariate statistics, The aims of multivariate analysis. Bivariate normal distribution and density, Multivariate normal distribution: Mean vector and variance covariance matrix, Correlation matrix, outliers, multivariate plots, checking for multivariate normality. Two independent samples, paired samples, Profile analysis, MANOVA, Repeated measurements. Cluster analysis, Principle component analysis, discriminant analysis and factor analysis.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM3213: Non-Life Insurance (45 hrs)

Limited and Excess-Loss Random Variables: Left Censoring and Limiting of distributions, The limited loss Variable, Limited loss random variable with limit u, the left-censoring and shifted variable, The excess loss random Variable. **Policy Limits:** Severity and frequency distributions, Policy Limit u,limited loss random variable with policy limit u, cost per loss, expected cost per loss. **Policy deductibled:** Expected cost per loss, expected cost per payment, Franchise deductible, The mean residual lifetime, Loss elimination ratio, combine policy limit and deductible, Modelling bonus payments, Graphical representation of expected cost per loss. **Additional Policy Adjustments:** Coinsurance factor, Maximum covered loss u in combination with u and coinsurance, inflation, inflation factor in insurance policy, policy adjustments for parametric distributions Models for the number of claims, frequency: Severity distributions, collective risk model, individual risk model, Models for the number claims, The(a,b,0) class of discrete distributions. **Models for Aggregate losses:** The collective or compound model for aggregate claims, Modification of the severity distribution.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM3222: Computing for Finance III (10 Lecture hrs + 40 Practical hrs)

Some applications in MFM2123 and MFM3123 using excel.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM3232: Business Proposals and Report Writing (30 hrs)

Communication in the business environment with emphasis on written reports: Communication process and role of communication in organizations, audience adaptation, Basic language and writing techniques with emphasis on style, tone, and situation considerations: coherence, credibility, readability, bias (e.g., gender, racial, and ethnic), clarity, conciseness, and accuracy. Short, informal reports: functions and objectives of reports; short, informal reports of various types, format and style of short reports. Formal reports: Collecting primary and secondary data; analyzing, organizing, and summarizing data; evaluating and interpreting data; drawing and support conclusions and recommendations; formatting formal reports. Visual aids (including computer graphics), Oral presentation.

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

MSF3212: Fundamentals of Management (30 hrs)

Introduction to management, The challenges of management, Pioneering ideas in management, Business environment, Social responsibility, ethics and culture, Functions of management, Managerial decisions making, Current issues in business world.

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

MSF3222: Scientific Writing and Communication (30 Lecture hrs + 30 Practical hrs)

Scientific Writing and Communication, Types of written communication, Use proper techniques in English language for precise writing, Components of scientific paper, Presenting statistics, Writing a structured scientific article, Oral and poster presentations, Ethics in publishing, Tools for effective literature search.

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

MIS3232: Stochastic Processes (30 hrs)

Probability theory a brief review. Probability spaces, random variables and vectors, convergence of a sequence of random variables, limit theorems etc., lognormal and bivariate Gaussian distributions. **Discrete time stochastic processes.** A first look at martingales, Stochastic processes - discrete in time, Markov chains in discrete time, The Poisson process etc., Conditional expectations, Random walks, Change of probabilities, Martingales, Martingale representation theorem. **Continuous time processes and their connection to PDE.** Markov processes in continuous time, Brownian motion, Brownian bridge, Brownian motion with drift and Wiener processes, Geometric Brownian motion, Stochastic integration, Stochastic differential equations and Ito's lemma.

Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

BSc Level IV - Semester I

MSF4116: Industrial Training (Whole Semester) *Non - GPA*

Students will be provided the opportunities to learn about statistics based research projects as real world applications with proper guidance. Guide the students to practice for solving real world problems using the Financial Mathematics as a tool and report writing and presentation.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

MSF4126: Research Project (Whole Semester)

Students will be provided the opportunities to learn about statistics based research projects as real world applications with proper guidance. Guide the students to practice for solving real world problems using the Financial Mathematics as a tool and report writing and presentation.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

BSc Level IV - Semester II

MIS4222: Statistical Quality Control (20 Lecture hrs + 20 Practical hrs) *Op.*

Quality Improvement and Statistics: Statistical quality control, Statistical process control; **Introduction to Control Charts:** Basic Principles, Design of a control chart, Analysis of control charts; Control charts for measurements ($\bar{X}$ and R or S control charts) ; Control charts for attributes (P chart , U chart, C chart) ; Process Capability Analysis; Cumulative Sum Control Chart, Exponentially Weighted MovingAverage Control Chart; Acceptance-Sampling: Single-Sampling Plans for Attributes, OC curve, Double, Multiple, and Sequential Sampling.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS4222: Reliability Theory (20 Lecture hrs + 20 Practical hrs) *Op.*

Reliability Concepts and Reliability Data: Examples of Reliability Data, General Models for Reliability Data, Repairable Systems and Nonrepairable Units, Strategy for Data Collection, Modelling and Analysis. **Models, Censoring, and Likelihood for Failure-Time data:** Models for Continuous Failure-Time Processes, Models for Discrete Data from Continuous Process, Censoring, Likelihood. **Nonparametric Estimation:** Estimation from Singly Censored Interval Data, Basic idea of Statistical Inference, Confidence Intervals from Complete or Singly Censored Data. **Location-Scale-Based Parametric Distributions:** Quantities of Interest in Reliability Applications, Location-Scale and Log-Location Scale Distributions, Parameters and Parameterization.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS4232: Categorical Data Analysis (25 Lecture hrs + 10 Practical hrs) *Optional*

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 2×2 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 classification, 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.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM4212: Credibility (30 hrs) *Optional*

Limited Fluctuation Credibility: Introductory Comments of Credibility Theory, The Limited Fluctuation Credibility Theory, Standard for full Credibility, Full Credibility applied to a frequency distribution and a Poisson Random Variables, Review of Compound Distributions, Partial Credibility. **Bayesian Probability Estimates on a Discrete Prior Distributions:** Prior distributions, Likelihood or data, posterior distributions, basic examples of Bayesian analysis with discrete Priors, Predictive Expectation-The Bayesian Premium, Bayesian Credibility questions, **Bayesian Credibility with continuous Priors:** Predictive Distributions, The Bayesian Structure, Some examples, The Double Expectation rule applied to Bayesian Credibility, The Gamma-Poisson Credibility Model, Some Additional Comments on Bayesian Estimators.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM4222: Computing for Finance IV (15 Lecture hrs + 30 Practical hrs)

Computational techniques for solving mathematical problems arising in finance. Numerical solution of parabolic partial differential equations, basic schemes, general theory, relation to binomial and trinomial

trees, boundary conditions for American options, computation of sensitivities, application to one factor and multi factor models. Stochastic simulation and Monte Carlo. Pseudo random number generators, generating random variables with specified distributions, statistical analysis of simulation data and error bars. Numerical solution of stochastic differential equations. Higher order Taylor expansion for solving ordinary differential equations and Higher order Differential equations.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM4232: Stochastic Processes in Finance (30 hrs) *Optional*

Probability theory a brief review. Probability spaces, random variables and vectors, convergence of a sequence of random variables, limit theorems etc., lognormal and bivariate Gaussian distributions. **Motivating example-Derivatives.** What is a derivative security? Types of derivatives, The basic problem: How much should I pay for an option? Fair price, Expectation pricing, Arbitrage and no arbitrage. The simple case of futures. Arbitrage arguments, The arbitrage theorem, Arbitrage pricing and hedging. **Discrete time stochastic processes and pricing models.** Binomial methods, Arbitrage and reassigning probabilities, A first look at martingales, Stochastic processes - discrete in time, Markov chains in discrete time, The Poisson process etc., Conditional expectations, Random walks, Change of probabilities, Martingales, Martingale representation theorem, Pricing a derivative and hedging portfolios, Martingale approach to dynamic asset allocation. **Continuous time processes and their connection to PDE.** Markov processes in continuous time, Brownian Motion, Brownian bridge, Brownian motion with drift and Wiener processes, Stochastic integration, Stochastic differential equations and Ito's lemma, Black-Scholes model, Derivation of the Black-Scholes Partial Differential Equation, Solving the Black Scholes equation, Comparison with martingale method, Optimal portfolio selection.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM4232: Stochastic Processes in Finance (30 hrs) *Optional*

Probability theory a brief review. Probability spaces, random variables and vectors, convergence of a sequence of random variables, limit theorems etc., lognormal and bivariate Gaussian distributions. **Motivating example-Derivatives.** What is a derivative security? Types of derivatives, The basic problem: How much should I pay for an option? Fair price, Expectation pricing, Arbitrage and no arbitrage. The simple case of futures. Arbitrage arguments, The arbitrage theorem, Arbitrage pricing and hedging. **Discrete time stochastic processes and pricing models.** Binomial methods, Arbitrage and reassigning probabilities, A first look at martingales, Stochastic processes - discrete in time, Markov chains in discrete time, The Poisson process etc., Conditional expectations, Random walks, Change of probabilities, Martingales, Martingale representation theorem, Pricing a derivative and hedging portfolios, Martingale approach to dynamic asset allocation. **Continuous time processes and their connection to PDE.** Markov processes in continuous time, Brownian Motion, Brownian bridge, Brownian motion with drift and Wiener processes, Stochastic integration, Stochastic differential equations and Ito's lemma, Black-Scholes model, Derivation of the Black-Scholes Partial Differential Equation, Solving the Black Scholes equation, Comparison with martingale method, Optimal portfolio selection.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM4242: Measure-theoretic Probability with Applications in Finance (30 hrs)

Optional

Definitions: sigma-algebra, measure, measurable space, measure space, set functions, measurable functions etc. **Probability space:** countable case, general case, Lebesgue measure and Cantor set, probability measures, Borel-Cantelli lemma **Random variables:** measure theoretic point of view, probabilistic approach. **Expectation:** definition, elementary convergence theorems (Fatou's lemma, monotone convergence theorem, dominated convergence theorem), product measures and Fubini's theorem, elementary inequalities (Chebysheff, Jensen's, Holder's, Minkowski's) **Conditional expectation and independence:** conditioning with respect to an event, independence, conditioning with respect to a partition, Radon-Nikodym theorem, conditioning with respect to a sigma-algebra. Simple numerical calculations and applications of above concepts in financial mathematics.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MIS4241: Statistical Consulting (15 Practical hrs)

Introduction to Statistical Consulting, Verbal, Written, and Presentation Communications, Negotiating a Satisfactory Exchange, Dealing with Difficult Situations, Methodological Aspects of Statistical Consulting, Grant Proposals and Manuscripts, Anatomy of a Study.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MFM4252: Introduction to Information Theory & Information Geometry with Applications to Finance (30 hrs) *Optional*

Introduction to information storage and information transmission as two basic problems in information theory and role of differential geometry in statistics. **How to quantify information** -Shannon's information measures: entropy, joint entropy, conditional entropy, relative entropy, mutual information. **Basic inequalities** - Convex / Concave functions, Jensen's inequality and its consequences, Log sum inequality and its applications , Data processing inequality. **Communication channels** - how to model a communication channel, channel capacity: for example, Noiseless Binary Channel, Binary Symmetric Channel (BSC), etc. Shannons noiseless & noisy coding theorems, Asymptotic Equipartition Property (AEP), Information-theoretical version of the Law of Large Numbers (LLN), **Information measures for continuous random variables -** differential entropy, relative entropy, mutual information, etc. **Basic concepts of information geometry -** Manifolds of Probability distributions/densities, Riemannian metric, Fisher information as the unique Riemannian metric, parallel transport, sub manifolds, geodesics, exponential and mixture families etc. **Applications -** Information theory and information geometry of financial market, interest rate theory, portfolio theory, etc.
Method of Evaluation: Continuous Assessments: 40% and End of Semester Examination: 60%

MSF4212: Human Resources Management (30 hrs) *Optional*

ntroduction to Human Resource Management, Job Design and Job Analysis and Human Resource Planning, Recruitment and Selection placement and Induction, Employee Training and Development, Employee Performance Evaluation, Employee Compensation, Employee Health and Safety Management, Employee Discipline and Employee Grievances Handling, Labour-Management Relations, Human Resource Information Systems.
Method of Evaluation: Continuous Assessments: 30% and End of Semester Examination: 70%

Note:

- MFM3232 and MSF3222 are elective, but one of these options must be taken.

8.9 Examinations - BSc Honours Degree Programmes in Financial Mathematics and Industrial Statistics

8.9.1 Evaluation

The method of evaluation of a Course Unit may be by one or more of the following as decided by the relevant department and it will be announced at the commencement of the relevant semester:

1. theory examination
2. practical examination
3. continuous assessment
4. class tests
5. assignments
6. reports
7. quizzes
8. presentation
9. mid-semester examinations
10. end-semester examination

Examinations shall be held during or at the end of the relevant semester as desired by the department.

8.9.2 Attendance

- To be eligible to sit for the examination(s) of a relevant course unit, the minimum attendance for theory/practical classes/field work/project(s) shall be 80%. Those who do not fulfil this requirement will be given a grade E^* (as indicated in the following table) for that particular Course Unit. In the case of Industrial Training, attendance is required as prescribed by the Faculty.
- In the event if a student fails to maintain at least 40% attendance for each practical course unit of Level I of the 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.

8.9.3 Grading

A grade for each course unit shall be expressed by a letter grade on a Four Point Grading System as described below, and the GPV of each grade will be used to calculate the Grade Point Average, GPA for a student.

Grades	Grade Point Value (GPV)	Marks
A+	**4.0**	**85-100**
A	**4.0**	**70-84**
A-	**3.7**	**65-69**
B+	**3.3**	**60-64**
B	**3.0**	**55-59**
B-	**2.7**	**50-54**

Grades	Grade Point Value (GPV)	Marks
C+	**2.3**	**45-49**
C	**2.0**	**40-44**
C-	**1.7**	**35-39**
D+	**1.3**	**30-34**
D	**1.0**	**25-29**
E	**0.0**	**0-24**

Note:

- Grade C or above is the normal requirement to pass a Course Unit.
- A student who obtains a lower grade than C in a particular Course Unit may improve that grade to a maximum of grade C by repeating that Course Unit within the stipulated period. In the event a student obtains a lower grade in a repeat attempt, he/she will be entitled to the previous highest grade. A repeat student is not entitled to attend lectures/practical classes in the relevant Course Unit.
- If it is required, the marks of the Continuous Assessment shall be carried forward for a repeating candidate for the improvement of overall grade.
- Grade E^* shall be given if a student has not applied, not been eligible or absent for the examinations.
- Letter " N" indicates an Academic Concession which enables the student to sit for the examination of a course unit as a first timer.
- Letter "W" indicates Results Withheld.
- Letter "M" indicates medical concession which enables the student to sit for the next immediate examination of the course unit as a first timer.

A student who registered for a course unit shall be considered as having completed the first attempt in the relevant examination irrespective of whether he/she sit for the examination at the end of the semester.

A student who has missed an end-semester examination because of illness shall appeal with supporting documents to the Dean for a concession within one week from the date of the examination. Letter "M" given in such occasion shall require the approval of the Faculty Board. Documents supporting his/her claim for a medical concession should be in accordance with the Internal Circular issued by the University of Ruhuna for submitting Medical Certificates.

A student who has missed an end- semester examination because of any reason other than medical may appeal with supporting documents to the Dean for a concession within one week from the date of the relevant examination. In case of failing to produce an acceptable reason a grade of E^* will be given. If the given reason is accepted by the Senate on the recommendation of the Faculty Board, a Letter "N" will be given and such a student will be considered as a first timer at the next immediate attempt.

8.9.4 Award of BSc Honours Degree in Financial Mathematics and Industrial Statistics

8.9.4.1 A student shall be eligible for the award of the Bachelor of Science Honours in Financial Mathematics and Industrial Statistics Degree if he/she has obtained

(a) A minimum of 120 credits, and

(b) an overall minimum Grade Point Average (GPA) of 2.00 from all course units followed throughout the four academic years of the degree programme, and

(c) grades of C or better to a minimum of 60% credits from the Theory Core Course Units of each main subject area (Financial Mathematics and Industrial Statistics), and

(d) grades of C or better in all practical core course units, and

(e) a grade of C or better for the fourth year Individual Research Project.

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

8.9.4.2 A student shall obtain a grade of C or better for the English Proficiency Level I, Level II and Level III for releasing results of his/her degree.

8.9.5 Award of Classes

A student who has satisfied conditions given in University and Faculty of Science by-laws is eligible for an award of a class if he/she completes the requirements indicated below within four academic years from the date of first registration securing grades of C or better aggregating to a minimum of 103 credits.

- First Class will be awarded if he/she obtains
  (a) a minimum GPA of 3.70 and
  (b) grades of A or better in Course Units aggregating to a minimum of 55 credits.
- Second Class (Upper Division) will be awarded if he/she obtains
  (a) a minimum GPA of 3.30 and
  (b) grades of B or better in Course Units aggregating to a minimum of 55 credits.
- Second Class (Lower Division) will be awarded if he/she obtains
  (a) a minimum GPA of 3.00 and
  (b) grades of B or better in Course Units aggregating to a minimum of 55 credits.

8.10 Exit from the Degree Program

A Student shall exit from the Degree Program, if he/she wishes, at the end of:

- Level 2 with an Higher Diploma in Science under section 8.10.2 or
- Level 3 with a Three-year BSc (General) Degree, if he/she fulfils the conditions specified under section 8.10.3.

8.10.1 Option for an exit with a two-year Higher Diploma in Science or a three-year BSc General Degree

A student reading for the BSc Honours degree may exit the programme at the completion of Level II (after semester IV) or Level III (after semester VI) with the Higher Diploma in Science or the Degree of Bachelor of Science respectively, provided that he/she has earned a minimum number of credits and fulfilled necessary requirements for each prescribed under section 8.10.2 and 8.10.3

8.10.2 Two-year Higher Diploma in Financial Mathematics and Industrial Statistics

A student shall opt to receive an Higher Diploma certificate if he/she leaves the programme at the end of the Level II of the degree programme. In addition a student who has not fulfilled minimum requirements for the completion of Three-year/Four-year BSc Degree at his/her final attempt shall be eligible to apply for the award of Higher Diploma.

The following conditions have to be fulfilled to receive Higher Diploma.

(a) complete a minimum of 60 CCUs from Level I and II course units
(b) grades of C or better in all practical CCUs
(c) a Grade Point Average (GPA) of 2.00 or more.

8.10.3 Three-year BSc (General) Degree in Financial Mathematics and Industrial Statistics

A student shall opt to receive BSc degree if he/she leaves the programme after the completion of the Level III of the degree programme, In addition a student who has not fulfilled minimum requirements for the completion of the BSc Honours Degree (Four-year) at his/her final attempt shall be eligible to apply for the award of Three-year BSc (General) Degree.

The following conditions have to be fulfilled to receive the BSc (General) Degree in Financial Mathematics and Industrial Statistics:

(a) complete a minimum of 90 credits from Level I, II and III course units
(b) grades of C or better from theory aggregating to a minimum of 60% credits of CCU of each main subject
(c) grades of C or better in all practical CCUs
(d) grades of $C-$ or better in all optional practical course units, and
(e) a Grade Point Average (GPA) of 2.00 or more.

8.11 Credit Values

8.11.1 BSc Honours in Financial Mathematics and Industrial Statistics Degree

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
MIS1112: Basic statistics in industry	20	20	2		2
MIS1122: Introduction to Probability and Distributions	30		2		2
MFM1112: Computing for Finance I		60		2	2
MSF1113: Calculus I	45		3		3
MFM1122: Operational Research I	25	10	2		2
MFM1132: Financial Management	30		2		2
MSF1123: Programming Techniques	30	30	3		3
MIS1213: Mathematical Statistics	45		3		3
MIS1222: Statistical Computing (R or Python software)		60		2	2
MFM1213: Financial Mathematics I	30		3		3
MFM1222: Introduction to Economics	30		2		2
MSF1212: Numerical Analysis I	20		2		2
MSF1222: Operational Research II	30		2		2
MSF1233: File organization and DBMS	30	30	3		3
MIS2113: Inferential Statistics	45		3		3
MIS2122: Sampling Techniques s and survey design	20	20	3		3
MSF2112: Calculus II	30		2		2
AMT212β: Computational Mathematics	30l + 15T		2.5		2.5
MFM2112: Mathematical Economics	30		2		2
MSF2122: Research Methodology	30		2		2
MSF2132: Linear Algebra	30		2		2
MFM2123: Financial Mathematics II	45		3		3
MIS2213: Regression Analysis	40	10	3		3
MIS2223: Survival Analysis	40	10	3		3
MFM2213: Financial Mathematics III (Market Models and Risk Management in Discrete Time)	45		3		3
MSF2212: Calculus III	30		2		2
MFM2222: Computing for Finance II	10	40		2	2
MSF2223: Numerical Analysis II	30	30	3		3
MIS2231: Case Study I	10	20		1	1
MFM3113: Financial Time Series	30	30	3		3
MIS3113: Design and Analysis of Experiment	30	30	3		3
MFM3123: Life Insurance	45		3		3
MFM3133: Financial Mathematics IV (Market Models and Risk Management in Continuous Time)	45		3		3
MFM3142: Operational Research III	30		2		2
MIS3122: Non-Parametric Statistics	20	20	2		2
MSF3112: Decision Theory	30		2		2
MFM3151: Case Study II	10	20		1	1
MIS3212: Bayesian Inference	25	10	2		2
MIS3222: Multivariate Data Analysis	20	20	2		2
MFM3213: Non-Life Insurance	45		3		3
MFM3222: Computing for Finance III	10	40		2	2
MFM3232: Business Proposals and Report Writing	30		2		2
MSF3212: Fundamentals of Management	30		2		2
MFM3252: Scientific Writing and Communication	20	30	2		2
MIS3232: Stochastic Processes	30		2		2
MSF4116: Industrial Training					Non GPA 6
MSF4126: Research Project					6
MIS4212: Statistical Quality Control *(Optional)*	20	20	2		2
MIS4222: Reliability Theory *(Optional)*	20	20	2		2
MIS4232: Categorical Data Analysis *(Optional)*	25	10	2		2
MFM4212: Credibility *(Optional)*	30		2		2
MFM4222: Computing for Finance IV	15	30		2	2

Course Unit	**Duration (hrs)**		**Credits**		Total
	Theory	Practical	Theory	Practical	
MFM4232: Stochastic Processes in Finance *(Optional)*	30		2		2
MFM4242: Measure-theoretic Probability with Applications in Finance *(Optional)*	30		2		2
MIS4241: Statistical Consulting		15		1	1
MFM4252: Introduction to Information Theory & Information Geometry with Applications to Finance *(Optional)*	30		2		2
MFM4262: Human Resource Management *(Optional)*	30		2		2

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 coursework, practical classes, and research projects.
The Department has facilities to offer BSc General (three year course) and BSc Honours (four-year course) degrees for undergraduates and research-based MPhil and PhD Degrees for graduate students. 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 on Electronics, Astronomy, Computational Physics, and Miscellaneous Topics. Sufficient laboratory space (for 160 students each year), 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, Remotely Sensed Satellite Ocean Data Processing and Analysis, Solar Energy Conversion Devices (Photovoltaic Cells and Photoelectrochemical Cells), Thin Films, Acoustics, Atmospheric Physics, Instrumentational Physics, Computational Physics, Medical Physics, Astronomy, and Astrophysics.

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 MPhil and PhD Degrees. Current major research areas are:

- Semiconductor Physics
- High Energy Physics
- Electronic and ionic conductivity measurements of inorganic compounds
- Modeling of ocean optical properties
- Processing and Analysis of Remotely sensed data of ocean waters
- 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, and Astrobiology
- Magnetic Resonance Imaging

Facilities in the Department

1. **Elementary Physics Laboratories and Advanced Physics Laboratory** (Zeeman effect, Millikan oil drop, fiber optics, Michelson interferometer, ESR experiment, UV experiment kit, etc.)
2. **A Smart Class Room for small group teaching**
3. **Well-equipped modern electronic laboratory** (Fully automated PCB prototyping machine facilitates milling, drilling, and cutting, Soldering and DE-soldering workstations, Modern electrical and electronic testing equipment, etc.).
4. **Astronomy Research Laboratory** (Modern (E-beam + Thermal) Evaporator system for mirror coating and thin-film coating, telescope fraction facility, fully automated 12-inch telescope, 8-inch reflector telescope, computer facilities for Astronomy related data analysis, Sky observation camping facilities).
5. **Acoustic Research Laboratory** (Reverberation room with modern testing equipment, High tech Sound level meter, Anechoic chamber)
6. **Mechanical Workshop** (Lathe, CNC Lathe, Drilling, Milling, Grinding, Bending, Arc welding, spot welding, Gas welding, MIG, and TIG welding).
7. **Prototyping Laboratory** (3-D printing, fully automated plastic and wood LASER engraving, Plastic bending).

Link Programmes

1. **CMS collaboration**
   CERN - Sri Lankan collaboration was established in 2018 with one major experiment called Compact Muon Solenoid (CMS) at the CERN (Organization for Nuclear Research) in Geneva, Switzerland. Physicists in the Department have been involved in research on the CMS experiment. Undergraduate students from the Department have participated in the CERN summer program annually. In addition, PhD program has initiated with the CMS collaboration in 2018. Furthermore, the Department expects to train graduate students in High Energy Physics at TIFR (Tata Institute of Fundamental Research) in India.
2. **Sivananthan Laboratories Inc., Illinois, USA**
   The Department has a collaborative research program with Sivananthan Laboratories Inc., Illinois, USA. The other program partners are the Institutes of Fundamental Studies, Kandy, Peradeniya University, Kelaniya University, and the Department of Physics, University of Jaffna.
3. **Lightning Research network Colombo University and Upsala University, Sweden**
   The Department strongly collaborates with the Lightning Research group, Colombo University and Angstrom Laboratory, Upsala University, Sweden.
4. **Las Cumbers Observatory (LCO)**
   The Department has a new undergraduate research program with Las Cumbers Observatory (LCO) since 2019.
   (`https://lco.global/education/partners/astrometry-research-group-sri-lanka/`)

9.2 Head of the Department

Dr. J. A. P. Bodhika
BSc (Ruhuna, SL), MSc, PhD (Colombo, SL)

9.3 Members of the Academic Staff

Designation	Name	Specialization
Emeritus Professors	Emeritus Professor W.G.D. Dharmaratna BSc (Peradeniya, SL) MSc, PhD (Tufts, U.S.A.)	Theoretical Particle Physics, High Energy Physics (CERN-CMS), Noise Pollution
Senior Professors	Senior Professor (Mrs.) Kanthi K.A.S. Yapa BSc (Kelaniya, SL) MSc, PhD (Tufts, U.S.A.)	Bio-Physics, Protein Folding Ocean Optics, Ocean Remote Sensing, Coastal Ocean studies
Professors	Professor. G. D. K. Mahanama BSc (Ruhuna, SL) PhD (London South Bank University, UK)	Solid State Physics, Solar Cells, Astronomy
	Professor. (Mrs.) N. M. Wickramage BSc (Ruhuna, SL) PhD (Ruhuna, SL)	Experimental High Energy Physics (CERN-CMS)
Senior Lecturers	Dr. K. P. S. Jayatilleke BSc (Kelaniya, SL) MSc, PhD (Cincinnati, U.S.A.)	Experimental Particle Physics Computational Physics
	Dr. J. A. P. Bodhika BSc (Ruhuna, SL) MSc, PhD (Colombo, SL)	Lightning and Thunder, Acoustics; Noise pollution, Sound Absorption Properties of Organic materials
	Mr. E. M. Ranatunga BSc (Ruhuna, SL) MPhil (Ruhuna, SL) (Reading for PhD at Ruhuna)	Instrumentational Physics, Solar Thermal Energy
	Dr. H. A. D. S. D. Perera BSc(Ruhuna, SL) MSc, PhD (Cincinnati, U.S.A.)	Semiconducting Nanowires, Heterostructures, Optical Spectroscopy

Designation	Name	Specialization
Senior Lecturers	Dr. (Ms) N. T. Wickramasuriya BSc (Ruhuna, SL) MSc PhD (Cincinnati, U.S.A.)	Characterization of Semiconductor Nanowires, Nanowire Device Fabrication
	Dr. W.M.K. De Silva BSc (Ruhuna, SL) MSc, PhD (Cincinnati, U.S.A.)	Magnetic Resonance Imaging
	Dr. K. V. S. Prasadh BSc (Ruhuna, SL) PhD (North Darkota, U.S.A)	Astronomy and Astrophysics
Probationary Lecturers	Mr. S. S. Abeywickrama (Temporory) BSc (Ruhuna, SL) B.Tech.Eng. (OUSL) MSc in Applied Electronics (Colombo) (Reading for MPhil at Univ. of Colombo)	Electronics and Communication Engineering
	Mrs. K.M. Liyanage BSc(Ruhuna, SL) (Reading for PhD at Ruhuna)	Experimental High Energy Physics (CERN-CMS)
	Mr. K. A. S. Lakshan BSc (Colombo, SL) (Reading for MS at NDSU, USA)	Electronics, Electromagnetism

9.4 Course Units in Physics for BSc (General) Degree

BSc 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.
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 $\times$ 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%

BSc 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; Kirchoff's Law, Maxwell's Cyclic Law, Supperposition Theorem, Thevenin Theorem, Reciprocity Theorem, Delta(δ) 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%

BSc 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. The 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%, End Semester Examination: 70%

BSc 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, Structure of the Nucleus, Nuclear force, Nuclear Reactions, Fission and Fusion, Nuclear Power, Elementary Particles, Cosmic Rays, Quarks, 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, four modules relevant to electronics circuit prototyping have to be completed. The examination is held at the end of semester II.
Evaluation methods: Continuous Assessment: 25%, Electronic Circuit Prototyping Modules: 25%, End Semester Examination: 50%

BSc 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 each week. A minimum of 12 distinct relevant general experiments will be offered during the semester I. Students are expected to submit a report for each experiment. The examination is held at the end of the semester I.
Evaluation methods: Continuous Assessment: 30%, End Semester Examination: 70%

BSc 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%, End Semester Examination: 70%

PHY3242: Computational Physics I (15 Lecture hrs + 30 hrs of Computer Laboratory Classes)

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 Semester Practical Examination: 30%, End Semester Written Examination: 40%

PHY3252: Special Topics in Physics (30 Lecture hrs) *Optional 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) *Optional 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.

Evaluation methods: Continuous Assessment: 25%, Group Project Report & Presentation: 25%, End Semester Examination: 50%

Note:

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.

9.5 Course Units in Physics for BSc (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, Electro-magnetic 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 courseworks are evaluated under this course unit. Students must submit all coursework at the end of each completed experiment.

PHY4084: Nuclear and Particle Physics (60 Lecture hrs)
Properties of nuclei including size, shape, spin, electric and magnetic moments, The deuteron, Nuclear reactions; Q valve; 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, Microcannonical and Cannonical 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 col-lector 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 of current interest (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: Computational Physics ((30 Lecture hrs + 60 Practical hours))

Computer Arithmetic, Error and uncertainties in computation, Numerical differentiation: first order and second order derivatives, 2-point, 3-point and5-point formulas, Numerical integration: Trapezoidal and Simpson's rules, composite and recursive formulas, solving non-linear equations: Bisection, Newton's and Secant methods. Interpolation: Lagrange, linear, polynomial, divided difference and cubic spline interpolation, Solving systems of linear equations: Gaussian elimination, Triangular factorization, Jacobi and Gauss-Seidel iterative methods; Numerical solution to ordinary differential equations: Euler, Euler-Cormer, Improved Euler, Taylor Series and Fourth order Runge-Kutta methods, Monte Carlo methods. Uniform and non-uniform random number generation, Evaluation of multidimensional integration, Random Walks, Fourier Methods, Simulation applications: Solution of partial differential equations: Heat, Wave and Laplace equations.
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.

Assessment method: Presentation and viva voce at the end of semester-II

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%

9.6 Credit Values

9.6.1 BSc General Degree

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
PHY1114: General Physics I	60		4		4
PHY1214: General Physics II	60		4		4
PHY1b22: Elementary Physics Practical I		60		2	2
PHY2114: General Physics III	60		4		4
PHY2112: Electronics	30		2		2
PHY2214: General Physics IV	60		4		4
PHY2222: Electronics Practical		60		2	2
PHY2b22: General Physics Practical I		60		2	2
PHY3114: General Physics V	60		4		4
PHY3121: General Physics Practical II		30		1	1
PHY3232: Astronomy	30		2		2
PHY3242: Computational Physics I	15	30	2		2
PHY3252: Special Topics in Physics	30		2		2
PHY3262: Physics for Bio-science Students	30		2		2
PHY3272: Computational Physics II	15	30	2		2
PHY3282: Microcontrollers & Applications	15	30	2		2

9.6.2 BSc (Honours) Degree in Physics

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
PHY4014: Mathematical Methods for Physics	60		4		4
PHY4024: Classical Mechanics & Special Relativity	60		4		4
PHY4053: Special Physics Practical I		135		3	3
PHY4034: Quantum Mechanics	60		4		4
PHY4044: Electromagnetic Theory	60		4		4
PHY4063: Special Physics Practical II		135		3	3
PHY4071: Practical Course Work					1
PHY4124: Astronomy and Cosmology	60			4	4
PHY4094: Statistical Mechanics	60		4		4
PHY4104: Solid State Physics	60		4		4
PHY4112: Electronics II	30		2		2
PHY4151: Learning Skills					1
PHY4173: Special Practical III		135		3	3
PHY4192: Fundamentals of Engineering Workshop Practices	15	30		2	2
PHY4084: Nuclear and Particle Physics	60		4		4
PHY4132: Miscellaneous Topics I: Atmospheric Physics	30		2		2
PHY4144: Miscellaneous Topics II: Comp. Physics	30	60	4		4
PHY4166: Research Projects					6
PHY4182: Special Practical IV		90		2	2

10 Department of Zoology

The Department of Zoology conducts courses covering basic and applied fields of Zoology for undergraduate students registered for BSc General Degree and BSc 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 PhD 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:

- Animal Ecology, Parasitology & Physiology
- Aquaculture and fish nutrition
- Aquatic Ecology
- Biodiversity & Conservation
- Biological effects of pollutants on animals
- Chronic Kidney Disease (CKDu)
- Conservation Genetics & Biology
- Environmental Biology of fishes
- Environmental Toxicology
- Fish taxonomy, biology & fisheries
- Insect eco-physiology
- Insect taxonomy and diversity
- Mammalian Reproductive Biology
- Molecular Genetics
- Ornithology
- Plant nematology
- Vector-borne & Zoonotic Diseases

10.2 Head of the Department

Senior Prof. (Mrs.) W.T.S.D. Premachandra
BSc (Ruhuna, SL), MSc (Hanover, Germany) PhD (Hanover, Germany)

10.3 Members of Academic Staff

Designation	Name	Specialization
Emeritus Professor	Prof. (Mrs.) N. J. De S. Amarasinghe BSc (Colombo, SL) D. Sc. (Namur, Belgium) M. I. Biol., Chartered Biologist	Fish population dynamics & Fisheries, Limnology, Bioindicators of water quality
Senior Professor	Prof. (Mrs.) W.T.S.D. Premachandra BSc (Ruhuna, SL) MSc (Hanover, Germany) PhD (Hanover, Germany)	Entomology, Plant Nematology, Entomopathogenic nematodes
	Prof. P.M.C.S. De Silva BSc (Ruhuna, SL) M. Phil (Bergen, Norway) PhD (Amsterdam, The Netherlands)	Environmental Toxicology
Chair Professor	Prof. (Mrs.) K.B.S. Gunawickrama BSc (Ruhuna, SL) MPhil (Bergen, Norway) PhD (Bergen, Norway)	Conservation Genetics, Biodiversity Research

Designation	Name	Specialization
Professor	Prof. (Mrs.) D.H.N. Munasinghe BSc (Ruhuna, SL) PhD (Deakin, Australia)	Fisheries and Molecular Genetics
	Prof. (Mrs.) M.P.K.S.K. de Silva BSc (Kelaniya, SL) MSc (Vrije Universiteit Brussel, Belgium) PhD (Ruhuna, SL)	Aquaculture, Fisheries Biology and Molecular Biology
Associate Professor	Prof. (Mrs.) H.C.E. Wegiriya BSc (Kelaniya, SL) PhD (Reading, UK)	Animal Biology, Entomology and Psychology
Senior Lecturer	Dr. W.A.H.P. Guruge BSc (Ruhuna, SL) MSc (Chiangmai, Thailand) PhD (Ruhuna, SL)	Fish Biology, Environmental Risk Assessment
	Mrs. K.A.M. Sudarshanie BSc (Ruhuna, SL) MPhil (Ruhuna, SL) MSc (Bremen, Germany)	Entomology, Parasitology, Animal reproductive Biology, Aquatic Ecology
Lecturer	Dr. K.V. Sandun N. Bandara BSc (Kelaniya, SL) MSc(Chinese Cultural University, Taiwan) PhD (Kelaniya, SL)	Biodiversity and Conservation, Fish reproductive biology, Aquatic Ecology, Fisheries Ecology and Life history strategies
	Mrs. W. P. S. N. Wijeweera BSc (Ruhuna, SL) MPhil (Ruhuna, SL)	Entomology
	Mr. W.M.C.D. Wijekoon BSc (Ruhuna, SL) MPhil (Ruhuna, SL)	Entomology, Physiology
Probationary Lecturer	Dr. W.G.D. Chathuranga BSc, PhD (Peradeniya, SL)	Ornithology, Veterinary Medical Entomology, Vector-borne & Zoonotic Diseases
	Ms. K. G. D. D. Thilakarathne BSc (Peradeniya, SL)	Wildlife and Conservation biology, Biodiversity and animal ecology, Malacology

10.4 Course Units in Zoology for BSc (General) Degree

BSc 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 : 30%, End Semester Examination : 70%

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, Cnidaria, Platyhelminthes, Nematoda, Annelida and minor phyla.

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

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 : 30%, End Semester Examination : 70%

BSc 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, amphibias, reptilians, aves.
Evaluation methods: Continuous Assessment : 30%, End Semester Examination : 70%

BSc 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, Proboscidia, 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 (Prostaglandings & 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*

Proces 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%

BSc 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.
Mendilian 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 protien 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%

BSc 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.

BSc 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% (Theory & Practical)

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% (Theory & Practical)

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% (Theory & Practical)

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% (Theory & Practical)

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, cyotoxic 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% (Theory & Practical)

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% (Theory & Practical)

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, Epimelectic 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% (Theory & Practical)

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, Learning theories, Nerve cells and nerve impulses, Synapses and hormones, Development and plasticity of brain, sensory systems and perception, Stress, Stress management, Rhythms of wakefulness and sleep, biological clocks, Regulation of internal body state, Temperature, taste and hunger regulation. Motivation. Theories in motivation.
Evaluation methods: Continuous Assessment : 30%, End Semester Examination : 70% (Practical & Theory)

BSc Level III - Semester II

ZOO3202: Biological Psychology II (25 Lecture hrs, 10 Practical hrs) *Optional/ Open for all students.*

Emotional behaviours; 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% (Practical & Theory)

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% (Theory & Practical)

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% (Theory & Practical)

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% (Theory & Practical)

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% (Theory & Practical)

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% (Theory & Practical)

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% (Theory & Practical)

10.5 Course Units in Zoology for BSc (Honours) Degree

Students are advised to follow relevant course units conducted in BSc 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 thretened 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: Immunology and Animal Pathology (30 Lecture hrs, 30 Practical hrs)

Immune system as a defense system in human, key processes of immune system, terminology used in immunology, innate and acquired immunity, cells, molecules and organs of the immune system, classes of antibodies, their structure and functions, genetic basis of antibody diversity, monoclonal antibodies, antigen processing and presentation, humeral immunity and cellular immunity, immuno- suppressive and autoimmune diseases, hypersensitivity, vaccines and immunization. Microorganisms and man, infectious diseases of man, distribution, life cycle, pathology, symptoms prevention and control of the pathogen, host defenses to infectious disease, parasitic adaptations to avoid the immune system Immunological techniques and their use in disease diagnosis.
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 pseudogenes; 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, trasition 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%

ZOO4183: Basic biostatistics and applications (30 Lecture hrs, 30 Practical hrs)

Basic concepts in biostatistics: types of data and variables, sources of data, population and sample, Descriptive statistical methods in organizing, summarizing and displaying univariate data, Probability and non-probability sampling, Probability distributions: binomial distribution, Poisson and normal distribution, Measures of central tendency and dispersion for numerical data, Statistical inference and hypothesis testing for single population and multiple populations of data: calculation of sample size, level of significance, null hypothesis, indices of variability, Experimental designs and data analysis: Single factor designs- completely randomized design, randomized complete block design, Latin square design, Factorial designs, Parametric statistical methods: paired and non-paired t-test, analysis of variance (ANOVA), repeated measures ANOVA, Z-test, F-test, Statistical relationships between variables: correlation analysis, linear regression model and inferences, Nonparametric methods: Rank and categorical data analysis and test statistics, Chi-square tests of independence and homogeneity, Practical use of statistical software for data 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 BSc 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

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
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 BSc 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
ZOO4103: Immunology and Animal Pathology	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
ZOO4183: Basic biostatistics and applications	30	30	2	1	3
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

FSC214α	Physical Fitness & Health Management
FSC2122	Active Citizenship
FSC3112	Management
FSC3122	Accounting
FSC3132	Speech Communication skills
FSC3bP2	Research Project

FSC214α: Physical Fitness and Health Management (15 Lecture hrs + 30 Practical hrs) Assessment of personal potential, Principals of life, Sports Nutrition for Health and Performance, Sports Injuries and Rehabilitation, First Aid, Basic Physiology of Sports and Exercises, Testing and Measurement, Weight Training for Sports, Sports Skill.
Evaluation methods: Continuous Assessment : 50%, End Semester Examination: 50% *(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.))*

Note: This course is offered to Level II students only. Further, the students who follow FSC214α are not eligible to follow FSC225α (Health related physical fitness and wellness) and vice versa

FSC2122: Active Citizenship (32 Lecture hrs) 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
Evaluation methods: Continuous Assessment : 50%, End Semester Examination: 50%

FSC3112: Management Introduction to Management, Managerial Decision making, Change and Development, Leadership is Organization, Motivation in Organization, Team in Organization, Human Resource Management

FSC3122: Accounting Introduction to Basic Accounting, Process of recording and preparing accounts, Preparation of final accounts introducing minor adjustment, Bank transactions and related accounting work, Manufacturing Accounts, Accounts of non- trading concerns, Petty cash procedures, Accounting Concepts.

FSC3132: Speech Communication (30 Lecture hrs + 25 Practical hrs Introduction to the theory of speaking, Foundations of speaking, Making choices about what to speak, Organizing the speech, Face to face interaction, Verbal materials, Persuasion, Speaking and Listening, Listener, Language and purpose, Identifying, Personal and Social goals, Speech Preparation for Special Occasions, Types of public speaking, Group communication, Research in communication.

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 BSc Honours Degree Students)

FSC225α: Health Related Physical Fitness and Wellness (60 Practical hrs) 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.
Evaluation methods: Continuous Assessment : 30%, Final Practical Examination: 70%

Note: 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

FSC2212: Active Citizen Community Project (60 Practical hrs) Needs assessment, planning the project, project proposal submission, proposal revision, approval of the project, implementation, project presentation, Evaluation.
Evaluation methods: Continuous Assessment : 50%, Report and Presentation: 50%

Note: This course is offered to Level II students who follow FSC2122 (Active Citizenship).

FSC 3212: Marketing Management Understanding the Critical Role of Marketing, Creating and Capturing Customer Value, Analyzing the Marketing Environment, Consumer Markets and Consumer Buying Behaviour, Business Markets and Business Buying Behaviour, Managing Marketing Information to Gain Customer Insights Marketing information system (MIS), Customer-Driven Marketing Strategy, Products, Services, and Branding Strategy Product and Services Decisions Branding Strategy, New-Product Development and Product Life-Cycle Strategies New-Product Development Process Product Life-Cycle Strategies, Pricing Strategies Internal and External Considerations Affecting Price Decisions New-Product, Product Mix and Price Adjustment Strategies, Marketing Channels, The Nature and Importance of Marketing Channels, The Role of Retailing and Wholesaling, Integrated Marketing Communications Strategy, The Promotion Mix Advertising, Sales Promotion, Personal Selling, Public Relations, Direct and Online Marketing, The Communications Process, Creating Competitive Advantage Competitor Analysis Competitive Strategies, Ethics and Social Responsibility in Marketing.

FSC3242: Human Resource Management Introduction to Human Resource Management, Iob Design and Iob Analysis, Human Resource Planning, Recruitment & Selection, Hiring & Employee , Induction, Human Resource Development, Employee Performance Evaluation, Career Management, Employee Compensation & welfare Management, Employee and Labor Relations, Employee Movements, Employee Health and Safety Management, Employee Discipline Management, Employee Grievances Handling
Evaluation methods: Continuous Assessment : 40%, Report and Presentation: 60%

FSC3252: Scientific writing and communication (20 Lecture hrs + 30 Practical hrs) . 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.

Note: Target group: BSc Honours Degree student (Level I/ compulsory), BSc General Degree student (Level III/ optional).

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

Librarian	Mr. N. Hettiarachchi MSSc (Lib. & Inf. Science) (Kelaniya) BSc (Hons) (Ruhuna)
Deputy Librarian **(Faculty of Humanities** **and social Sciences) (Reader Services)**	Mr. U.A. Lal MSSc (Lib. & Inf. Science) (Kelaniya), BA (Hons) (Peradeniya)
Senior Assistant Librarian **(Periodicals Division)**	Mrs. SL Gammanpila MLS(Colombo) BSc Agri (Hons) (Ruhuna)
Senior Assistant Librarian **(Faculty of Science)** **(Acquisitions Division)**	Dr. T. Kuruppu Arachchi PhD. (QUT, Australia & Colombo, Sri Lanka) MLS (Colombo) BSc Botany Special (Hons)(Ruhuna)
Senior Assistant Librarian **(Faculty of Fisheries** **and Marine Sciences & Technology** **(Cataloguing and Classification)**	Mrs. Sakunthala Senevirathna MSSc (Lib. & Inf. Science) (Kelaniya) Dip. in Journalism (Colombo) BA - Lib Sci. (Hons) (Kelaniya)
Senior Assistant Librarian **(on study leave)**	Ms. P.K. Jayasekara MLS (Colombo) BSc Agri (Hons) (Ruhuna)
Assistant Librarian **(Faculty of Management)**	Mr. D.M.T. Madushanka Dip. in Computer Hardware with Network (VTC) Dip. in Accounting and Business Studies (CMASL) Passed Finalist (AATSL) BSc Busi. Info. Tech. (SP) Degree (Rajarata)

Administrative Staff Members

Senior Assistant Registrar (Library Services)	Mr. C.P.K. Edirisinghe BA (Hons)(J'Pura) PDBA (Ruhuna)

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

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. Time magazine
  2. Journal of the National Science Foundation of Sri Lanka
  3. විජය පරිගනක සහරාව

  Databases subscribed through Consortium of Academic Libraries of Sri Lanka (CONSAL)

  1. Emerald
  2. Taylor & Francis
  3. Oxford University Press

  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.

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: `https://opac.lib.ruh.ac.lk/cgi-bin/koha/opac-search.pl` 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 3.

Table 3: 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 accidently, 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	12300	librarian@lib.ruh.ac.lk

***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 English Language Programmes

The Faculty of Science with the assistance of the Department of English Language Teaching (DELT), offers academic programmes aimed at developing the English language skills of the undergraduates.

12.2.1 Staff attached to the Faculty of Science

Name	Educational / Professional Qualifications
Ms. Hirumi Senevirathne Lecturer (Probationary)	BA (Sabaragamuwa) MA (OUSL - Reading)
Ms.Shavindra Chandradasa Temporary Assistant Lecturer	BA (Colombo), MA (Kelaniya), MPhil (Kelaniya - Reading)

12.2.2 English Language Courses offered by Faculty of Science

- **Intensive Course in English**
  The Faculty of Science 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 prgramme.
- **Courses offered during academic years**
  Introduction:
  The Faculty of Science offers a three-year compulsory programme of English for the BSc undergraduates in three levels. In this programme, the students are provided with handouts prepared by the staff members attached to the Dean's office of the Faculty of Science. 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 (60 Lecture hrs.)**
  Self-Description: Life in three stages, Language through literature I, Introduction to presentation skills, Giving directions, Giving instructions, Describing graphs and charts, General conversations (Small Talk), Language through literature II, Informal writing (letters, e-mails), Comparisons, Report writing, Note taking, Impromptu speeches, Reading strategies (skimming, scanning and inferring), Lateral thinking.
  Method of Evaluation: Continuous Assessments: 60% and Final Examination: 40%
- **Level II ENG2b10 (60 Lecture hrs.)**
  Exploitation of comprehensive language, Introduction to academic essay writing, Language through literature III, Extensive reading, Paraphrasing and summarizing, Toning, Report writing II (lab report), Public speaking, Formal/Business correspondence, Report writing III (project report)
  Method of Evaluation: Continuous Assessments: 60% and Final Examination: 40%
- **Level III ENG3b10 (60 Lecture hrs.)**
  Discussions and Debates, Academic writing (argumentative essays), Self-branding, Writing a CV, Writing a cover letter, Interview Etiquette, Expressing ideas on controversial topics, Writing short reports on surveys, experiments and research, Presenting a theory, Abstract writing, Writing a short research proposal, Presentation skills, Organizing an event (preparation of agenda, invitations, welcome address, vote of thanks)
  Method of Evaluation: Continuous Assessments: 60% and Final Examination: 40%
- **Requirement of English language for obtaining the BSc Degree :**
  In order to obtain the BSc (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.

12.2.3 Credit Values

Course Unit	Duration (hrs)		Credits
	Semester I	Semester II	
ENG 1b10	30	30	-
ENG 2b10	30	30	-
ENG 3b10	30	30	-

13 Sports and Recreation

13.1 Physical Education Unit

Activities pertaining to sports and recreation are conducted by the Physical Education Unit. There is an advisory board consists of the officials of the Physical Education Unit and two academic staff members from the each faculties. Whenever necessary, external assistance is sought for coaching on a part-time basis. Vision of the unit is to enhance skill undergraduates in making employable graduate.
There are numerous student sports activities organized by the Physical Education Unit 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 students from 08.30 a.m. to 7.00 p.m. on weekdays and it is open for students from 08.30 a.m. to 05.00 p.m. on weekends. The unit has well equipped strength training hall to develop physical fitness of sportsmen/ women and students.

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"

13.2 Staff of Physical Education Unit

Position	Name and Academic Qualifications	Attached Faculty
Director	Mr. P. N. Weerasinghe BCom (Hons) (J'pura), Diploma in Sports	NA
Instructor	Mr. K. H. Keeerthi Kumara BA (Kelaniya) (Physical education Training Certificate)	NA
	Mr. P. K. Sanath Chandana (Physical education Training Certificate)	Faculty of Science
	Ms. D. M. D. Priyadarshani BSc (Hons) Physical education, (SUSL).	Faculty of Fisheries, Marine Science and Technology
	Ms A. B. Renuka BA Teachers in Diploma, Sports diploma	Faculty of Technology
	Mr. B. R. N. Saranga BSc (Hons) Agri. Economics	Faculty of Management and Finance
	Mr. K. G. S. Divanjana, BBA (Hons) in Accounting	Faculty of Humanities and Social Sciences
	Mr. W. P. N. T Lakmal, BSc In Sports Science (SUSL)	Faculty of Engineering
	Ms. R. M. C. Shamali BA Ruhuna	Faculty of Allied Health Science
	Mr. G. W. Jayantha, BA (Hons) Mass Media, (Colombo)	Faculty of Agriculture
	Ms. S. L. Vidanaduruge, BSc in Sports Science, (SUSL)	Faculty of Medicine

13.3 Sports Facilities

The University of Ruhuna provides many facilities for those who participate in sports events. Sports goods are freely available for students who participate in inter-university tournaments/ meets and practice sessions. A subsistence of Rs.500 is paid per day for a student when they participate in an event outside the university. For team events, the required clothing is provided to students at a cost of 20% of the total value. For practice sessions of inter-university championships, the university provides an allowance of Rs.50 per day for a student for nourishment.

Indoor Sports

At the present, Physical Education Unit provides facilities for following indoor sports:

- Basketball (Men and Women)
- Badminton (Men and Women)
- Table Tennis (Men and Women)
- Weight Lifting (Men and Women)
- Power Lifting (Men and Women)
- Volleyball (Men and Women)
- Chess (Men and Women)
- Taekwondo (Men and Women)
- Carom (Men and Women)
- Netball (Women)
- Wrestling (Men)
- Karate (Men and Women)
- Scrabble (Men and Women)

Outdoor Sports

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)
- Basketball (Men and Women)
- Hockey (Men and Women)
- Elle (Men and Women)
- Cricket (Men)
- Football (Men)
- Tennis (Men and Women)
- Kabadi (Men and Women)
- Rugger (Men)
- Swimming (Men and Women)
- Baseball (Men)
- Softball Cricket (Women)
- Road Race (Men and Women)
- Race Walking (Men and women)

Sports Coordinators of Faculty of Science

Sports Name	**Coordinator**	**Department**
Road Race (Men)	Dr. T.G. Dayananda	Botany
Carrom (Men & Women)	Dr. A.S. Ranaweera	Chemistry
Wrestling (Men)	Dr. Y.MAL.W. Yapa	Chemistry
Cricket (Men)	Dr. M.S. Kodikara	Chemistry
Tennis (Men & Women)	Prof. S. Wanniarachchi	Chemistry
Baseball (Men)	Prof. J.W. Hewage	Chemistry
Volleyball (Men & Women)	Dr. C.N. Rathnaweera	Chemistry
Netball (Women)	Dr. W.S. Hemalika	Chemistry
Elle (Men & Women)	Prof. J.W. Hewage	Chemistry
Hockey (Men & Women)	Dr. Nishantha L. Kalutharage	Chemistry
Basketball (Men & Women)	Dr. Jeewantha S. Hewage	Chemistry
Badminton (Men & Women)	Dr.C.T. Wannige	Computer Science
Table Tenis (Men & Women)	Dr.C.T. Wannige	Computer Science
Chess (Men & Women)	Mr. S.A.S. Loremsuhewa	Computer Science
Weightlifting (Men & Women)	Mr. K.R. Wijeweera	Computer Science

Sports Name	Coordinator	Department
Karate (Men & Women)	Dr. A.W.L.P. Thilan	Mathematics
Softball Cricket (Women)	Dr. H.L. Jayetileke	Mathematics
Rowing (Men & Women)	Dr. M.C.S. Fernando	Mathematics
Power Lifting (Men & Women)	Dr.D.M. Samarathunga	Mathematics
Athletics (Men & Women)	Dr. W.M.K. De Silva	Physics
Rugby (Men)	Dr. H.A.D.S.D. Perera	Physics
Swimming (Men & Women)	Dr. K.V.S. Prasad	Physics
Kabadi (Men & Women)	Dr. J.A.P. Boddhika	Physics
Taekwondo (Men & Women)	Mr. W.G.D. Chathuranga	Zoology
Scrabble (Men & Women)	Prof. D.H.N. Munasighhe	Zoology
Road Race (Men)	Dr. T.G. Dayananda	Zoology

13.4 Inter-Faculty and Inter-University Tournaments

There are annual sports events such as inter-faculty and inter-university tournaments. The Sri Lanka University Games (SLUG) are held at a selected university once in three years. Students are able to participate in the World University Games and the Asian University Championships that held once in two years.

13.5 University Colors

In every two years, Colors Award Ceremony is held and those who show excellent sports abilities are awarded colors.

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 compulsary for BSc (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.

14.1.4 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.

BSc (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.

BSc (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
A+	**4.0**	**85-100**
A	**4.0**	**70-84**
A-	**3.7**	**65-69**
B+	**3.3**	**60-64**
B	**3.0**	**55-59**
B-	**2.7**	**50-54**

Grades	Grade Point Value (GPV)	Marks
C+	**2.3**	**45-49**
C	**2.0**	**40-44**
C-	**1.7**	**35-39**
D+	**1.3**	**30-34**
D	**1.0**	**25-29**
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:**

(a) Three continuous assessments shall be given during the semester/year

(b) 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 (IMT1b1β, IMT2b2β and IMT3b1β) in Industrial Mathematics

A student who follows Industrial Mathematics as a subject must pass all IMT1b1β, IMT2b2β and IMT3b1β to earn the BSc (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*

$$\text{Final Mark} = \text{M1} \times 35\% + \text{M2} \times 30\% + \text{M3} \times 35\%$$

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 detials of the process of the verification of marks are available at the faculty office. The final reccommendation 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:

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

14.2.7 Award of Classes for BSc (General) Degree

A candidate who has satisfied conditions given in Section 14.2.6 is eligible for an award a Class 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
   (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 BSc (Honours) Degree

A student who has fulfilled all the stipulated conditions in Section 14.2.8 shall be awarded a Class, 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 Class 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
   (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 specilization, 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 specilization, 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 specilization

14.2.10 Option of reverting to BSc General Degree

A student reading for a BSc Honours Degree may request for the award of the BSc 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 BSc 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 BSc (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

BSc (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 BSc (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.

BSc (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 BSc (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:	
	BSc (General) Degree - Level I	450.00
	BSc (General) Degree - Level II	200.00
	BSc (General) Degree - Level III	200.00
	BSc (Honours) Degree - Level I	200.00
	BSc (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 BSc (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 BSc (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 BSc General Degree final examination in Physical Science.
- **Tissaweera Siriwardene Jinasena Memorial Gold Medal**
  A student who obtained the BSc (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 BSc (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.
- **Professor N.J. De S. Amarasinghe Gold Medal**
  A student who obtained a First Class of Second-Class Upper Division for the Degree of Bachelor of Science Honours in Zoology with the highest Grade Point Average for Zoology Core Course Units registered for the degree.

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 at an award ceremony held at the faculty.

  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 elegible 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**
  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.

- 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)**
  - **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.
- **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 extra curricular 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. W.M.K. De Silva (Department of Physics)

Support staff for student counseling

Name	Department	Email Address
Dr. R.D.A. Gunasekara	Botany	rda@bot.ruh.ac.lk
Prof. S. Wanniarachchi	Chemistry	sarathwan@chem.ruh.ac.lk (on leave)
Prof. W.S. Hemalika	Chemistry	hemalika@chem.ruh.ac.lk (on leave)
Dr. Jeewantha S. Hewage	Chemistry	Jeewantha@chem.ruh.ac.lk (on leave)
Dr. C.N. Rathnaweera	Chemistry	nadun@chem.ruh.ac.lk
Dr. M.S. Kodikara	Chemistry	mskodikara@chem.ruh.ac.lk
Dr. W.K.K.D. Siriwardana	Chemistry	wkkdsiriwardana@chem.ruh.ac.lk
Dr. H.L. Jayetileke	Mathematics	lakshika@maths.ruh.ac.lk
Dr. A.W.L.P. Thilan	Mathematics	pubudu@maths.ruh.ac.lk
Dr. N.T. Wickramasuriya	Physics	nadeeka@phy.ruh.ac.lk
Dr. K.V. Sandanuwan	Physics	sandanuwan@phy.ruh.ac.lk
Dr. K.V.S.N. Bandara	Zoology	kvsandun@zoo.ruh.ac.lk
Dr. W.G.D. Chathuranga	Zoology	chathurangawgd@zoo.ruh.ac.lk

16.2 Career Guidance Unit

16.2.1 Introduction

Career Guidance Unit helps undergraduates to develop their skills and abilities of self-assessment information seeking and decision making required for coping with the needs of complex of world of work & to develop lifelong learning ambitions. University of Ruhuna established the Career Guidance Unit in March 2000 to provide innovative and inclusive support to University of Ruhuna students, supporting their transition from study to future opportunities. We are planning to develop and maintain partnerships with a wide variety of employers and industry professionals to get the inside knowledge and to provide greater development opportunities. Success in career guidance depends on providing up to date information on training & employment opportunities and having a good knowledge of available opportunities in the local and international training market. For that, we plan to run interactive events and training sessions, enabling us to provide an inclusive, comprehensive and accessible careers and employability support. Beginning from the University Studentship at the University of Ruhuna, the Career Guidance Unit (CGU) is helps to chart the path towards the first destination upon graduation. In this endeavor, the career guidance unit is to assist the undergraduates in acquiring attributes and soft skills which can assist them in reaching standards matching the potential employers requirements. To this end, CGU usually conducts a number of programs on various aspects of career aimed at increasing the soft skills aspects in e.g. Personality development, qualities of leadership, communication and presentation skills etc., and in pragmatic training of e.g. writing an effective CV, facing interviews etc., to help in building self-confidence and in preparation to undertake progressive steps towards entering the corporate sector. CGU also provides opportunities for our graduates to secure employment in reputed companies in the corporate sector, and thereby set the stage for both graduates and the industry to benefit mutually.

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 with the consultation of the Faculty Academic Career Advisor. Such programs include regular soft skills development courses, Leadership training, talent enhancing programs, outbound 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 the CGU website 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	Prof. T.S.L.W. Gunawardana BBA (Ruhuna, SL), MSc (UiA, Norway), PhD (Nordland, Norway) Telephone - Office: 041 22222681 Ext: 2132 Mobile: 071 85 77 625 E-mail: gunawardana@badm.ruh.ac.lk
Career Guidance Counsellor	Ms. Sujeewa Dilrukshi Vidanagamage BA (Hon), MA (Sociology), PGD (Counseling), Dip.in Counseling (IPC), MPC Mobile: 071 4475666 E-mail: sujeewapt@gmail.com
	Ms. Pubudu Mallawarachchi BSc (Hon) (Ruhuna), MA (Ruhuna), Dip in Counseling (Ruhuna), Dip in Career Guidance (SLFI), Industrial Training (Korea) Mobile: 071 8359365 E-mail: bpkcgu@gmail.com

Career Guidance Counsellor	Mr. W.P. Nilanka Srinath BA (Hon) (Ruhuna), MA (Kalaniya), MA (B.P.U), PGD in Counseling (Colombo), PGD in Education (OUSL), Royal Pandith (OSS) Mobile: 071 439 5787 E-mail: wpnilankasrinath@gmail.com
	Ms. Vindya Welihena BMS (Hon) (OUSL), Dip. In Mgmt (OUSL), Ad.Cer in Counselling Psychology Mobile: 077 3838663 E-mail: vindyawelihena81@gmail.com
	Mr. N.K. Kalansuriya BSc (Agri)(Ruh, SL), MBA (SJP, SL) Mobile: 071 322 0924 Email: nilantha.kls@gmail.com
Management Assistant	Mrs. W.A.S.P. Gunasekara
Office Assistant	Mr. H. Gamunu

Career Academic Advisors

Faculty of Agriculture	Dr. MAP.D.P. Wickramarathne 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	Mrs. A.D.S.S. Karunanayaka Senior Lecturer Department of Nursing BSc (Hon) Nursing (SJP, SL), MPhil (Ruhuna, SL) Mobile: 071 870 9530 E-Mail: shashika_karunanayaka@yahoo.com
Faculty of Engineering	Dr. N.W. Prins Senior Lecturer Department of Electrical & Information Engineering BSc Engineering (Moratuwa), MA (Sri Lanka), PhD (Miami-USA) Mobile: 076 3677121 E-Mail: prins@eie.ruh.ac.lk
Faculty of Fisheries and Marine Sciences & Technology	Mrs. R.G.A. Iroshanie Lecturer Department of Oceanography & Marine Geology BSc(Hons) in Fisheries Biology (Ruhuna), MSc(Bodo, Norway) Mobile: 071 7591192 E-Mail: anushikagamage@gmail.com
Faculty of Humanities & Social Sciences	Mrs. Janeeka De Silva Senior Lecturer Department of History BA(Kelaniya), M.Phill (Kelaniya) Mobile: 071 8152253 E-Mail: desilvajaneeka@yahoo.com

Faculty of Management & Finance	Ms. D.M.R.D. Dissnayake Lecturer Department of Entrepreneurship MSc (SJP, SL), MSc (Agder, Norway), BBA (Ruh, SL), Reading for PhD (SJP, SL) Mobile: 071 8443281 E-Mail: ddissanayakedee@gmail.com
Faculty of Medicine	Dr. Subodha S. Wickramasinghe Senior Lecturer Department of Microbiology MBBS(Ruhuna), Pg.Dip. Med. Micro.(Colombo), MD Medical Microbiology(Colombo). Mobile: E-mail: subodhawick@med.ruh.ac.lk
Faculty of Science	Dr. J.A.P. Bodhika Senior Lecturer Department of Physics BSc (Ruhuna, SL), MSc (Colombo, SL), PhD (Colombo, SL), Mobile: 0773979309 E-Mail: bodhika@phy.ruh.ac.lk
Faculty of Technology	Ms. W.M.C.S Jayaweera Lecturer Department of Bio System Technology BSc (Ruhuna, Sri Lanka) Mobile: 071 1371046 E-Mail: champikajayaweera@yahoo.com

CGU Contact Details: Telephone - Office: 041 22222681 Ext: 12145

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 (MBBS, Ceylon)
	Dr. A. Weerasinge (MBBS, Ceylon)
	Dr. S. Yapa (MBBS, Ceylon)
Dental Surgeon	Dr. (Ms.) S. Athapaththu (BDS, Pera)
Nurse	Ms. W.A. Gunasekera
	Ms. M.G.S. Krishanthi

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 9.00 am to 4.00 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.

16.4 Miscellaneous Facilities

- **Cafeterias (for students & Staff)**
  There are three cafeterias located in the Wellamadama University Complex.
- **Shops**
  - 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.

Society	**President** Name/Mobile No	**Secretary** Name/Mobile No
Buddhist Society	J.G.S. Sanjeewa 0763226284	D.T. Karunarathne 0713745568
කලා හවුල	D.G.G.T. Bandara 0179781116	D.A. Morawaka
Zoological Society	H.M.M.D. Dedunupitiya 0715526633	S.T.D.Dhananjani
Botany Society	D.W.A.A.L.Weerasinghe 0715526633	D.L.P.Nirmani
Chemical Society	N.W.P.R.J. Perera 0715526633	W.W.N.P. Wanigasekara
Mathematics Society	W.N.M.Perera 0715526633	S.M.D.K.A.Kulasekara
Physics Society	C.P.K. Fonseka 0769147616	M.H.U. Kavindi 0715538522
Research Circle Society	W.I. Anjala Gayashani 0781745468	K. Eranga Rupasinghe
Photography Society	W.D.J.R. Norbert 0773755818	L.D.T.T.D. Wicramage
Birders Club	A.R.O.G. Athauda 0711119858	D.P.L.G.D.Upenjalika
Sports Club	H.R.S.D.Samarakkodi	A.A.H.Jayawickrama
Ruhuna Science Career Circle	H.B.Mavini Keshala Kularatne	V.G.S.I.Karunaratne

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 an 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 MPhil and PhD

19 Appendix - Administrative Officers of the University

Registrar
Mrs. P.S. Kalugama, *BA (Econ) (Sp.) Hons. (SJP), MA (Edu) London, UK, MBA (RUH)*
Bursar
Mr. K. A. R. S. Jayakodi, BSc (SJP), Post Graduate in financial management (Contract Basis)

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)

   General Administration
   Mr. K. G. Nalintha Kumara
   Assistant Registrar

2. **Examinations**
   Mrs. K. G. C. A. Bandarathilake, *BSc Management (Public) (Sp.) Hons. (SJP), ICASL, Executive Dip. in Accounting & Finance Part I (ICASL), PG Dip. in Business Management (CMB)*
   Senior Assistant Registrar

   Non Academic Establishment
   Mrs. S. K. K. Mudalige, *BSc Agric. Hons. (RUH), M.Sc. (PDN), Certificate in Human Resource Management (MASSEY), MBA (RUH)*
   Deputy Registrar

   Academic Establishment
   Mr. L. Isuru Kalpage, *BSc (Finance) (Sp.) Hons.(SJP), Intermediate Level (ICASL)*
   Senior Assistant Registrar

3. **Distance and Continuing Education Unit**
   Mrs. P. M. S. P. Yapa, *BBSc(Sp.) Hons.(RUH), MBA(RUH)*
   Deputy Registrar

   Corporate Management Division
   Mrs. C. Seneviratne, *BSc (General) Hons. (RUH), PDBA (RUH), Dip. in English (CMB)*
   Deputy Registrar

4. **Salaries & Loan**
   Mrs. E.A.S.M. Perera, *B.B.Management Accountancy (Sp.) (KLN),CAB II (ICACL)*
   Assistant Bursar

5. **Accounts**
   Mrs. D. V. L. Krishani, *B.BA (Sp.)(Accounting)(RUH), Strategic Level I (ICASL)*
   Assistant Bursar

6. **Payments**
   Mrs. E.A.S.M. Perera, *B.B.Management Accountancy (Sp.) (KLN),CAB II (ICACL)*
   Assistant Bursar (Acting)

7. **Supplies**
   Ms. A. G. K. Chandrarathna, *B. B. Mgt Accountancy (SP) (UOK), AAT Finalist, (ICASL)*
   Assistant Bursar

   Mrs. A. Anusha, *BSc (Business Administration) (Sp.) (SJP), Final I (ICASL)*
   Senior Assistant Bursar

   Internal Audit
   Mr. O.V.L.P. Anura, *BBA (Sp.) Hons. (RUH)*
   Senior Assistant Internal Auditor

8. **Library**
   Mr. C.P.K. Edirisinghe, *BA (Stat) Hons. (SJP), PDBA (RUH)*
   Senior Assistant Registrar (Library Service)

9. **International Affairs Unit & Internal Quality Assurance Unit**
   Mrs. H.G.N. Devika, *BA (KLN),MA (Sociology)(RUH)*
   Senior Assistant Registrar

10. **Student Affairs**
    Mrs. P. N. N. Wickramasinghe, *B.B.M(Special), Human Resources (KLN), Business Level (ICASL)*
    Assistant Registrar

11. **Security Section**
    Mr. S. S. P. Liyanage, *Defence Media & Communication Course,(UOC)*
    CSO

    Physical Education
    Mr. K. H. Keerthi Kumara, *BA (Kelaniya)*
    Director of Physical Education

12. **Lands & Buildings**
    Mr. S. Diyunuge, *BSc (Eng.) Hons. (MRT), PG. Dip. (BSE), MIES, AMIESL*
    Works Engineer

    Mr. R.J.K. Rajapakshe, *BSc Agric. Hons. (RUH)*
    Curator (Landscape)

Administrative/ Finance Officers of Faculties

1. **Faculty of Humanities & Social Sciences**
   Mrs. T.D.G. Pathirana, *BSc (General) Hons. (RUH),PG Dip. in Business Management (CMB)*
   Senior Assistant Registrar

2. **Faculty of Science**
   Mrs. S. Sarwalokaraja, *BSc in Agriculture. (UOJ)*
   Assistant Registrar

3. **Faculty of Management & Finance**
   Mr. W. W. Anura, *BAHons. (PDN), MA(CPDS) Tribhuwan, Nepal, Dip. in English for Employment (RUH), Dip. in Psychological Counseling (RUH)*
   Senior Assistant Registrar

4. **Faculty of Fisheries & Marine Sciences and Technology**
   Miss. M. I. Dilhani, *BSc Agric.Hons. (RUH)*
   Assistant Registrar

5. **Faculty of Graduate Studies**
   Mr. P. A. Piyal Renuka, *BA Statistics (SJP), P.G. Dip. in Comty Devt (CMB), PG Dip. in Business Administration(RUH)*
   Deputy Registrar

6. **Faculty of Agriculture**
   Mrs. B.H. Chintha, *BCom. (Sp.) Hons. (KLN), PDBS (RUH), Dip. in English for Employment (RUH)*
   Senior Assistant Bursar

7. **Faculty of Engineering**
   Miss. H. D. Dissanayaka, *BSc (USJ)*
   Assistant Registrar

   Mr. De Zoysa, *D.L.R., BSc (Sp.) Hons. Accounting (SJP), ACA*
   Assistant Bursar

8. **Faculty of Medicine**
   Mrs. R. Lakmali Hettiarachchi, *BBA(Finance) (Sp.)(CMB), Business Level (ICASL)*
   Assistant Registrar

   Mrs. A. S. I. Fernando, *BCom. (KLN), ACA*
   Assistant Bursar

9. **Faculty of Technology**
   Mrs. H. H. K. N. Dharmasiri, *BSc Animal Science & Fisheries (PDN)*
   Assistant Registrar

10. **Faculty of Allied Health Science**
    Mrs. G.H.C. Nadeeshani, *BSc HRM(Sp.)Hons.(SJP),CIMA(Final)*
    Assistant Registrar

    Mrs. Y.D.G. Jayawardhana, *BSc in Business Administration*
    Assistant Registrar