University of Ruhuna
Faculty of Science
Matara, Sri Lanka

Student Handbook - 2019

Bachelor of Science
and
Bachelor of Computer Science
Degree Programmes

2018/2019

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University of Ruhuna
Faculty of Science
Student Handbook 2019

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.

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1 University of Ruhuna

1.1 Introduction and brief history of the University

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

Faculties of Humanities and Social Sciences, Fisheries and Marine Sciences & Technology, Management & Finance, Science and Graduate Studies are located at the main University premises at Wallamadama (Matara). Faculties of Agriculture, Engineering and Medicine are located in Mapalana (Kamburupitiya), Hapugala (Galle) and Karapitiya (Galle) respectively. The Faculty of Technology is temporary located at the Wellamadama premises until the construction of buildings at Kamburupitiya are completed. The central administration unit of the University is also located at the Wallamadama University complex.

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 recruitment of the University of Ruhuna for the Bachelors degree programmes in 1978, a total of 272 students were enrolled and in the year 2016 it has been increased to 7464 students, across seven faculties (Table 1), recording its fast growth during the past four decades.

Table 1: Distribution of students among the seven faculties (2016).

Name of the Faculty	**No. of Students**
Agriculture	736
Engineering	1117
Fisheries and Marine Sciences & Technology	170
Humanities and Social Sciences	1602
Management and Finance	1795
Medicine	821
Science	953
Technology	135
Allied Health Science	135
Total student population of the University	7464

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 belongs 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 expressway. Matara is the last railway station where the railway lines end and the last exit of the expressway in the South.

1.3 Officers of the University

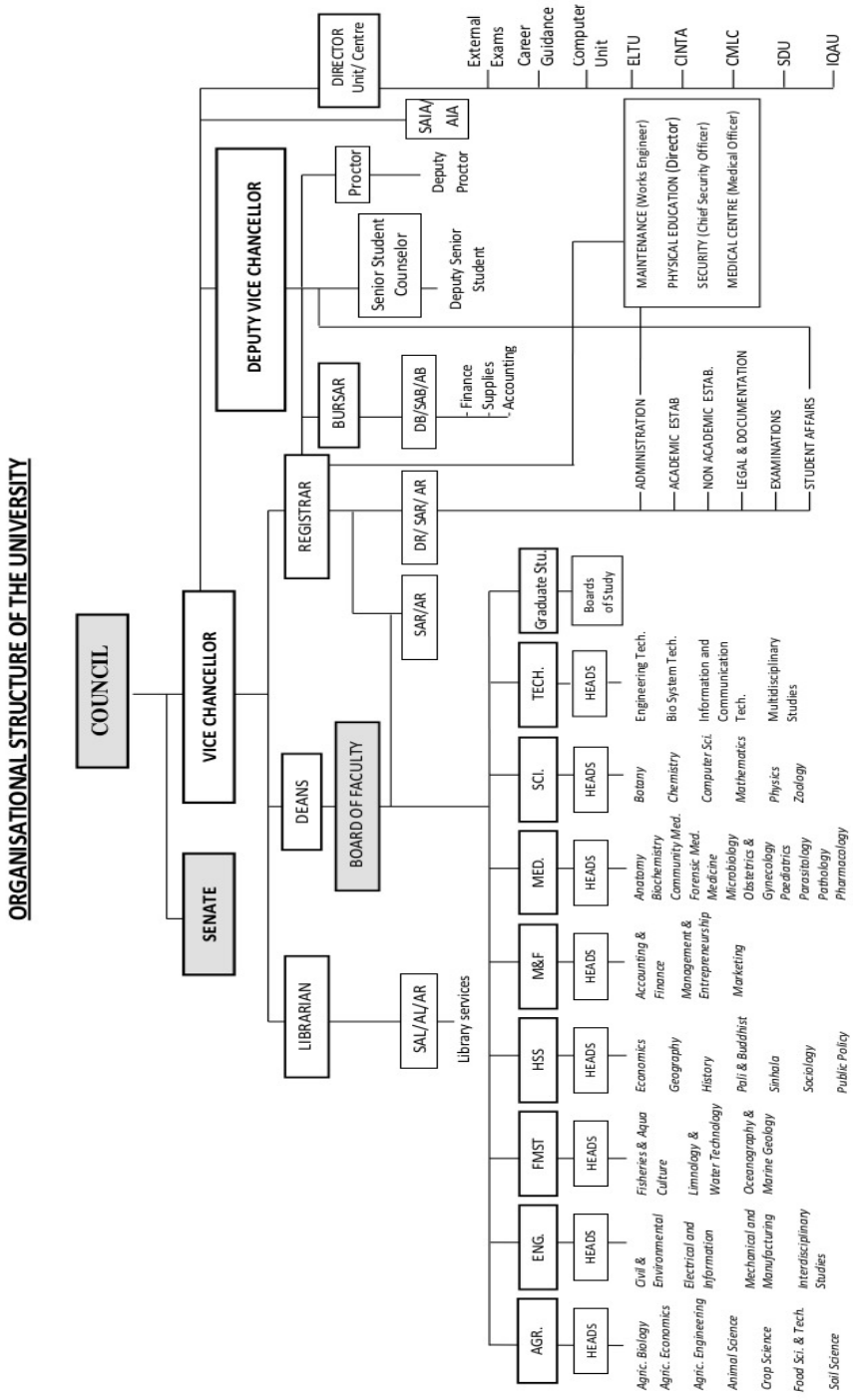
Chancellor	*Venerable Rajakeeya Panditha Pallaththara Sumanajothi Nayaka Thero*
Vice-Chancellor	*Senior Professor T.S.D. Amarasena* *MBBS (Ruhuna), DCH(Col.)* *MD(Paed-Col.), DCH(Syd.)*
Deputy Vice-Chancellor	*Dr.A.M.N. Alagiyawanna* *B.Sc. (Eng Hons) (Moratuwa),* *MEng (AIT), DEng (Nagaoka), C.Eng, MIE(SL)*

Deans of Faculties

Agriculture	*Prof. S.D. Wanniarachchi* *BSc Agric.(Ruhuna)* *MSc (Guelph,Canada)* *PhD (Guelph,Canada)*
Engineering	*Dr. H.P. Sooriyaarachchi* *B.Sc. (Eng Hond)(Moratuwa)* *C.Eng,MIE(SL),MEng.(Tokyo)* *PhD (Sheffield, UK)*
Humanities and Social Sciences	*Dr. Upali Pannilage* *B.A., M.Phil, PhD (Ruhuna)* *PG Dip.(Colombo)*
Medicine	*Prof. I.V.Dewasiri* *MBBS(Ruhuna), DCH(Paed-Col), MD(Col)*
Science	*Prof. P.A. Jayantha* *B.Sc. (Kelaniya, Sri Lanka)* *M.Sc. (JPura, SL)* *Ph.D.(QUT,Australia)*
Technology	*Senior Professor W.G.D. Dharmarathna* *B.Sc. (Pera)* *MSc, PhD (Tufts, USA)*
Management & Finance	*Dr. T.S.L.W. Gunawardana* *PhD(Bodo, Norway)* *MSc(Agder, Norway)* *BBA(Ruh, SL)*

Fisheries and Marine Sciences and Technology	*Dr.(Mrs.) H.B. Asanthi* *B.Sc. (Hons) (Ruhuna),* *PhD (Montpellier, France)*
Postgraduate Studies	*Senior Professor (Mrs) M.V.Weerasooriya* *MBBS(Peradeniya)* *Dr. Med.Sci.(Parasitology)* *Kyushu University, Japan*
Allied Health Sciences	*Dr. K.G. Imendra* (Actg.Dean) *BDS (Pera), PhD (Japan)*
Librarian	*Mr. Ananda Karunarathna* *B.Dev. Studies (Statistics) (Colombo, SL),* *Dip. Lib. & Inf. Science (Kelaniya, SL),* *MSSc.(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 campuses are as follows;

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

1.5.2 Telephone and Fax Numbers of the University

	Telephone	**Fax**
Wellamadama Complex	+94(0)41222681-2 +94(0)412227001-4	+94(0)412222683
Faculty of Agriculture	+94(0)41229220	+94(0)412292384
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

1.5.3 Electronic Mail/Web

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

1.6 Internal Telephone Numbers

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

2 Faculty of Science

2.1 Introduction

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

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

Vision Statement - Faculty of Science

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

Mission Statement - Faculty of Science

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

2.2 Aims of the Faculty

The main objective of the faculty is to produce high quality Science graduates in both biological and physical sciences to cater in diverse fields of science in the country itself and outside.
The degree programmes offered by the faculty have been designed to develop following attributes in each student:

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

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

- A sound knowledge in basic scientific concepts in various subjects
- A basic understanding of principles of scientific method and their application
- Apply the knowledge to solve real world problems
- Learn effective and efficient communication methods through report writing, presentations, brainstorming sessions etc...
- Participating in various 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 *Professor P. A. Jayantha* *B.Sc. (Kelaniya),* *M.Sc. in Industrial Mathematics (SJP),* *Ph.D. (QUT, Australia)*	+94(0)412222701	jayantha@maths.ruh.ac.lk	4101
Assistant Registrar *Ms. K.D.De.S Jayasekara* *B.Sc. (Colombo)* *M.Sc. in Natural* *Resource Management*	+94(0)412222701	office@sci.ruh.ac.lk	4102

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

2.4 Degree Programmes

Currently the Faculty of Science offers B. Sc. General (3 year) and B.Sc. Special (4 year) Degrees in biological and physical science streams and Bachelor of Computer Science (BCS) General and Special Degree programmes. These are full time courses consisting of a number of course units organised as two semesters per academic year. The General Degree Programmes run through six semesters while the Special 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 tyhe volume of learning is considered in the SLQF, the number of credits that should be earned by students of each qualification is also given. The minimum number of credits a student must earn to complete a B.Sc. General Degree and a B.Sc. Special Degree and a BCS General Degree and a BCS Special Degree with the corresponding SLQF Level is given in the following Table.

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

2.5.2 Accreditation

B.Sc. and BCS General/Special 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 Special 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	3	Examination period	4
Vacation periods and Holidays			11
Total			52

3.4 Orientation Programme

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

3.5 Course Structure

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

Table 2: Main streams of Courses offered by the faculty

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

several other Course Units from different disciplines are also available as Optional Course Units. The denotations 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 Special Degree in a particular subject area. The duration of a Special Degree program is four years in total. Special degree program is considered as Level IV which consists of two academic years, namely Special 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	01
e.g.	30 hour Course Unit	02
	45 hour Course Unit	03
Practical Course Units:	30-45 hour Course Unit	01
	60-90 hour Course Unit	02
Projects:	30-45 hour Project	01
Combined Course Units: e.g.		
30 theory hours and 45	practical hours together	03
15 theory hours and 45	practical hours	02
30 theory hours and 22.5	practical hours	02.5

3.7 Selection of Course Units

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

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

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

3.7.1 Biological Science Stream

During the first two academic years, students in Biological Science Stream must obtain Core Course Units offered by any three departments out of the Department of Chemistry, Zoology, Botany and Physics. 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. During semester II of Level III they have freedom to select Course Units from among Optional Course Units available for Physical Science students. Course units available for different streams in Physical Science are given in the Section 3.11.

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

3.8 Identification of Course Units

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

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

Character(s)	Representation	Examples
First three characters	Subject	MAT- Mathematics, PHY - Physics
Fourth character	Level	2 - Level II, 1 - Level I
Fifth character:	Semester of the year	2 - Second Semester 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 Special Degree Programme

Special 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 Special Degree Programme depending on its requirements, available facilities and student performances. All Special Degree Programmes shall be of four-year duration.

3.9.1 Criteria for Selection to a Special Degree programme

1. A student shall be eligible to apply if he/she has fulfilled the following requirements at the completion of the Level II of the General Degree:
   (a) a minimum of 60 credits,
   (b) grades of C or better from theory aggregating to a minimum of 60% credits from each subject,
   (c) grades of C- or better in all practical course units of the subjec to be specialised.
   (d) grades of D+ or better in all other practical course units.
   (d) a GPA of 2.00 or more, (The GPA is calculated using the formula in section 14.2.4), and
   (e) grades B- or better for 80% of course units of the subject to be specialised.
2. 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 Levels I & II of the General Degree Examination,
   (b) performance in the other subject(s) offered at the examinations referred to (a) above and
   (c) the general aptitude and application of the student.
3. The decision of the Dean of the Faculty shall be final and conclusive.
4. Pass the English Proficiency Level II and Level III.

3.10 Course Unit Combinations - Biological Science Stream

Pathways available for Biological Science Streams are shown in the following tables.

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

Pathways available for Biological Science Stream for B.Sc. Level I & II											
B.Sc. Level I						B.Sc. Level II					
Course Unit	BS1	BS2	BS3	BS4	Th/ Pr	Course Unit	BS1	BS2	BS3	BS4	Th/ Pr
ZOO1102	C	C		C	Th	ZOO2102	C	C		C	Th
ZOO1112	C	C		C	Th	ZOO2112	C	C		C	Th
ZOO1121	C	C		C	Pr	ZOO2121	C	C		C	Pr
ZOO1202	C	C		C	Th	ZOO2202	C	C		C	Th
ZOO1212	C	C		C	Th	ZOO2212	C	C		C	Th
ZOO1221	C	C		C	Pr	ZOO2221	C	C		C	Pr
PHY1114		C	C	C	Th	PHY2114		C	C	C	Th
PHY1214		C	C	C	Th	PHY2b22		C	C	C	Pr
PHY1b22		C	C	C	Pr	PHY2214		C	C	C	Th
ICT1b13	C	C	C	C	Th+Pr	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	Th+Pr
BS1, BS2, BS3, BS4: Bio-Science Stream from 1 to 4. ICT2b13 (CCIT) - For students who passed ICT1b13 (CLC) exam											

Pathways available for Biological Science Stream for B.Sc. Level III							
	Semester - I						Semester - II
Subjects	Course Unit	BS1	BS2	BS3	BS4	Th/Pr	Optional Course Units
Chemistry	CHE3112 CHE3122 CHE3132	C C C	C C C	C C C		Th Pr Th	CHE3212, CHE3222, CHE3232
Physics	PHY3114 PHY3121		C C	C C	C C	Th Pr	PHY3232, PHY3242, PHY3252, PHY3262, PHY3272,PHY3282
Botany	BOT3112, BOT3122, BOT3132, BOT3151, BOT3162, BOT3172, BOT3182, BOT3191, BOT3142.						BOT3212, BOT3222, BOT3232,BOT3242, BOT3251, BOT3261, BOT3271, BOT3282, BOT3292.
Zoology	ZOO3112, ZOO3122, ZOO3133, ZOO3152, ZOO3162, ZOO3172, ZOO3182, ZOO3192.						ZOO3202, ZOO3211, ZOO3223, ZOO3232, ZOO3252, ZOO3272, ZOO3292.
Mathematics							MAT324β, MAT325β, MAT326β, IMT323β, IMT324β, AMT324β
Computer Science	COM3b52						COM3252, COM323α:, COM324α
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

Pathways available for Physical Science Stream for B.Sc. Level I									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
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
CHE1032	C		C	C				C	Pr
CHE1212	C		C	C				C	Th
CHE1222	C		C	C				C	Th
PHY1114		C	C		C		C		Th
PHY1b22		C	C		C		C		Pr
PHY1214		C	C		C		C		Th
COM1111						C	C	C	Th
COM112β						C	C	C	Pr
COM113α						C	C	C	Th
COM121β						C	C	C	Th
COM122β						C	C	C	Pr
ICT1b13 (CLC)	C	C	C	C	C				Th

Pathways available for Physical Science Stream for B.Sc. Level II									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
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
MAT223β									Th
MAT225β									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
IMT222β	One of these options must be taken (C)								Th
IMT223β									Th
IMT224β									Th

Pathways available for Physical Science Stream for B.Sc. Level II									
Semester - I & Semester - II									
Course Unit	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8	Theory/Practical
AMT211β				C	C	C			Th
AMT212β				C	C	C			Th
AMT221β				C	C	C			Th
AMT222β				One of these					Th
AMT223β				options must					Th
AMT224β				be taken (C)					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
COM212β						C	C	C	Pr
COM213α						C	C	C	Th
COM2141						C	C	C	Th
COM221β						C	C	C	Pr
COM222β						C	C	C	Th
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								Th
MAT313β	must be taken(C)								Th
IMT3b1β	C	C							Project
IMT312β	One of these options								Th
IMT313β	must be taken(C)								Th
AMT311β			Only one of these options						Th
AMT313β			can be taken(C)						Th
AMT312β			One of these options						Th
AMT314β			must be taken(C)						Th
COM311β						C	C	C	Th
COM312β						O	O	O	Th+Pr
COM3b3β						C	C	C	Pr
COM3b52	O	O	O	O	O				Th+Pr
CHE3112	C		C	C				C	Th
CHE3122	C		C	C				C	Th
CHE3132	C		C	C				C	Th
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
COM3252	O	O	O	O	O	O	O	O	Th
COM3212						O	O	O	Th
COM323α	O	O	O	O	O	O	O	O	Th+Pr
COM324α	O	O	O	O	O				Th+Pr
COM326β						O	O	O	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
FSC Course Units (Optional)									FSC3212 FSC3222 FSC3232
Any other Course Unit that may be approved by the faculty									

3.12 Attendance Requirement

Students' attendance for course units they registered can be viewed. 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 in 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 Special Degree Applications

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

4.8 Applications for Demonstrator/Tutor positions

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

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

4.9 Hostel Facilities and Policy

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

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

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

4.10 Financial Assistance

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

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

4.10.1 Mahapola Higher Education Scholarships

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

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

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

4.10.2 Bursaries

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

Full student bursary	Rs. 4000/=	Per instalment

4.10.3 Ruhuna Science Faculty Scholarship Fund (RSFSF)

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

4.10.4 Other Scholarships

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

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

5 Department of Botany

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

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

5.1 Research Areas

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

- Propagation techniques of medicinal plants.
- Taxonomy of marine algae and Toxic algae.
- Biological control of plant pathogens including soil borne plant diseases such as Panama wilt of banana, collar rots of bean, chilli and tomato, Trichoderma-based biopesticides and biofertilizers.
- Screening of natural compounds from plants for pharmaceutical purposes.
- Organic agriculture and 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.

5.2 Head of the Department

Senior Prof. L.P.Jayathissa, B.Sc. (Ruhuna, SL), Ph.D.(Stirling ,UK)

5.3 Members of the Academic Staff

Designation	Name	Specialization
Professors	Senior Prof. L. P. Jayatissa B.Sc. (Ruhuna, SL) Ph.D. (Stirling, UK)	Toxic Cyanobacteria Ecotoxicology Coastal ecology
	Senior Prof. S. Abeysinghe B.Sc. (Ruhuna, SL) M.Sc. (Wageningen, Netherlands) Ph.D. (Brussels, Belgium)	Molecular biology Crop protection
	Prof. (Mrs.) P. D. Abeysinghe B.Sc. (Ruhuna, SL) M.Sc., Ph.D. (Brussels, Belgium)	Molecular biology Plant Systematics
Senior Lecturers	Dr. (Mrs.) N. P. Dissanayaka B.Sc. (Peradeniya, SL) Ph.D. (Reading, UK)	Plant Physiology Weed Biology
	Mr. P. S. Kariayawasam B.Sc. (Ruhuna, SL) M.Sc. (Florida Int'l, USA)	Plant Eco-physiology
	Dr. T. G. Dayananda B.Sc. (Ruhuna, SL) M.Sc., Ph.D. (Kyushu, Japan)	Molecular Phylogeny Population Genetics
	Dr. (Mrs). K. K. G. U. Hemamali B.Sc. (Ruhuna, SL) M.Sc., Ph.D. (Kyushu, Japan)	Molecular Plant Breeding Population Genetics
	Dr. K. Masakorala B.Sc. (Ruhuna, SL) M.Sc. (Plymouth, UK) Ph.D. (USTB, Beijing, China)	Environmental Science Environmental toxicology Bioremediation
	Dr. W. G. S. Manel Kumari B.Sc. (Ruhuna, SL), M.Sc. (Peradeniya, SL) M.Sc. (Wageningen, The Netherlands) Ph.D. (Queensland)	Plant Virology Microbiology
Lecturers	Mr. R. D. A. Gunasekara B.Sc. (Ruhuna, SL) M.Sc. (Ghent, Belgium) (Reading for Ph.D. (Peradeniya))	Phycology Plant Ecology
	Dr. K.A.S. Kodikara B.Sc. (Ruhuna, SL) M.Sc. (VUB, Belgium) Ph.D.(VUB, Belgium)	Plant Ecology
Probationary Lecturers	Mrs. Jayani Perera B.Sc. (Ruhuna, SL) M.Sc. (Montpellier, France) (Reading for Ph.D.)	Plant Physiology
	Mr. D. D. N. Sripal B.Sc. (Ruhuna, SL) (Reading for Ph.D)	Plant Taxonomy
	Ms. S.Y.S.D. De Silva B.Sc (Colombo, SL)	Plant Taxonomy

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

Level I - Semester I

BOT1112: Plant Diversity, Unity and Evolution (30 lecture hrs) Phylogenetic relationships and evolutionary trends of Monera, Protista, Fungi, Bryophyta, Pteridophyta and Metaphyta, Structural diversity of non-vascular plants and vascular plants, Reproductive patterns of Monera, Protista, Fungi and Metaphyta

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)

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.

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

Level I - Semester II

BOT1212: Genetics (30 lecture hrs) Introduction, Mendel's Laws of Genetics, Chromosome morphology, Gene linkage, Crossing over and Gene Mapping, Sex determination and sex linkage, Probability in Mendelian inheritance and pedigree analysis, Mutationa (mutagenic agents, chromosome aberration, euploids, aneuploids, autopolyploids and allopolyploids), Viral and bacterial genetics, Genetics of fungi, Extra nuclear inheritance, Population Genetics and Hardy Weinberg equilibrium

BOT1221: Plant Systematics (15 lecture hrs) Historical background, general definitions, 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

BOT1231: Plant Ecology (15 lecture hrs) Fundamentals of Ecology, Different Vegtation types in Sri Lanka

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

Level II - Semester I

BOT2112: General Microbiology (30 lecture hrs) A brief histroy of Microbiology, Microbes in our life, Branches of Microbiology, Observing microorganisms through microscope, Structure of prokaryotic cell,Classification of microorganisms,Microbial growth, Mi-

crobial genetics, Microorganisms and diseases, Environmental microbiology, microbes used in industries.

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, Post harvest diseases, Plant disease epidemiology, Important plant diseases of major crops in Sri Lanka, Plant disease control and management

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, control of gene expression, protein synthesis, replication, isolation of DNA, quality and quantity assessments

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

Level II - Semester II

BOT2212: Plant Physiology and Biochemistry (30 lecture hrs) Plant & water ; essentially 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 physiology of flowering vernalization.

BOT2221: Environmental Science (15 lecture hrs) Fundamentals of environmental science,Natural resourses & threats on natural resourses, 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,Invasive flora in Sri Lanka & related environmental issues.

BOT2231: Soil- Plant Relationships (15 lecture hrs) Physical and chemical characteristics of soil, , 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,(Interaction between plants & microorganisms in the rhizosphere), Analysis of Nutrients in the soil and in plants,Major soil types of Sri Lanka, Soil Conservation and sustainable management of soil.

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

Level III - Semester I

BOT3112: Advanced Plant Ecology (20 lecture hrs + 21 practical hrs) *Op. Prerequisite: Botany core courses*
History of Development of Ecology, Biodiversity, patterens of Biodiversity,main threats on

biodiversity, Conservation of Biodiversity.Ecosystem valuation and Environmental Accounting, Indigenous knowledge on Plant Ecology in Sri Lanka.

BOT3122: Horticulture, Floriculture and Landscaping (20 lecture hrs+21 practical hrs) *Op. for Biology students*
Divisions of horticulture, Advantageous and disadvantages of horticulture, Classification of horticultural plants, Plant propagation methods, Cultivation of horticultural plants plant ,Plant Nurseries,Hydroponics,Floriculture, Landscaping: Designing, Installing and maintenance, Post-planting immediate care, Pruning and training of plants

BOT3132: Advanced Microbiology (20 lecture hrs+21 practical hrs) *Op. Prerequisite: Botany core courses*
Plant-microbe interactions (rhizosphere, phyllosphere, role in disease resistance), Ecology of microorganisms (interactions with environment, role in biogeochemical cycles)

BOT3142: Advanced Plant Pathology (15 lecture hrs + 30 practical hrs) *Op. for Biology students*
Molecular plant pathology - Genetics of host-pathogen interactions (gene for gene interaction, recognition and triggering resistance), Hypersensitive Reaction (HR), Induced resistance in plants (local and systemic), Putative signal transduction pathways towards systemic resistance, Biotechnology in plant protection (Diagnosis, detection, transgenics etc.) Ecological plant pathology Epidemiology, Disease forecasting, Plant disease management (chemical, cultural, biological control, etc. and integrated approaches)

BOT3162: Forestry (20 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, Forest based industries.

BOT3172: Food Technology (20 lecture hrs + 21 practical hrs) *Op. Prerequisite: Botany core courses* Hitory of food science & technology, Food spoilage, Food poisoning,Food preservation methods of food, Post harvest technology, Food packaging and labelling, genetically modified/engineered food,Food safty.

BOT3182: Advanced Molecular Biology (20 lecture hrs + 21 practical hrs) *Op. Prerequisites: BOT2131*
Advanced Molecular Biology (25 lecture hrs + 15 practical hrs) Genome organization, chromosome structure and function, organelle gene organization, recombination, DNA repair, gene expression, gene regulation, post-transcriptional modifications, mechanism of protein synthesis and protein structures, transposons and their practical applications.

BOT3191: Weed Biology (12 lecture hrs + 06 practical hrs) *Op. for Biology students*
Characteristics of weeds, Classification of weeds, Weed spread and evolution, Impact of weeds,Usefulness of weeds, preventive methods, mechanical & chemical weed control,Herbicides (application, mechanisms of action, transformations in plants, persistence and behaviour in soil), Invasive weed species, Allelopathic effect of weeds, Paddy field and aquatic weeds

Level III - Semester II

BOT3212: Wood Science (20 lecture hrs+21 practical hrs) *Op. for Biology students*
Terminology, Structure of wood, Physical properties of wood, Mechanical properties of wood, Grading of woods/timber, Common and specific uses of woods, Wood seasoning, Wood preservation

BOT3222: Plant Tissue Culture (20 lecture hrs+21 practical hrs) Cell theory /totipotency, history of plant tissue culture, in vitro methods in plant tissue culture (sterile technique, media components), 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.

BOT3232: Advanced Plant Physiology (25 lecture hrs+15 practical hrs) *Op. Prerequisite: Botany core courses*
Crop establishment and seedling growth, Crop photosynthesis and yield, Metabolic and structural factors influencing photosynthetic rate, Light distribution and canopy structure Limitations of crop yield by weather and climate, Partitioning and remobilization of photosynthetic assimilates, Translocation and source sink relationship, Biochemical adaptations of plants to the environment, Biochemistry of C3 C4 intermediate species.

BOT3242: Advanced Environmental Science (20 lecture hrs+21 practical hrs) *Op. Prerequisite: Botany core courses*
(The global environment Population growth, Decline of vital life support ecosystem, Global atmospheric changes, Loss of biodiversity)Strategic and integrative themes for sustainable future, Biogeochemical cycles, Solid waste management,Integrated solid waste management,Municipal Solid Waste(MSW),Mismanagement and side effects,Environmental monitoring,Bioindicators, Biomarkers,Biosensors, Bio-indicators and bio-monitoring,Bioremediation Techniques, Environmental impact assessment (EIA)

BOT3251: Plant Virology (15 lecture hrs) 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.

BOT3261: Economic Botany 23(15 lecture hrs) *Op. for Biology students*
Concepts of economics, Agro-forestry, Mangroves, Medicinal plants, Plantation crops in Sri Lanka, Fruits and vegetables, Fibre and Timber, Spices, oils, gums etc., Algae, Microorganisms

BOT3271: Genetic Engineering and Biotechnology (15 lecture hrs) 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.

BOT3282: Plant breeding (25 lecture hrs+ 15 practical hrs) *Op. for Biology students*
History of plant breeding, Conventional breeding methods (mass selection, pure line selection, hybridization, single seed descent, backcross breeding, Recurrent selection methods, synthetic varieties), Modern plant breeding methods, Protoplast culture and anther culture techniques.

BOT3292: Plant Ecophysiology (25 lecture hrs+ 15 practical hrs) *Op. for Biology students*
Plant cell and its environment, Plant growth and plant growth analysis, Interactions between functions of plants and environmental parameters, Life and environmental parameters, Light environment of plants and measurements, Water status and water stress, Methods of assessing water status and water stress, Dendroclimatology, Stable carbon isotopes in plant ecophysiology studies

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

Course Unit	Lectures	Practicals	Credits
BOT4012: Quantitative Plant Ecology	25	15	2
BOT4022: Horticulture, Floriculture and Landscaping	25	15	2
BOT4032: Microbial Ecology	25	15	2
BOT4042: Applied Microbiology	30		2
BOT4052: Advanced Plant Pathology	20	21	2
BOT4062: Advanced Molecular Biology	25	15	2
BOT4072: Economic Botany & Entrepreneurship	30		2
BOT4083: Forestry & Forest Management	30	30	3
BOT4092: Food Technology	25	15	2
BOT4102: Plant Cell and Tissue Culture	25	15	2
BOT4112: Weed Biology and Management	25	15	2
BOT4122: Genetic Engineering & Biotechnology	30		2
BOT4132: Advanced Plant Physiology	25	15	2
BOT4142: Advanced Environmental Science	25	15	2
BOT4152: Advanced Plant Virology	25	15	2
BOT4162: Wood Science & Technology	25	15	2
BOT4172: Techniques in Plant Breeding	25	15	2
BOT4182: Herbarium Methodologies	15	45	2
BOT4192: Advanced Plant Systematics	25	15	2
BOT4202: Ecotoxicology	25	15	2
BOT4213: Biostatistics	30	30	3
BOT4222: Molecular Evolution and Phylogenetics	25	15	2
BOT4232: Plant Ecophysiology	25	15	2
BOT4242: Seed Physiology and Technology	20	21	2
BOT4282: Bioinformatics	20	21	2
Total Theory Units			52
(Practical, Soft skills & Research)			
BOT4252: Practical skills in Botany	90hrs		2
BOT4262: Scientific Report Writing, Seminars & Industrial Training			2
BOT4276: Research Project			6
Total Practical Credits			10
Total Botany Credits			62
Total Required Credits from Special Degree Course			60

BOT4012: Quantitative Plant Ecology (25 lecture hrs + 15 practical hrs) Quantitative description of vegetation, Sampling, Association between species, Plant communities, Classification, Ordination, Pattern, Habitats and ecosystems of Sri Lanka

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,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.

BOT4032: Microbial ecology (25 lecture hrs + 15 practical hrs) Plant-microbe interactions (rhizosphere, phyllosphere, role in disease resistance), Ecology of soil and aquatic microorganisms (interactions with environment, role in biogeochemical cycles), Microbiology of air, Unusual environments, Case studies

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, biodeterioration), Medical microbiology

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)

BOT4062: Advanced Molecular Biology (25 lecture hrs + 15 practical hrs) Genome organization, chromosome structure and function, organelle gene organization, recombination, DNA repair, gene expression, gene regulation, post-transcriptional modifications, protein synthesis and structures, protein trafficking, transposons and their practical applications, human genome project, seminars in molecular biology.

BOT4072: Economic Botany and Entrepreneurship (30 lecture hrs) Concepts of economics, Agro forestry, Mangroves, Medicinal plants, Plantation crops in Sri Lanka, Fruits and vegetables, Fibre and Timber, Spices, oils, gums etc., Algae, Microorganisms, Concepts of entrepreneurship, Excursions

BOT4083: Forestry and Forest Management (30 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, Forest based industries, Use of remote sensing and GIS in forestry, Forest management, Carbon stock & sequestration, Forest Conservation, Analysis of forest vegetation, Forest based industries, UN-REDD program.

BOT4092: Food Technology (25 lecture hrs +15 practical hrs) *(Optional for students following Special Degree in Botany)* Hitory of food science & technology, Food spoilage, Food poisoning food preservation methods , Post harvest technology, Food packaging and labelling, genetically modified/engineered food, Food nutrition, Food processing, Food analysis, Fruit ripning, Microbes in food industory

BOT4102: Plant Cell and Tissue Culture (25 lecture hrs + 15 practical hrs) In vitro methods in plant tissue, Micropropagation, Callus and suspension cultures, Organ cultures, Organogenesis, Embryogenesis, Haploid cultures, Protoplast cultures and their applications, Somaclonal variation. In vitro production of secondary metabolites, Virus free plants and Rejuvenation, Somatic embryogenesis and artificial seeds, Applications of tissue culture in Sri Lanka, Cryopreservation.

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

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

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.

BOT4142: Advanced Environmental Science (25 lecture hrs + 15 practical hrs) *Op. for students following Special Degree in Botany*

The global environment (population growth, decline of vital life support ecosystems, global atmospheric changes, loss of biodiversity), Sustainability,Solid wasre management, Anaerobic digestion technology,Agriculture related environmental problems, Environmental monitoring,Bioindic indicators 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.

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.

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.

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),

BOT4182: Herbarium Methodologies (15 Lecture hrs + 45 practical hrs) Botanical gardens and herbaria preparation of herbarium specimens, regulations and getting permission in plant collection, pressing, drying, mounting and labeling (preparation of plant specimens for deposit as herbarium vouchers), applications of herbaria, students are required to collect prescribed number of specimens and submit as a herbarium collection at the end of the second year of the Special Degree.

BOT4192: Advanced Plant Systematic (25 lecture hrs + 15 practical hrs) Species concept, Phenotypic plasticity and polymorphism, Taxonomic data: morphological, anatomical, palynological, cytogenetics, phytochemistry and reproductive biology in plant systematics, Introduction to plant molecular systematics: different methods and molecular markers, analysis of molecular data. Some economically important plant families, Red list, IUCN.

BOT4202: Ecotoxicology (25 lecture hrs + 15 practical hrs) *Op. for students following Special 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 assesments,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

BOT4213: Biostatistics (30 lecture hrs + 30 practical hrs) MAS3223 conducted by the Department of mathematics and practicals with computer software applications which includes; 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

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

BOT4232: Plant Ecophysiology (25 lecture hrs + 15 practical hrs) *Op. for students following Special 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

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

BOT4252: Practical skills in Botany (90 practical hrs) Characterization of bacterial cultures, morphological differences of blue green bacteria, structural characteristics of algae, major life cycle patterns of fungi and their classification, morphological and reproductive characteristics of bryophytes, mosses, ferns, gymnosperms and angiosperms, primary and secondary growth in stems and roots of monocots and dicots, anomalous structures of dicot stems, floral anatomy and keys, identification of important forest tree species and their ecological adaptations, investigate and measurements of environmental parameters, analysis of vegetation and plant communities, analysis of microbial communities of different habitats, identification of causal agents of plant diseases and symptoms, characterization of plant viruses, assessment and measurements of important physiological parameters of plants, analysis and identification of important biological molecules and enzyme reactions, analysis and interpretation of genetic data.

BOT4262: Scientific Report writing Seminars and Industrial Training

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.

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).

6 Department of Chemistry

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

6.1 Research Areas

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

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

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

6.2 Head of the Department

Prof. (Mrs.) Vajira P. Bulugahapitiya, B.Sc. (Ruhuna, SL), Ph.D. (Fribourg, Switzerland)

6.3 Members of the Academic Staff

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

Designation	Name	Specialization
Senior Lecturer	Dr. A. S. Ranaweera B.Sc. (USJP, SL), Ph.D. (USA)	Inorganic synthesis Chemical Engineering
	Dr. (Mrs.) Harshi Manawadu B.Sc. (Colombo, SL), Ph.D. (USA)	Organic Chemistry
	Dr. Nishantha K. Kalutharage B.Sc. (Ruhuna, SL), Ph.D. (USA)	Inorganic Chemistry Homogeneous Catalysis Organometallic Chemistry
	Dr. Jeewantha S. Hewage B.Sc. (Ruhuna, SL), Ph.D. (USA)	Inorganic Chemistry
	Dr. (Mrs.) H. D. Jayasekera B.Sc. (Ruhuna, SL), Ph.D. (USA)	Organic Chemistry, Photochemistry
	Dr. Y. M. A. L. W. Yapa B.Sc. (Ruhuna, SL), Ph.D. (USA)	Synthetic Organic Chemistry Green Chemistry
	Dr. K. B. Jayasundera B.Sc. (P'deniya, SL), Ph.D. (USA)	Analytical Chemistry
	Dr. M. S. Kodikara B.Sc. (Ruhuna, SL)	

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

Level I

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

Level II

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

Level III : OPTIONAL COURSES

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

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.*)

Level I - Semester I

CHE1112 : General Chemistry and Basic Concepts in Analytical Chemistry
General Chemistry: atomic structure and subatomic particles, atomic properties, nuclear stability and nuclear reactions, chemical bonding, VSEPR theory and molecular orbital theory.
Analytical chemistry: significant figures, statistical analysis of chemical data, solubility and solubility product, gravimetry, titrimetry (acid/base, redox, complexometric and precipitation).
Evaluation methods: Continuous Assessment : 30% , Semester End Examination : 70%

CHE1122: Fundamentals in Organic Chemistry Basic concepts in organic chemistry, IUPAC nomenclature of organic compounds, stereoisomerism conformational analysis, reactive intermediates, reactions of aliphatic compounds, aromaticity and reactions of aromatic compounds.
Evaluation methods: Continuous Assessment : 30% , Semester End Examination : 70%

CHE1032: Practical Inorganic and Organic Chemistry-I Practical Inorganic Chemistry: Safe laboratory practices, basic laboratory techniques; Qualitative semi-micro analysis of inorganic samples/inorganic mixtures for basic cations and anions acid base titrations, permanganometry, iodometry, dichrsomate titrations.
Practical Organic Chemistry: Qualitative analysis; Elemental analysis, Functional groups analysis, Preparation of derivatives and recrystallization, Determination physical constants, Identification and separation of binary organic mixtures.
Evaluation methods: Continuous Assessment : 30% , Semester End Examination : 70%

Level I - Semester II

CHE1212: Descriptive Inorganic Chemistry I Chemistry of s and p block elements; Oxides, Sulphates, Nitrates, Carbonates, Allotropes, Three-centred bonding, Silicones, Chemistry of transition elements: General properties, oxidation states, Colour, Mag-

netic 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%

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%

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%

Level III - Semester I

CHE3112: Industrial Chemistry I Theoretical interpretation of industrial process. Quality Management; Food Chemistry and Technology; Chemistry related to food harvesting, storing, packaging, spoilage, deterioration, processing and preservation; dairy industry. Practical(s): Case studies in industrial concepts, Food technology and analysis.
Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%

CHE3122: Analytical Chemistry Sampling methods, Chemometrics, Instrument performance characteristics. Atomic absorption, emission and inductively coupled plasma spectroscopy, Fluorescence spectroscopy. Electroanalytical Chemistry, Potentiometric methods,

Electrogravimetric methods, Coulometry, Voltammetry. **Practical:** Electroanalytical techniques.
Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%

CHE3132: Biochemistry Amino acids, Peptides and proteins, Carbohydrates, Lipids, Nucleotides and Nucleic acids, Enzymes, Coenzymes. Enzyme kinetics and inhibition, Bioinorganic chemistry; structure and function of proteins. **Practical:** Isolation, purification, quantitative and qualitative identification of biomolecules, Identify reducing sugars, polysaccharides, lipids, amino acids and proteins using diagnostic reagents.
Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%

Level III - Semester II

CHE3212: Environmental Chemistry Atmospheric, aquatic and soil chemistry, water quality parameters, treatment of water to produce potable water. Treatment methods for industrial waste, case studies, air quality analysis, industrial pollution, agrochemicals, clinical waste, e-waste, nuclear waste, air pollution, soil analysis, solid waste treatment and practical related to above.
Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%

CHE3222: Industrial Polymer Chemistry Industrial Polymers, and polymer structures, mechanisms and kinetics of polymerization; molecular weight distributions; methodologies of polymer synthesis; physical and mechanical properties of polymers, Chemistry of Rubber & Related Industries, Chemistry and technology of Wood Adhesives. **Practical:** Synthesis of polymers and adhesives; testing of viscosity, mechanical and non-mechanical properties.
Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%

CHE3232: Pharmaceutical Chemistry Drug categories, , main process of drug in the body; administration, absorption, transportation, action and metabolism. Prodrugs, drug specificity, Bioassay methods and natural product based leading compounds, inorganic pharmaceuticals and drug storage and drug deterioration. Drug safety, quality assurance, standardization related herbal drugs, selected topics of drugs. Laboratory course on analysis of drugs preparation of electrolytes, purification methods of drugs and test for purity, drug synthesis and preparation of drug monograph.
Evaluation methods: Mid Semester Theory Examination : 20%, Semester End Theory Examination : 50% , Semester end Practical Assessment : 30%

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

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

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

CHE 4114 :Advanced Inorganic Chemistry-I (60L) Molecular Symmetry and Group Theory(10L), Molecular Orbital Theory(10L), Advanced Coordination Chemistry(10L), Advanced Organometallic Chemistry-I (10L), Advanced Inorganic Reaction Mechanisms (10L), Electronic Spectra of Transition metal Complexes (10L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4123:Reactive Intermediates & Advanced Organic Reaction Mechanisms (45L) Reactive Intermediates (8L), Advanced Organic Reaction Mechanisms (10L), Physical Organic Chemistry(10L),Organic Photochemistry (9L), Pericyclic Reactions (8L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4132 : Quantum Chemistry and Molecular Spectroscopy (30L) Quantum Chemistry (12L), Molecular Spectroscopy (10 L), Photochemistry (08L)
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4142: Laboratory and Quality Management (30L) Chemometry (10 L), Quality Control & Quality Assurance (10L), Laboratory and Quality Management (10L)
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4152: Laboratory Inorganic Chemistry (90 hrs) Semimicro qualitative analysis, Gravimetric analysis, Chromatography, Titrametric analysis.
Evaluation method: Continuous Assessments and /or End Semester Examination

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

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

CHE 4213: Advanced Organic Chemistry I (45L) Structure determination of organic molecules using spectroscopy (20L), Natural Products Chemistry (25L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4223: Topics in Advanced Physical Chemistry (45L) Advanced Thermodynamics (11L), Statistical Thermodynamics (12 L), Advanced Kinetics (12L), Advanced Electrochemistry (10L)
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4233 : Advanced Analytical Chemistry-I(45L) Principles of Instrumentation (10L), Electroanalytical Chemistry (20L), Chromatography (15L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4242 : Advanced Analytical Chemistry II (30L) Solvent Extraction , Distillation (08L), Molecular Absorption and Emission Spectroscopy (07L), FTIR, CD Spectroscopy (08L), Atomic Absorption Spectroscopy (07L) .
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4252 : Environmental Chemistry (30L) Chemical Concepts pertaining to Environmental Processes (02L), Aquatic Chemistry (08L), Atmospheric Chemistry (10L), Soil Chemistry (10L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4262 : Laboratory Organic Chemistry (90hrs) Purification of organic mixtures using different methods (Crystallization and Distillation), Synthesis of Organic compounds, Monitoring of organic synthesis using chromatography. Extraction and Phytochemical analysis of Natural Products. Purification of Natural Products extracts using Chromatography and characterization of Natural products. Structure elucidation of organic molecules using Spectroscopy (UV, IR, Mass and NMR). Drug synthesis and Drug analysis, Extraction Oleoresin and analysis.
Evaluation method: Continuous Assessments 30% and End Semester Examination 70%

CHE 4272: Laboratory Analytical Chemistry (90 hrs) Titrimetric & photometric analysis of synthesized inorganic complexes, Laboratory environmental chemistry, Laboratory in industrial based analysis.
Evaluation method: Continuous Assessments and /or End Semester Examination

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

CHE 4314: Advanced Inorganic chemistry-II (60L) Physical methods in Inorganic Chemistry (IR, NMR, MASS, MOSSBUAR, EPR, Diffraction Techniques) (15L), Bioinorganic Chemistry (10L), Selected Topics in Inorganic Chemistry (17L), Advanced Organometallic Chemistry II (08L), Supramolecular Chemistry (10L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4323 : Advanced Organic Chemistry II(45L) Advanced Stereochemistry (08L), Organic Synthesis (20L), Advanced Heterocyclic Chemistry (08L), Carbohydrate Chemistry (09L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4333: Solid State and Surface Chemistry (45L) Solid State Chemistry(10L), Surface Chemistry (12L), Heterogeneous Catalysis (08L), Intermolecular Forces and Magnetic Properties (08L),Nanochemistry (07L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4342: Advanced Biochemistry (30 L) Peptides, Proteins, Nucleic acids (15L), Metabolisms of Biomolecules (08L), Enzymology, Mechanism of enzyme action (07L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4352:Computational Chemistry (23L + 15P) Comparative Introduction to Classical and Quantum simulation methods, Classical Simulation, Quantum simulations (23L) and relevant Laboratory (15Hr)
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4362: Industrial Chemistry & Technology (30L) Concepts in Chemical Engineering & Industrial Chemistry (12L), Polymer Science and Technology (08L), Industrial Pollution, Waste Treatment (05L), Mineral resources in Sri Lanka Chemistry and Industrial Applications (05L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4371: Laboratory Biochemistry (45hrs) Practical Biochemistry and Practical Food chemistry
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE 4411: Current Topics in Chemistry Self study on the current topic provided by the staff.
Evaluation method: End Semester Written Examination

CHE 4422: Essay & Seminar Essay: Self study of a given essay topic to each student and writing an essay.
Assessment method: Evaluation of Essay report + Essay Presentation and viva-voce
Seminar: Self study and presentation on review articles given by the staff (02 articles in Level-II: 01 article per student per semester)
Assessment method: Evaluation of the presentation and viva-voce

CHE 4436: Research project Research topic is given to each student at the beginning of Special Level-II. Conducting research, Submission of Dissertation and Presentation.
Assessment method: Evaluation of the Dissertation, Presentation and viva voce at the end of semester-II

Special Topics in Chemistry

CHE 4442: Forest Products and Textile Industry (30L) Wood Adhesion and Adhesives (15L), Textile Chemistry (15 L)
Evaluation method: Continuous Assessments and /or End Semester Examination

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

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

CHE 4472 :Biological Chemistry (30L) Biophysical Chemistry (08 L), Reactive species in Biology (07L), Food Chemistry and Technology (08L), Pharmaceutical Chemistry(07L).
Evaluation method: Continuous Assessments and /or End Semester Examination

CHE4482: Selected Topics in Industrial Chemistry (30L) Cleaner Production and Green Chemistry (10L), Cleansing Agents (05L), Rubber Chemistry & Technology (10L), Surface Coatings (05L).
Evaluation method: Continuous Assessments and /or End Semester Examination

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

Implemented since 2019

Subjective to the By-laws of the Faculty of Science, these regulations shall be effective from the commencement of the academic year 2017/2018.
As per the new syllabus, evaluation method of each course unit is as follows:
Continuous assessments: 30%
Final examination : 70%

Continuous assessment: Procedure

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

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

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

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

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

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

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

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

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

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

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

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

7 Department of Computer Science

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

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

7.1 Research Areas

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

7.2 Head of the Department

Dr. J.A. Jeewanie
B.Sc. (Kelaniya, S.L.), M.Sc. (Keele, U.K.), PhD (Tilburg, Netherland)

7.3 Members of Academic Staff

Designation	Name	Specialization
Senior Lecturer	Mr. S. A. S. Lorensuhewa B.Sc. (Colombo, SL) M.Sc. (Zhejiang, China)	Computer Applications, Text Mining Text Classification Data Mining, and Rule Extraction and Knowledge Representation Applications of Machine Learning Techniques
	Dr. W. A. Indika B.Sc. (Kelaniya, S.L.) M.Sc. (Kelaniya, S.L.) PhD (UCSC, S.L)	Knowledge Representation, Ontology, Semantic Web, Ontology Engineering, Mobile Applications
	Dr. Tharaka Ilayperuma B.Sc. (Kelaniya, SL) Ph.L (Sweden) Ph.D. (Sweden)	Business Modelling, Goal Modelling and Service Modelling for the purpose of Information systems development
	Dr. J. A. Jeewanie B.Sc. (Kelaniya, SL) M.Sc. (Keele, UK) Ph.D (Tilburg, Netherland)	Conceptual Modelling, Service-oriented Computing, Value Oriented Service Identification, Model driven Business -IT aligment methods
	Dr. Thusangi Wannige B.Sc.(Colombo, SL) MPhil(Colombo, SL) Ph.D (Lincoln, New Zealand)	Computational Systems Biology, Bioinformatics, Modelling and simulation, computer vision
Lecturer	Ms. M. A. L. Kalyani B.Sc. (Colombo, SL) Ph.L. (Uppsala, Sweden)	Static and dynamic Load Balancing algorithms MPI implementations , Grid Computing
	Ms. C. I. Kithulgoda B.Sc. (Kelaniya, SL) M.Sc. (Moratuwa, SL) (On study leave)	Data stream mining, Discrete optimization
	Ms. T.D. Gilmini Geethika B.Sc.(Hons)(Peradeniya, SL) MSc (UCSC, SL) M.Phil (USJP, SL)	Knowledge engineering ,Business Process Modeling and Business Rule modeling with c healthcare domain
	Ms. W. A. Mohotti B.Sc. IT (Moratuwa, SL) Reading for PhD (On study leave)	Agent Based Systems, Web based applications
	Ms. S. M. Vidanagamachchi B.Sc. (UCSC, S.L.) PhD (Peradeniya, S.L.)	Embedded Systems, Reconfigurable Computing, Machine Learning, Bioinformatics
	Ms. D. W. C. P. Kumari B.Sc. (UCSC, SL) Reading for M.Phil (UCSC, S.L.) (On study leave)	Evolutionary Algorithms, Data Structures & Algorithms.

Designation	Name	Specialization
Probationary Lecturer	Ms. P. N. Hameed B.Sc. (Peradeniya, SL) PhD (Australia)	Bioinformatics, Data mining, Image processing
	Ms. M. K. S. Madushika B.Sc. in Engineering (Peradeniya, SL) PhD (Australia)	Image Processing, Computer Vision Pattern Recognition and Machine Learning
	Mr. Kasun Ranga Wijeweera B. Sc. (Peradeniya, SL) M. Phil. (Peradeniya, SL)	Computational Geometry
	Mr. K. D. C. G. Kapugama BCS (Ruhuna, SL) (on study leave)	Data Mining, Text Mining

7.4 Members of the Academic Support Staff

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

7.5 Course Units in Computer Science for B.Sc. (General) Degree

Level I - Semester I

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

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

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

Level I - Semester II

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

COM122β: File organization & DBMS (30 lecture hrs. & 22.5 practical hrs.) **File Organization:** Introduction to file organization, Storage devices, Record structure and design, Data transferring times, Traditional file organizations (File, Sequential, Indexed, Indexed-sequential and Hashed Files), Accessing the physical files, Need for a database approach and its objectives. **Database Management Systems:** Motivation for database management systems, History of data models, DBMS architecture, ER model concepts, Relational model concepts, ER-to-relational mapping, Functional dependencies and normalization process, Relational algebra, Relational calculus, Data manipulation using SQL, Data views and security, Introduction to data administration and database administration, Introduction to new concepts an database system. Practical using Oracle or MS Access

Level II - Semester I

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

COM213α: Operating Systems (15 lecture hrs. & 22.5 practical hrs.) Introduction, Process Management, CPU Scheduling, Deadlocks, Memory Management, File-System Implementation, I/O Systems. Practical oriented

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

Level II - Semester II

COM221β: Data Communications and Computer Networks (30 lecture hrs. & 22.5 practical hrs.) Introduction, Data Communication, Reference Model, Local Area Network, Wide Area Network with Internetworking, Binding Protocol Address, Routing, Digital telephony, Domain Name Service, IP Telephony , Dynamic Host Configuration Protocol, Introduction to Network Security, Wireless Communication, Future of Network

COM222β: Multimedia Technologies (30 lecture hrs. & 22.5 practical hrs.) Introduction to Multimedia and Hypermedia Technology, Multimedia Basics, What is Digital Media, Multimedia Hardware and Software, Multimedia Data types (Building Blocks) and

File types, Animations Basics, Audio and Video Basics, Multimedia Compression Techniques and Standards, Multimedia Authoring Environments, Multimedia System Design Overview, Multimedia on the Internet, Multimedia Communication Systems, Multimedia Operating Systems, Multimedia Storage, Multimedia Databases and Retrieval, Issues of Multimedia and Future Development.

Level III - Semester I

COM311β: Internet Programming and Web Technologies (30 lecture hrs. & 22.5 practical hrs.) Introduction to the Internet, Web servers, Web designing and designing issues, Delivering Multimedia over web pages, Client Side Programming, Client-server side Programming, Server Side Programming, Databases and the web, Extensible markup Language, Web Security.

COM312β: System and Network Administration (30 lecture hrs. & 22.5 practical hrs.) Overview of Linux System, Linux shell commands and environment, Basic Unix shell programming, Disks and Other storage media, Overview of the directory tree, Booting and shutting down, Rootly power, Essential tasks of the system administrator, User Account Management, File Protection, Managing Packages, X windows system, Backup and Restore, Performance Analysis, Setting up printer server, Monitoring and Managing Networks, Setting up File Servers, Electronic Mail system

COM3b3β: Computer Project (15 lecture hrs. & 60 practical hrs.) Students are assigned one large project or number of smaller projects to work on. These software projects are evaluated at a presentation and by a project report

COM3b52: PC Hardware and Networking (15 lecture hrs. & 45 practical hrs.) *Op for students who have passed the ICT2b13 (CCIT) examination;* PC Hardware architecture, Clocked digital logic, Motherboards, CPUs, Memory Technologies, Disk Storage, Expansion Cards, Resolutions and system requirements, Monitor size, dot pitch and refresh rates, Maintenance/Cleaning/ Repairing Hardware Tools, Preventive Maintenance & Computer Safety, Cleaning A PC externally and internally, Assemble PC system, Diagnosing & Troubleshooting, Introduction to Computer Network, Components of Computer Network, Network Connectivity Devices, Network topologies, LAN, MAN, WAN, Intranets, Extranets, Setting Up a Computer Network System and Network Administrator, Internetworking

Level III - Semester II

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

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

COM323α: Visual Programming (15 lecture hrs. & 22.5 practical hrs.) *Op for all students* Introduction: Application development environments, command line environments, Graphical user environments. Integrated Development tools, Visual tools, Object Based / Object oriented / Event-driven programming and programming in the Windows environment at design time, run time and break time, User Interfaces: SDI, MDI Applications, Introduction to DLL s, Active X and other technologies, predefined object methods & functions, Menus and toolbars, Common Dialog Controls etc., Data Types, Programming control Structures, data structures and sub programs: Debugging, Error and exception handling, Database programming, Building Web applications:

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

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

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

Based on their performance of the ICT1b13 course unit, a limited number of students are selected to follow an advanced course in Information Technology (ICT2b13/CCIT). The students who pass ICT2b13 are allowed to follow PC-Hardware and Networking (COM3b52), see details at the above section for course unit description. The students who pass ICT1b13 and ICT2b13 course units are awarded certificates by the department.

ICT1b13: Computer Literacy Course (CLC) (30 Lecture hours & 60 practical hours) Basic concepts of software and hardware, Windows operating system, Computer Programming: Programming using C, Word Processing, Spreadsheet Applications, Database management, Presentaion Applications.
Note: According to the examination criteria stated in this handbook, students who do not follow computer science as one of the subjects for their degree programme must pass the examinations of Computer Literacy Course (ICT1b13) in order to release the final results of the B.Sc. Degree.

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

7.7 Bachelor of Computer Science (General) Degree

The Bachelor of Computer Science (BCS) degree program is an outcome of an enormous effort of the staff of the Department of Computer Science. One of the prime objectives of this degree programme is to prepare the undergraduates for a career in Computer Science

and Information Technology, which is one of the major driving forces of the economic development of Sri Lanka. Students admitted to the program will pursue a full-scale Computer Science programme of three years leading to the degree of Bachelor of Computer Science (General). Based on the performance, a limited number of students will be selected to study an extra year leading to the degree of Bachelor of Computer Science (Special). One of the prime objectives of the special degree is to offer in-depth knowledge in selected areas of computer science for those who wish to pursue an academic and/or research careers.

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

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

Level I - Semester I

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

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

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.

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

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

AMT112β: Mathematical Foundation of CS (30 lecture hrs & 15 tutorial hrs) (core) - refer Course unit details under Department of Mathematics

MAT112δ Differential Equations (15 lecture hrs & 7 tutorial hrs) (core) - refer Course unit details under Department of Mathematics

MAT113δ: Introductory Statistics (15 lecture hrs & 8 tutorial hrs) (core) - refer Course unit details under Department of Mathematics

Level I - Semester II

CSC1213: Database Management Systems (30 lecture hrs. & 45 practical hrs.) (core) Introduction to DBMS, Managing databases using SQL, The Entity-Relationship Model, Data Manipulation using Relational Algebra & Relational calculus, Database Design Process, Data Views and Security, Data Normalization, File Organization : Storage Architecture, Indexing, Hashing, Transaction Processing, Introduction to Distributed Databases & Data Mining.

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

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

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

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

MAT121β: Algebra (30lecture hrs & 15 tutorial hrs) (core) - refer Course unit details under Department of Mathematics

MAT122β: Calculus (30lecture hrs & 15 tutorial hrs) (core) - refer Course unit details under Department of Mathematics

Level II - Semester I

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

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

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

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

AMT212β: Computational Mathematics (30 lecture hrs & 15 tutorial hrs) (core) - refer Course unit details under Department of Mathematics

MAT211β: Linear Algebra I (30 lecture hrs & 15 tutorial hrs) (core) (core) - refer Course unit details under Department of Mathematics

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

Level II - Semester II

CSC2213: Rapid Application Development (30 lecture hrs. & 45 practical hrs.) (core) Introduction to Rapid Application Development (RAD), Core issues in RAD, Es-

timation, Scheduling Teamwork, Best practices in RAD, Introduction to Software Design with Patterns, Gang of four Catalog Creational Design Patterns, Structural Design Patterns, Behavioral Design Patterns, Content Management Systems (CMS)

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

CSC2242: Advanced Database Management (30 lecture hrs.) (core) File Structures, Index, Query Processing and Optimization, Batch Processing, Physical Database Design and Tuning, Data Security Transaction Management, Object Databases, Object-Relational Mapping, XML Databases, Emerging Technologies

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

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

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

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

MAT225β: Mathematical Statistics I (core)

- refer course unit details under Department of Mathematics

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

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

Level III - Semester I

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

CSC3122: e-Commerce and Professional Practice (30 lecture hrs.) (Optional) Introduction to E-Commerce and E-Business. E-Commerce Business Models. Business Strategies. Business and IT Alignment. Value-Oriented E-Business Modeling. Building e-Commerce Systems. Ethical Issues.

CSC3132: Data Warehousing and Data mining (30 lecture hrs.) (Optional) Concept of data mining, classification, clustering, concept of data warehousing with special emphasis on architecture and design.

CSC3133: Network and System Administration (30 lecture hrs. & 45 practical hrs.) (Optional) Overview of Linux System, Linux shell commands and environment, Basic Unix shell programming, Disks and Other storage media, Overview of the directory tree, Booting and shutting down, Rootly power, Essential tasks of the system administrator, User Account Management, File Protection, Managing Packages, X windows system, Backup and Restore, Performance Analysis, Setting up printer server, Monitoring and Managing Networks, Setting up File Servers, Electronic Mail system.

CSC3142: Internet Services and Protocols (15 lecture hrs. & 45 practical hrs.) (Optional) Introduction, the Internet, Internet protocols and Application services, Transport Protocols (TCP, UDP), Client Server computing, Packet and Protocol level Analysis, Email Service, SMTP, POP3, IMAP protocols, Email server and User Agent Configuration, World Wide Web, HTTP protocol and Web Server Configuration, Web caching, Proxy Servers and Cookies, Load Balancing and Proxy Server Configuration, Telnet, SSH and File Transfer Protocol, FTP server configuration, Voice over IP communication VOIP server configuration, Domain Name Service, DNS configuration, Server Performance and Tuning

CSC3152: Geographic Information Systems (15 lecture hrs. & 45 practical hrs.) (Optional) Introduction to GIS, GIS Data, Data Quality Issues, Basic GIS Operations, Spatial Modeling and Analysis, GIS Modeling, GIS Organization and Management, GIS Applications

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

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

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

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

MAT313β: Mathematical Statistics II (30lecture hrs & 15 tutorial hrs) (Optional) refer course unit details under Department of Mathematics

Level III - Semester II

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

7.8 Bachelor of Computer Science (Special) Degree

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

7.8.1 Criteria for Selection to the BCS (Special) Degree Programme

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

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

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

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

7.8.2 Course Units of BCS (Special) Degree Programme

Semester I

Code	Name of Course Unit	No of Credits	Core/optional
CSC 4112	Research Seminar	2	Core
CSC 4122	Research Methodology	2	Core
CSC 4133	Neural networks	3	Core
CSC 4046	Individual Research project	6	Core
CSC 4152	Enterprise Modeling	2	Core
CSC 4162	Data mining for Business Intelligence	2	Core
CSC 4172	High Performance Computing	2	Core
Total Credits for Semester I		19	

Semester II

Code	Name of Course Unit	No of Credits	Core/optional
CSC 4212	Compiler Construction	2	Core
CSC 4222	Service Oriented Computing	2	Core
CSC 4232	Formal Methods and Software Verification	2	Optional
CSC 4242	Articial Intelligence	2	Core
CSC 4252	Bioinformatics	2	Optional
CSC 4262	Selected Topics	2	Optional
Total Credits for Semester II		12	

Bachelor of Computer Science (Special) Degree - Semester I

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

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

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

CSC 4133: Neural Networks (30 Lecture hours) Introduction to Artificial Neural Networks, Multi-Layer Perceptrons, Back-Propagation Algorithm, ANNs using Tools, Pre-Processing Techniques, Feature Extraction & Selection algorithms, 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.

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

CSC 4162 - Data Mining for Business Intelligence (30 lecture hours) Introduction, Introduction to data mining, Intro- duction and overview to the Business Intelligence, the need of business intelligence, Business intelligence solutions, Data, Quality of data, Supervised learning and unsupervised learning

CSC 4046: Individual Research project This course provides an opportunity for the students to work as an individual to produce a system. The students will carry out an individual project and submit a dissertation. The students will also make a presentation of the project and face for a viva.

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

Bachelor of Computer Science (Special) Degree - Semester II

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

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

CSC 4242: Artificial Intelligence (30 Lecture hours) Introduction to AI Techniques, State and State Space, Heuristic Search Techniques, Resolution and Theorem Proving, Semantic Net and Partitioned Semantic Nets, Conceptual Dependency Diagram and Scripts, Minimax Theorem and Alpha-Beta Pruning, Natural Lan- guage Processing.

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

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

CSC 4252: Bioinformatics (30 Lecture hours) Introduction to Bio-informatics, Archives and Information Retrieval, Pairwise sequence Alignments: Dot Plots, Simple Alignments. The Needleman and Wunsch Algorithm, BLAST algorithm, FASTA algorithm, Multiple sequence alignments : Introduction to multiple sequence alignments, Greedy approach, Star alignment approach and ClustalW algorithm, Hidden Markov models, Phylogenetic Trees: Introducing distance measures and distance based phylogenetic tree building algorithms UPGMA, NJ, Introducing character based measures and character based phylogenetic tree building algorithms: maximum parsimony and maximum likelihood. Protein and RNA Structure Prediction: Secondary Structure, Tertiary and Quaternary Structure, Tools for Modeling Protein Folding, Introduction to drug discovery and ligand docking algorithms, micro array data analysis

7.9 Examinations - BCS Degree Programmes

Bachelor of Computer Science (General) Degree

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

The duration of the special 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 (Special) Degree courses.

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

7.9.1 Attendance

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

7.9.2 Examination Criteria

Evaluation Methods

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

Grading System

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

Pass in a Course Unit

- A candidate who obtains grade C or better for a Course Unit will be considered to have passed in that Course Unit.
- If a student fails to complete a Course Unit, grade of E will be given unless an acceptable reason is produced. In the event of given reason is accepted by the Senate on the recommendation of the Faculty Board, he/she will be considered as sitting for the first time in a subsequent attempt for that course unit.
- A student who obtains a C- or lower grade in a particular Course Unit, may re-sit the examination in respect of that Course Unit for the purpose of improving its grade within the stipulated period. The highest grade a student can obtain is C, which is in this instance equivalent to GPA 2.0. In the event a student obtains a lower grade, he/she will be entitled to the previous grade. Repeat candidates are not entitled to attend the lectures/practical classes of the Course Unit in which he/she has failed.

Verification of Marks

See section 14.2.3 for details.

7.9.3 Bachelor of Computer Science (General) Degree Requirements

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

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

(a) 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 Honours

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

(1) **First Class:**
First Class Honours will be awarded if he/she obtains

(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.

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

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

(a) A minimum of 120 credits with at least 30 credits from the fourth academic year of Bachelor of Computer Science (Special) degree course units,

(b) An overall minimum Grade Point Average (GPA) of 2.5 for all course units followed throughout the four academic years of the degree programme and

(c) A grade not inferior to C for the fourth year Individual Research Project.

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

Award of Honours

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

(i) First Class Honours

  (a) A minimum GPA of 3.70 for Special Degree Course Units,

  (b) A minimum GPA of 3.70 for all course units, and

  (c) Grades of A or better for Special Degree Course Units aggregating to a minimum of 15 credits

(ii) Second Class (Upper Division)

  (a) A minimum GPA of 3.30 for Special Degree Course Units,

  (b) A minimum GPA of 3.30 for all course units, and

  (c) Grades of A- or better for Special Degree Course Units aggregating to a minimum of 12 credits

(iii) Second Class (Lower Division)

  (a) A minimum GPA of 3.00 for Special Degree Course Units, and

  (b) A minimum GPA of 3.00 for all course units

7.9.5 Option of reverting to BCS General Degree

A student reading for a Bachelor of Computer Science (Special) Degree may request for the award of the Bachelor of Computer Science (General) Degree foregoing the special Degree. This request should be made within 14 days after the release of the final results of the Special Degree programme.
The student shall satisfy the following conditions:

(a) The results of the Bachelor of Computer Science (General) Degree shall be determined solely on the basis of course units he/she has followed in the first three academic years.

(b) A student shall be deemed to have passed the Bachelor of Computer Science (General) Degree Examination if he/she has satisfied the requirements of the section 8 of the Bachelor of Computer Science (General) Degree By-Law.

(c) student shall be eligible for an award of Honours for the Bachelor of Computer Science (General) Degree if he/she has completed the requirements within 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.

7.10 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

The main objectives of the department are

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

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

8.1 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

8.2 Head of the Department

Dr. W.A.R. De Mel, B.Sc. (Kelaniya, SL), M.Phil. (Ruhuna, SL), M.S. (SHSU, USA), M.S. (MST, USA), Ph.D. (MST, USA)

8.3 Members of the Academic Staff

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

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

8.4 Course Units offered for B.Sc. (General) Degree

Mathematics

Level I - Semester I

MAT111β: Vector Analysis (30 lecture hrs + 15 tutorial hrs) *-(Credit value 2.5)*
Vector Algebra: Definition of a Vector, Addition and Subtraction, Components, Physical examples.
Vector Products: Scalar and Vector products including a brief introduction to determinants, triple products, Geometrical applications. Differentiation and Integration of a Vector functions.
Vector Analysis: Scalar and Vector fields, grad, div, curl, Manipulation with combina-

tions 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 assessment: end of semester examination

MAT112δ: Differential Equations (15 lecture hrs + 7 tutorial hrs) *-(Credit Value 1.25)*
Introduction, Equations of first order and first degree, Orthogonal trajectories, Clairant's form, Linear equations, Theory of operators, Euler's form, Simultaneous equations.
Method of assessment: end of semester examination

MAT113δ: Introductory Statistics (15 lecture hrs + 8 tutorial hrs) *-(Credit Value 1.25)*
Definition of Probability, Conditional Probability and the Independence of events, , The Law of Total Probability and Bayes' Rule, Definition of random variables, Cumulative distribution function, Density functions for discrete random variables and continuous random variables, Expectations, Mean, Variance, standard deviation, Expected value of a function of a random variable, Moments, Central Moments, Moment Generating function, Bernoulli and Binomial Distributions, Hypergeometric Distribution, Poisson Distribution, Geometric Distribution, Uniform Distribution, Normal Distribution, Exponential and Gamma Distribution, Approximation: Binomial and Poisson by Normal.
Method of assessment: end of semester examination

MAT1142: Mathematics for Biology (30 lecture hrs) Only for students following Biological Science Stream *-(Credit Value 2 - Not counted for the Degree)*
Basic Algebra (including Complex Numbers), Logarithms, Trigonometric functions, Limits, The principle of Differentiation, Differentiation of a Product, Quotient and a function of a function, Maxima and Minima, Partial Differentiation, Total Differentiation, Homogeneous Functions and Eulers Theorem on Homogeneous functions, Integration as the converse of Differentiation, Integration by parts, Exact Differential equations, Definite Integral, Vectors, Determinants, Matrices, Introduction to Group Theory, Statistics for Chemistry(permutations, Configurations and Microstates, Molecular Assemblies, The importance of , W=W!/na! nb! ,The Boltzman Distribution.)
Method of assessment: end of semester examination

Level I - Semester II

MAT121β : Algebra (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*
Elementary set theory, Relations, mappings and functions, theory of polynomial equations in one variable including the statement of the fundamental theory, Newton's relations between roots, solution of cubic and biquadratic equations, determinants, solution of equations using determinants nth roots of unity, factors of $x^n - a^n$, $x^n + a^n$, $x^{2n} - 2x^n a^n \cos(nx) + a^{2n}$, elementary group theory, rings and fields, complex theory approach through fields.
Method of assessment: end of semester examination

MAT122β: Calculus (Real Analysis) (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*

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

Level II - Semester I

MAT211β: Linear Algebra (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*
Vector Spaces and Subspaces, Linear Transformations, Dual Spaces, Matrices, Operations on Matrices, Rank, Elementary Transformations, Elementary Matrices, Normal Forms, Solving Systems of Linear Equations, eigenvalues, eigenvectors, Characteristic Polynomial, Cayley-Hamilton Theorem and Applications, Minimum Polynomial.
Method of assessment: end of semester examination

MAT212β: Real Analysis-I (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*
Theory of series: Lower limits upper limits of sequences, Series, Test for convergence and divergence, Absolute convergence, Rearrangements, Cauchy products, Power series and radius of convergence.
Riemann Integration: Upper and Lower sums, Upper and Lower Integral, The Riemann Integral, Properties of Riemann integrals, fundamental Theory of calculus, Improper Integrals, Integration by parts.
Method of assessment: end of semester examination

Level II - Semester II

MAT221β: Number Theory (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*
Integers: Prime and irreducible, division algorithm, Euclid's algorithm, Fundamental Theorem of Arithmetic, Integers mod n, Chinese Remainder Theorem, Euler's function
Prime integers: Sieve of Eratosthenes, perfect numbers, Mersenne numbers, Fermat numbers, infinite number of primes, the prime number theorem. Gaussian integers **Modular calculations:** Fermat's Little Theorem, Wilson's theorem. Sums of squares, Fermat's Last Theorem, Sums of 4 squares.
Primitive elements: Roots of unity, factors of Fermat primes, roots of polynomial equations, the number of n^{th} roots of unity, the Primitive Element theorem.
Integer polynomials: Hensel's Lemma, primitive elements *mod n*. Special Topics in Number Theory.
Method of assessment: end of semester examination

MAT222δ: Real Analysis-II (15 lecture hrs + 7 tutorial hrs) *-(Credit Value 1.25)*
Sequences and series of functions, Point-wise convergence of sequence of functions, Uniform convergence of sequence of functions, Convergence and Uniform convergence of series of functions, Integration and differentiation of series of functions.
Method of assessment: end of semester examination

MAT224δ: Geometry (15 lecture hrs + 8 tutorial hrs) *-(Credit Value 1.25)*
Plane: Various forms of the equation of a plane. Straight Line, Various forms of the equation of a line.
Sphere: Various forms of the equation of a sphere, Tangent line to a sphere, Tangent plane to a sphere, Condition of Tangency, Intersection of two spheres.
The Central Conicoids: Ellipsoid, Hyperboloid of one sheet, Hyperboloid of two sheets, Intersection of a conicoid and a line, Tangent Line to a conicoid, Tangent Plane to a conicoid,

Normal to a conicoid, Number of Normals from a given point.
Method of assessment: end of semester examination

MAT225β : Mathematical Statistics-I (30 lecture hrs + 15 tutorial hrs) - *Prerequisite MAT113δ (Credit Value 2.5)*
Joint Density Functions, Joint Cumulative Distribution Function, Conditional Distribution Function, Independence, Covariance and correlation coefficient, Conditional Expectations, Joint Moment Generating Function and Moments, Independence and Expectation, Bivariate Normal Distribution, Expectations of Functions of Random Variables.
Distribution of Function of Random variables: Cumulative Distribution Function Technique, Moment Generating Function Technique, Transformation Technique. Population and Samples, Random Sample, Statistic, and Sample Moments, Sample Mean, Law of Large Numbers, Central limit Theorem.
Sampling from the normal distribution: Sample mean, chi-square distribution, F distribution, Student t Distribution.
Method of assessment: end of semester examination

Level III - Semester I

MAT311β: Group Theory (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*
Groups and subgroups: Groups, subgroups/normal subgroups, quotient groups, cyclic groups, Cayley diagrams.
Permutations, cosets and direct products: groups of permutation, orbits, cycles and alternating groups, cosets and the theorem of Lagrange, direct product, finite groups.
Homomorphism and factor groups: Homomorphism factor group, factor group computation and simple groups.
Method of assessment: end of semester examination

MAT312β: Real Analysis-III (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*
Non Linear Analysis: Functions from $\mathbb{R}^n$ to $\mathbb{R}^m$, Open balls and Open 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 assessment: end of semester examination

MAT313β: Mathematical Statistics-II (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5) Op. 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 assessment: end of semester examination

Level III - Semester II

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

Industrial Mathematics

Level I - Semester I

IMT111β: Classical Mechanics-I (Dynamics) (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)* Frame of reference, Inertial frames, Forces, Velocity, Acceleration, Linear momentum, Angular velocity, Angular acceleration, Angular momentum, motion of a particle (Newton laws), motion of a system particles, Rotating coordinate systems, moments and products of inertia. Parallel axes theorem, perpendicular axes theorem for moments and products of inertia. Principle axes and principle moments of inertia of a system of particles, Rotating coordinate systems, Infinitesimal rotation, Euler equations, Generalized coordinates, Lagrange's formulations, Hamiltonian functions, Theory of small oscillation, Impulsive motion.
Method of assessment: end of semester examination

IMT1b2β: Mathematical Computing (15 lecture hrs + 60 practical hrs) *-(Credit Value 2.5)*
Introduction to computer systems and its historical development, contribution from mathematicians (e.g. 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: UNIX commands, directory structure, text editors, user accounts and file permissions, text editors, virtual terminals in text mode. programming with C on Unix 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 X-Windows system. Method of assessment: Practical examination/assignments/project report and end of semester oral examinatin and/orpresentation.

Level I - Semester II

IMT121β: Classical Mechanics-II (Statics) (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*
Theory of Forces and Couples: Force acting at a point, Resultant of a system of Forces acting at a point, Condition for equilibrium of a system of Forces acting at a point, Vector moment of a Force, Couple, Moment of a Couple, Resultant of a system of Forces in 3D, Invariants, Wrench, Coplanar Systems of Forces, Varignon's Theorem of Moments, Parallel Systems, Conjugate forces.
Bending of Beams: Shear and Bending moment in a beam, Relations among Load, Shear and Bending Moment, Thin Elastic Beams, Bernoulli-Euler Law, Macaulay's Notation, Clapeyron's equation for three moments.

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

IMT122β : Mathematical Modelling-I (30 lecture hrs + 15 tutorial hrs) - *Prerequisite MAT112δ (Credit Value 2.5)*
Introduction: General Introduction to Modelling, concepts of system identification, Deterministic vs Stochastic, classification of models.
Modelling via First Order Differential Equations: Modelling Through First Order and Simple Higher Order Differential Equations, Linear Differential Equations (LDEs), systems of Ordinary Differential Equations (ODEs).
Analysis of Solutions: Existence and uniqueness of solutions, continuation of solutions, dependence on initial conditions and parameters, linear systems of equations with constant and variable coefficients, autonomous systems, phase space, and stability, Interpretation of solutions in modelling.
Applications: Population ecology, chemical kinetics, traffic dynamics, Mechanics, Biology and Medicine, Pharmokinetics, Economics, Engineering, Special topics in modelling.
Method of assessment: end of semester examination

Level II - Semester I

IMT211β: Classical Mechanics-III (Fluid Dynamics) (30 lecture hrs + 15 tutorial hrs) *-(Credit Value 2.5)*
Equations of stream lines, Equations of vortex lines, Differentiation following the motion of a fluid. Equations of continuity, Euler's and Bernoulli's equations, Irrotational motion, uniqueness theorem, Kinetic energy, Sources and sinks, Images, Potential flow, Complex potential.
Method of assessment: end of semester examination

IMT2b2β : Mathematical Computing (15 lecture hrs + 60 practical hrs) *-(Credit Value 2.5)*
Introduction to the computer package Mathematica, how to type mathematics, special characters, basic constructions, Numerical computations, Standard functions, Accuracy, The use of variables, Working with whole numbers, Finding prime numbers, Handling algebraic expressions and doing symbolic computations, Graphics in Mathematica, Calculus in Mathematica, Solving equations, Introduction to programming (procedural vs functional) using various numerical and algebraic methods to solve equations and sets of equations, Defining new functions, Writing new commands which perform more complicated tasks. Method of assessment: Practical examination/assignments/project report and end of semester oral examination and/oral presentation.

Level II - Semester II

IMT221β:Mathematical Modelling-II (30 lecture hrs + 15 tutorial hrs) *-Prerequisite IMT122β (Credit Value 2.5)*
Introductory Numerical Solutions of Differential Equations, Mathematical Modelling through Difference Equations, Further Study on Systems of Differential Equations with Matrices. Modelling with Partial Differential Equations (PDEs): The concept of a PDE, Method of separation of variables, Mass-Balance equation (The first method of obtaining PDE Models),

Momentum-Balance Equation (The second method of obtaining PDE Models), Variational Principles (The third method of obtaining PDE Models), Probability Generating functions (The fourth method of obtaining PDE Models), Nature of PDEs Initial and Boundary Conditions.
Method of assessment: end of semester examination

IMT223β: Applied Probability(Information Theory)(30 lecture hrs + 15 tutorial hrs) *-Op. for students following Industrial Mathematics (Credit Value 2.5)*
Event Spaces, probability measure, probability space, sample space, continuity of a probability measure, Defining random variables on probability spaces and their functions, partition theorem, conditional probabilities, Distribution Functions, The law of large numbers, Introduction to Information theory and Claude Shannon's remarkable work on mathematical formulation of the central problem in telecommunication channels, Error correcting codes for binary symmetric channel and their performances, Shannon's noisy channel coding theorem, probability and entropy, entropy and mutual information, convex functions and Jensen's inequality, the data processing theorem, Discrete memoryless channels and their capacity-cost functions, measuring the information content of an ensemble, the Source-Channel Coding Theorem for the Binary Symmetric Channel.
Method of assessment: end of semester examination

IMT224β: Applied Statistics-I (30 lecture hrs + 15 tutorial hrs) *-Op. for students following Industrial Mathematics (Credit Value 2.5)*
Collecting and Summarizing data: Constructing tables and graphs, Measures of center of a set of observations, Median, Arithmetic Mean, Mode.
Samples and Populations: Methods of choosing a sample, Measures of variability: Range, Mean deviation, Variance and Standard deviation, Semi-interquartile range, five number summaries, Box and Whisker plots, stem and leaf plots.
Joint distributions of data: The Scatter diagram, the concept of a statistical relation, Quantitative description of a statistical relation, Covariance, Correlation coefficient
Linear regression: Regression equation, Prediction and error, Interpreting regression.
Statistical Applications with probability models: Bernoulli, Binomial, Poisson, Normal approximations, Statistical software packages.
Method of assessment: end of semester examination

Level III - Semester I

IMT3b1β : Industrial Mathematics Project (90 project hrs) *-(Credit Value 2.5)*
This includes a real world problem solving task, using mathematical (modelling) techniques and computational tools that the student has learnt in Level-I, II and III.
Method of assessment: Practical examination/assignments/project report and the end of semester oral examination and/or presentation.

IMT312β : Mathematical Modelling-III (30 lecture hrs + 15 tutorial hrs) *-Op. for students following Industrial Mathematics (Credit Value 2.5)*
Solution of Linear Differential Equations by Laplace Transforms, Mathematical Modelling through Graphs, Mathematical Modelling Through Calculus of Variations and Dynamic Programming or Special Topics and/or Project, Stochastic Modelling, A survey on Ancient Sri Lankan Science and Technological Methods, Topics in Mathematical Modelling of Life-Environmental relationships.
Method of assessment: end of semester examination

IMT313β : Applied Statistics-II (30 lecture hrs + 15 tutorial hrs) *-Op. for students following Industrial Mathematics, Prerequisite IMT224β (Credit Value 2.5)*
Testing hypotheses about many population means: Introduction to analysis of variance, Linear model for analysis of variance, variability as sum of squares, Test statistics and rejection rules.
The population regression: Formulating hypotheses about regression, Analysis of Variance for regression
Nonparametric tests: Chi-square test,Contingency tables (test for independence), Kolmogorov-Smirnov test,The sign test, The Rank test (Mann-Whitney U-test), Runs test (one sample runs test, two sample runs test), Kruskal-Walis, H-test
Method of assessment: end of semester examination

Level III - Semester II

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

Applied Mathematics

Level I - Semester I

AMT111β : Classical Mechanics-I (Dynamics) (30 lecture hrs + 15 tutorial hrs) *(Credit Value 2.5)*
Refer IMT111β under Industrial Mathematics for details.

AMT112β: Mathematical Foundation of Computer Science (30 lecture hrs + 15 tutorial hrs) *(Credit Value 2.5)*
Logic Syllogisms, propositional logic, propositions, arguments, predicates and quantifiers, logic programming.
Number Systems: Number Systems (decimal, Roman etc.), Binary number system, Octal system, Binary arithmetic (including complements methods)
Boolean Algebra and Logic circuits: Boolean Algebra, Switching circuits, logic circuits.
Method of assessment: end of semester examination

Level I - Semester II

AMT121β: Classical Mechanics-II (Statics) (30 lecture hrs + 15 tutorial hrs) *(Credit Value 2.5)*
Refer IMT121β under Industrial Mathematics for details.

AMT122β: Mathematical Modelling-I (30 lecture hrs + 15 tutorial hrs) *(Credit Value 2.5)*
Refer IMT122β under Industrial Mathematics for details.

Level II - Semester I

AMT211β : Classical Mechanics-III (Fluid Dynamics) (30 lecture hrs + 15 tutorial hrs) *(Credit Value 2.5)*
Refer IMT211β under Industrial Mathematics for details.

AMT212β: Computational Mathematics (30 lecture hrs + 15 tutorial hrs) *(Credit Value 2.5)*
Numerical computing and computers: Introduction, Using a computer to do numerical analysis, Computer arithmetic and errors.
Solving Non Linear equations: Bisection Method, Newton's Method, Fixed point Iteration $x = g(x)$ Method, Secant Method, Regular-Falsi Method.
Interpolation and Curve Fitting: Interpolation, Lagrange polynomials, Divided Differences, Interpolating with a Cubic Spline, Least Square Approximation.
Numerical Differentiation and numerical Integration: Getting derivatives and integrals numerically, Trapezoidal rule (composite formula), Simpson's rules, Applications of cubic splines.
Method of assessment: end of semester examination

Level II - Semester II

AMT221β: Mathematical Modelling-II (30 lecture hrs + 15 tutorial hrs) *(Credit Value 2.5)*
Refer IMT221β under Industrial Mathematics for details.

AMT223β: Applied Probability (Information Theory) (30 lecture hrs + 15 tutorial hrs) *Op. for students following Applied Mathematics(Credit Value 2.5)*
Refer IMT223β under Industrial Mathematics for details.

AMT224β: Applied Statistics-I (30 lecture hrs + 15 tutorial hrs) *Op. for students following Applied Mathematics (Credit Value 2.5)*
Refer IMT226β under Industrial Mathematics for details.

Level III - Semester I

AMT311β: Numerical Analysis (30 lecture hrs + 15 tutorial hrs); *(Credit Value 2.5) Op. 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, S. O. R Method, etc.
Numerical solution of Ordinary differential equations: Euler and Modified Euler methods, Runge - Kutta method, Convergence criteria, Errors and error propagation.
Numerical solution of partial differential equations: Parabolic type, Elliptic type, Hyperbolic type.
Method of assessment: end of semester examination

AMT312β: Mathematical Modelling III (30 lecture hrs + 15 tutorial hrs); *(Credit Value 2.5) Op. for students following Applied Mathematics, and not allowed with AMT311β*
Refer IMT312β under Industrial Mathematics for details.

AMT313β: Mathematical Methods in Physics and Engineering-I (30 lecture hrs + 15 tutorial hrs); *(Credit Value 2.5) Op. 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 assessment: end of semester examination

AMT314β: Applied Statistics-II (30 lecture hrs + 15 tutorial hrs); *(Credit Value 2.5) Op. for students following Applied Mathematics, Prerequisite IMT224β*
Refer IMT313β under Industrial Mathematics for details.

Level III - Semester II

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

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 Op. (Credit Value 2.5)*
Metric spaces: Definition and examples, Open set, Closed set, neighbourhood, Convergence, Cauchy Sequence, Complete Linear, Completion of metric spaces, Banach's fixed point theorem.
Normed spaces: Linear space, Normed space, Banach space, Finite dimensional normed spaces and sub spaces, Compactness and finite dimensions, Linear operators, Bounded and Continuous linear operators, Linear operators and functional, on finite dimensional spaces, Normed spaces of operators, Dual space, Inner product space, Hilbert spaces.
Fundamental Theorems for Normed and Banach spaces: Zorn's Lemma, Hann-Banach Theorems, Reflexive spaces, Strong and weak convergence, Numerical integration and weak convergence.
Method of assessment: end of semester examination

MAT322β: Complex Variables (30 lecture hrs + 15 tutorial hrs), *Op. (Credit Value 2.5)*
Theory of Complex Variables: Complex Functions, Complex differentiability, the Cauchy-Riemann equations, Analytic functions, Cauchy's Theorem, Cauchy's Integral Formula, Taylor's and Laurent's Theorem, Classification of singularities, Laurent expansions, Contour Integration, The cauchy's residue Theorem, Integration of rational and trigonometric functions using residue theorem
Method of assessment: end of semester examination

MAT323β: Differential Geometry and Tensor Analysis (30 lecture hrs + 15 tutorial hrs), *Op. (Credit Value 2.5)*
Differential Geometry: Unit tangent vector, principal normal, binomial vector and curvature of a curve, surfaces, parametric curves, surfaces of revolution, metric, directional ratios and coefficients, Gauss and mean curvature, orthogonal trajectories, families of dual curves, Geodesics.
Tensor Analysis: Transformation of coordinates, summation convention, the Kronecker-delta, contravariant and covariant vectors, contravariant, covariant and mixed tensors, symmetric and skew-symmetric tensors, tensor algebra, metric tensor, conjugate metric tensor, Christoffel's symbols of first and second kind, covariant derivatives.
Method of assessment: end of semester examination

MAT324β: Mathematical Models in Ecology (30 lecture hrs + 15 tutorial hrs), *Op. (Credit Value 2.5)*
Basic description of mathematical modelling, Introduction of models in Ecology, Analysis

of Dynamical systems. Non linear Dynamical systems, Web analysis, population Dynamics. Logistic model, Graphical and Analytical Approaches to Harvesting, Economics of Harvesting. Breeding Season and age structure, Predator-prey system with age structure, Analysis based on competition with aid of logistic equation, Stability and Complexity, The statistical mechanics of population .
Method of assessment: end of semester examination

MAT325β: Introductory Econometrics (30 lecture hrs + 15 tutorial hrs), *(Credit Value 2.5) Op. 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 multivariable 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 assessment: end of semester examination

MAT326β: Mathematical Foundation of Computer Science (30 lecture hrs + 15 tutorial hrs), *(Credit Value 2.5); Op. for Students who do not follow Applied Mathematics or Computer Science*
Logic: Syllogisms, propositional logic, propositions, arguments, predicates and quantifiers, logic programming.
Number Systems: Number Systems (decimal, Roman etc.), Binary number system, Octal system, Binary arithmetic (including complements methods)
Boolean Algebra and Logic circuits: Boolean Algebra, Switching circuits, logic circuits.
Method of assessment: end of semester examination

MAT327β:Introduction to Financial Mathematics (30 lecture hrs + 15 tutorial hrs) *(Credit Value 2.5)*

Introduction: Time Value of Money, Compound Interest, Simple Interest, Present Value, Future Value, Accumulation Function, Discount Rate, Continuous Interest, Force of Interest, and Equation of Value.
Annuities: Immediate, Due, Time Lines, Perpetuities, Continuous Annuities, Variable Annuities, and Reinvestment Problems.
Loan Repayment: Amortization, Prospective/Retrospective Methods, Instalment Loan, Sinking Funds, Net Interest, and Capitalization of Interest.
Bonds: Face value, Par value, Coupon rate, Redemption Value, Bond Price, Makehams Formula, Amortization of Premium/Discount, Callable Bond, Price-Plus Accrued, Market Price, and True Price.
Yield Structure of Interest Rate: Internal Rate of Return, Cash Flows, Borrowing Projects, Time/Dollar Weighted Rates, Portfolio Method, and Net Present Value.
Term Structure Interest Rates: Term Structure of Interest Rates, Risk Free Rates, Yield Curve, and Forward Rate.
Asset Liability Management, Duration and Immunization: Assets, Liabilities Man-

agement, Duration, Convexity, Immunization, Stocks, Dividends, and Mutual Funds.
Method of assessment: end of semester examination

IMT321β: Applied Algebra (Algebraic Data Encryption & Decryption Methods) (30 lecture hrs + 15 tutorial hrs), *(Credit Value 2.5) Op. 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 assessment: continuous assessment (assignments) and end-of-semesters examination.*

IMT322β: Computational Fluid Dynamics (30 lecture hrs + 15 tutorial hrs), *Op. (Credit Value 2.5)*
Basic Concepts of Fluid Flow: Introduction, Conservation Principles, Dimensionless form of a flow equation
Simplified Mathematical Models for fluid flows: Incompressible Flow, Inviscid (Euler), Stokes (Creeping) Flow
Mathematical Classification of Flows: Hyperbolic Flows, Parabolic Flows, Elliptic Flows, Introduction to the Navier-Stokes Equation
Introduction to Numerical Methods: Approaches to Fluid Dynamical Problems, What is CFD? , Possibilities and Limitations of Numerical Methods.
Components of a Numerical Solution Process: Mathematical Model, Discretization Method, Numerical Grid, Finite Approximation, Solution process, Convergence Criteria, Properties of Numerical Schemes
Discretization Approaches: Finite Difference Methods, Application of Finite Difference Methods to Different types of Models, Idea of Finite volume and Finite Element Methods with motivating examples.
Method of assessment: end of semester examination

IMT323β: Theory and Applications of Neural Networks (30 lecture hrs + 15 tutorial hrs), *Op. (Credit Value 2.5) 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 assessment: continuous assessment (assignments) and end-of-semesters examination.

IMT324β: Statistics with Computer Applications (30 lecture hrs + 15 tutorial hrs), *Prerequisite MAT225β,MAT313β ,AMT314β, IMT313β Op. (Credit Value 2.5)*
Introduction to Statistical Packages, Data Analysis using a computer package, Descriptive Statistics, Graphical representation of data, Estimation, Hypothesis Testing, Regression, Analysis of Variance, non-parametric methods. Method of assessment: continuous assessment (assignments) and end-of-semesters examination.

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 assessment: end of semester examination

AMT322β: Theory of Special Relativity (30 lecture hrs + 15 tutorial hrs), *Op. for students not following Physics (Credit Value 2.5)*
Introduction (Inadequacy of Newtonian mechanics and the need of a new mechanics), The Space-time continuum and separation between events, Events and particles, Space-time, world lines and space-time diagrams, the motion of a material particle, the light-cone, the fundamental quadratic form, space-time as a 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 assessment: end of semester examination

AMT323β: Mathematical Quantum Mechanics (30 lecture hrs + 15 tutorial hrs), *Op. (Credit Value 2.5)*
The failure of Newtonian Mechanics to explain phenomena at microscopic level, problem of separation of observable from the observer. Quantum states, representation of quantum states by state (column) vectors, Observables as Hermitian Matrices, mean values and correspondence principle, the angular momentum of a photon, Uncertainty. Equations of motion, quantum particles in one-dimension and three dimension. The Spin of the electron, quantum particle in a spherically symmetric potential. The bound states of the hydrogen atom, The Dirac notation. Fourier transform, Applications to wave-packets, Basic Ideas of Hilbert space theory, theory of linear operators in Hilbert Spaces, Cauchy-Schwarz and Bessel inequalities, Completeness. Special Topics in Quantum Mechanics and applications: The EPR Paradox and Entanglement, Quantum effects in the computer-chip, Introduction to Quantum Computer.
Method of assessment: end of semester examination

AMT324β: Basic Statistics and Data Analysis (30 lecture hrs + 15 tutorial hrs), *(Credit Value 2.5) Op. Only for Bio Science Students*

Fundamental concepts in probability, Random variables, Mean, variance and expected values, Classification and Description of Sample Data, Sampling Distributions, Estimations, Hypothesis Testing, Regression Analysis, Analysis of Variance and Scientific Applications. *Method of assessment: continuous assessment (assignments) and end-of-semesters examination.*

8.5 B.Sc (Special) Degree Programmes in Mathematics

Introduction The department offers two streams in the B. Sc Special Degree Programme - namely,

- Mathematics and Applied Mathematics (Math & AM) and
- Mathematics and Statistics (Math & Stat).

The duration of the special 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 Special Degree programme.

During the Levels I and II of the special degree programme, a student shall follow a minimum of **52 credits** of course units from the subject of specialization. Furthermore, a special 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.

8.5.1 Course Units offered for B.Sc.(Special) Degree in Mathematics - Level I

B.Sc. Special Degree (Level I) - Semester I						
Code	Title	Contact Hours	Math &AM stream		Math & Stat Stream	
			Credits	Status	Credits	Status
MSP311β	Group Theory (MAT311β)	30L 15T	2.5	C	2.5	C
MSP312β	Real Analysis-III(MAT312β)	30L 15T	2.5	C	2.5	C
MSP313β	Mathematical Statistics-II (MAT313β)	30L 15T			2.5	C
MSP3144	Mathematical Methods in Physics and Engineering-II (AMT313β)	60L	4	C		
MSP316β	Applied Statistics-II (IMT313β)	30L 15T			2.5	C
MSP3174	Topology	60L	4	C		
MSP3184	Measure Theory with Applications	60L	4	C	4	C
MSP3193	Bayesian Inference and Decision Theory	45L			3	C
MSP3b9β	Mathematical Computing (IMT2b2β)	75P	2.5	O	2.5	O
Total minimum compulsory credits			17		17	
B.Sc. Special Degree (Level I) - Semester II						
Code	Title	Contact Hours	Math &AM stream		Math & Stat Stream	
			Credits	Status	Credits	Status
MSP321α	Advanced Group Theory	23L	1.5	C	1.5	C
MSP322α	Real Analysis-IV	23L	1.5	C	1.5	C
MSP323β	Complex Variables(MAT322β)	30L 15T	2.5	C		
MSP324α	Complex Analysis	23L	1.5	C		
MSP3254	Numerical Methods with Applications	60L	4	C	4	C
MSP3263	Regression Analysis	45L			3	C
MSP3274	Differential Geometry and Tensor Analysis	60L	4	C		
MSP3283	Special Topics in Statistics (e.g. Multivariate Data Analysis)	45L			3	C
MSP3292	Applied Statistics-III	30L			2	C
Total minimum compulsory credits			15		15	
β: Credit value 2.5		C : Compulsory		O: Optional		
α: Credit value 1.5		E : Elective				

8.5.2 Detailed Syllabus for B.Sc. Special Degree in Mathematics - Level I

MSP311β: Group Theory (30 lecture hrs + 15 tutorial hrs) Same as MAT311β (Credit Value 2.5)

MSP312β: Real Analysis-III (30 lecture hrs + 15 tutorial hrs) Same as MAT312β (Credit Value 2.5)

MSP313β: Mathematical Statistics-II (30 lecture hrs+15 tutorial hrs) Same as MAT313β (Credit Value 2.5)

MSP3144: Mathematical Methods in Physics and Engineering-II(60 Lecture hrs) *(Credit Value 4)*
Part A:
Same as AMT313β.
Part B:
Applications of Laplace Transforms to Differential Equations, Fourier Transforms, Legendre Functions, Hermite Equation, Functions and Polynomials, Laguerre Equation and Polynomials, Riccati's Differential equation, The Dirac-Delta function,
Method of assessment: end of semester examination

MSP316β: Applied Statistics-II (30 lecture hrs+15 tutorial hrs) - Same as MIM313β (Credit Value 2.5)

MSP3174: Topology (60 hrs) *(Credit Value 4)*
Topological Spaces, Basis for a Topology, The Subspace Topology, Closed Sets, Limit Points, Continuous Functions, The Product Topology, The Metric Topology, Connected Spaces, Compact Spaces
Method of assessment: end of semester examination

MSP3184: Measure Theory with Applications (60 hrs) *(Credit Value 4)*
Borel - Algebra, Borel subsets, Lebesgue outer Measure, Lebesgue measurable subsets, Lebesgue measure, Lebesgue measurable functions. Properties that hold almost everywhere, Lebesgue Integral, Lebesgue integrable functions, Monotone Convergence Theorem, Dominated Convergence Theorem, Fatou's Lemma, Relation of Riemann and Lebesgue Integrals, Modes of convergence (topics are discussed with applications example probability theory), Introduction to martingales
Method of assessment: end of semester examination

MSP3193: Bayesian Inference and Decision Theory (45 hrs) *(Credit Value 3)*
Fundamentals of the Bayesian theory of inference, probability as a representation for degrees of belief, the likelihood principle, the use of Bayes Rule to revise beliefs based on evidence, conjugate prior distributions for common statistical models, methods for approximating the posterior distribution. Graphical models for representing complex probability and decision models by specifying modular components.

Concepts in decision analysis, including influence diagrams, decision trees, and utility theory or/and special topics in advanced Bayesian inference and decision theory.
Method of assessment: end of semester examination

MSP3b9β Mathematical Computing (90 project hrs) *(Credit Value 2.5)* Same as IMT2b2β;
The symbolic/numerical mathematics package Mathematica is introduced to solve mathematical problems on the computer. In particular special attention will be given to functional programming aspects of symbolic and numerical computations in Mathematica.
Method of assessment: Practical examination/assignments/project report and the end of semester oral examination and/or presentation

MSP321α: Advanced Group Theory (23 hrs) *(Credit Value 1.5)*
Isomorphism Theorems, Series of groups, sylow theorems, applications of the sylow theorem, free groups.
Method of assessment: end of semester examination

MSP322α: Real Analysis-IV (23 hrs) *(Credit Value 1.5)*
Implicit functions: definition, derivative of implicit functions, Implicit function theorem Jacobians, stationary values under subsidiary conditions . More on Integration on R^2: Green's theorem, Change of Variables in a double integral.
Calculus of variation.
Method of assessment: end of semester examination

MSP323β: Complex Variables (30 lecture hrs + 15 tutorial hrs) - Same as MAT322β

MSP324α: Complex Analysis (23 hrs) *(Credit Value 1.5)*
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 assessment: end of semester examination

MSP3254 Numerical Methods with Applications (60 hrs) *(Credit Value 4)*
Solving Linear Systems: Matrix notation, direct methods, Gauss, Jordan, Aitken Method etc.
Iterative methods: Jacobi, Gauss-Seidel, SOR method etc.
Numerical Solution of Ordinary Differential Equations: Euler and modified Euler methods and Runge-Kutta methods, convergence Criteria, errors and error propagation. Numerical Solution of Partial Differential Equations: parabolic type, Elliptic type and Hyperbolic type.
Method of assessment: end of semester examination

MSP3263: Regression Analysis (45 hrs) *(Credit Value 3)*
Introduction: Regression and model building, use of regression, role of the computer.
Simple Linear Regression: simple linear regression model, least-square estimation of the parameters, hypothesis testing on the 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 assessment: end of semester examination

MSP3274 Differential Geometry and Tensor Analysis (60 hrs) *(Credit Value 4)*
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 assessment: end of semester examination

MSP3283 Special Topics in Statistics (eg. Multivariate Data Analysis) (45 hrs) *(Credit Value 3)*
Multivariate data and multivariate statistics: Introduction, Types of data, Basic multivariate statistics, The aims of multivariate analysis. **Exploring multivariate data graphically:** scatterplot, scatterplot matrix, checking distributional assumptions using probability plots.
Cluster analysis, Principle component analysis, Logliner and logistic models for categorical multivariate data, Models for multivariate response models, discriminant analysis and factor analysis.
Method of assessment: end of semester examination

MSP3293:Applied Statistics III (30 hrs) *(Credit Value 2)*
One-Factor Experiments: Analysis of Variance Techniques,One-Way ANOVA, Completely Randomized Design, Two-way ANOVA, Randomized Block Design.
Chi-squared Tests: Goodness of Fit Test, Categorical Data, Test for Independence, Test for Homogeneity,
Nonparametric Tests: Sign test, Signed-Rank test, Rank-Sum test, Kruskal-Wallis test, Runs test, Rank Correlation Coefficient.
Applied Nonparametric Regression: Introduction, Basic idea of smoothing, Smoothing techniques, Choosing the smoothing parameter.
Method of assessment: end of semester examination

8.5.3 Course Units offered for B.Sc.(Special) Degree in Mathematics - Level II

B.Sc. Special Degree (Level II) - Semester I						
Code	Title	Contact Hours	Math &AM stream		Math & Stat Stream	
			Credits	Status	Credits	Status
MSP4114	Ring & Field Theory	60L	4	C	4	C
MSP4b26	Seminars and Research/ Study Project*	120	6	C	6	C C
MSP4134	Functional Analysis	60L	4	C		
MSP4144	Time Series Analysis	60L			4	C
MSP4153	Statistical Laboratory	60L			3	C
MSP4164	Analytical and Numerical Methods for PDEs	60L	4	C		
Total minimum compulsory credits			18		17	

B.Sc. Special Degree (Level II) - Semester II						
Code	Title	Contact Hours	Math &AM stream		Math & Stat Stream	
			Credits	Status	Credits	Status
MSP4214	Mathematical Foundations of Quantum Mechanics/Special Topics in Mathematical Physics (Eg. Classical & & Quantum Information Theory)	60L	4	E		
MSP4224	Introduction to Stochastic Analysis	60L	4	E	4	E
MSP4234	Topics in Applied Mathematics-I (Eg. Dynamical Systems/ /Control Theory)	60L	4	E		
MSP4244	Topics in Applied Mathematics-II (Eg. Geo-mathematics/Relativity Theory/ Electro-magnetic Theory/ Computational Fluid Dynamics)	60L	4	E		
MSP4254	Special Topics in Applied Mathematics	60L	4	E	4	E
MSP4263	Design and Analysis of Experiments/ Operations Research	45L			3	E
MSP4273	Special Topics in Statistics, (Eg. Categorical Data Analysis/ Sampling Theory)	45L			3	E
MSP4283	Introduction to Stochastic Processes	45L			3	E
MSP4293	Medical statistics	45L			3	E
Total minimum compulsory credits			12		13	
β: Credit value 2.5		C : Compulsory		O: Optional		
α: Credit value 1.5		E : Elective				
*Commenced at the beginning of the Level II and runs throughout the year.						

8.5.4 Detailed Syllabus for B.Sc. Special Degree in Mathematics - Level II

MSP4114 Ring & Field Theory (60 hrs) *(Credit Value 4)*
Ring and fields: rings and fields, integral domain, characteristic of a ring, subrings and subfields , Ideals , maximal ideals and prime ideals. Homomorphisms and imbedding of rings,
Isomorphism: Quotient rings, homomorphism, imbedding of rings, more on ideals,
Isomorphism theorems Euclidean and factorization domains: Euclidean domains, prime and irreducible elements, polynomial rings, unique factorization domains.
Extension fields: Introduction to extension fields, algebraic extension, roots of polynomials, splitting fields, ruler and compass constructions, prime subfields, separable extension.

Galois theory: Normal extension, automorphism of field extension, fundamental theorem of Galois theory, Galoi's extension, finite fields.
Method of assessment: end of semester examination

MSP4b26 Seminars and Research/Study Project-Mathematics/Statistics *-(Credit Value 6)*
Every special degree student is required to conduct supervised investigation on a research topic assigned at the beginning of the semester and is required to submit a dissertation.
Method of assessment: Seminars/Presentations, Dissertation and Oral Examination

MSP4134 Functional Analysis (60 hrs) *(Credit Value 4)*
Metric Spaces, Limit and Continuity, Connectedness, Completeness and Compactness, Completion of Metric Spaces, Normed Vector Spaces, Normed Spaces, Finite Dimensional Normed Spaces, Linear Subspaces of Normed Spaces, Banach Spaces, Fundamental Theorems for Normed and Banach Spaces, Inner Product Spaces, Hilbert Spaces, Orthogonal Expansions, Separable Hilbert Spaces, Linear Operators and Functionals, Liner Transformations on Hilbert Spaces, Spectrum of a Linear Operators.
Method of assessment: end of semester examination

MSP4144 Time Series Analysis (60 hrs) *(Credit Value 4)*
Introduction to basic concepts of time series analysis such as auto-regression, moving averages, integration, ARIMA, autocorrelation, and trends and volatility.
Stationarity, testing for unit roots, and structural change different formulations of lags, and causality. Time series forecasting.
Time series modelling, such as multi-equation models, cointegration and error-correction models or/and special topics in advanced time series analysis.
Method of assessment: end of semester examination

MSP4153: Statistical Laboratory (60 hrs) *(Credit Value 3)*
Analysing data with Computers using 'R' software package.

MSP4164: Analytical and Numerical Methods for PDEs (60 hrs) *(Credit Value 4)*
Analytical methods for Partial Differential Equations: Introduction to Elliptic, Parabolic and Hyperbolic PDEs, Initial and boundary value problems, Superposition Principle of solutions, Fourier series, Separation of variables, Homogeneous and non-homogeneous problems, Time dependent and independent non-homogeneous problems, Sturm-Liouville Systems, Eigenvalues and eigenfunctions, Finite Fourier Transforms and non-homogeneous problems, Problems in Infinite Spatial Domains, Fourier Transforms, Fourier Transforms method for PDEs, Laplace Transforms methods for PDEs.
Numerical Methods for Partial Differential Equations: Approximation of partial derivatives using finite differences, Finite-difference methods for parabolic, hyperbolic and elliptic equations, Heat equation, Wave equation and Poisson equation as examples, Convergence and Stability, Finite-element methods for PDEs in one dimensional space
Method of assessment: end of semester examination

MSP4214: Mathematical Foundations of Quantum Mechanics / Special Topics in Mathematical Physics (60 hrs) (Credit Value 4) (This module shall be offered as a teaching module or a reading module.)

Physical background, Dynamics, Observables, The uncertainty principle, spectral theory, Scattering States, Special Cases (e.g. infinite well, potential well etc), Many-particle systems, density matrices, Survey of modern philosophy of quantum theory/quantum computing, Introduction to quantum information theory. Course contents of Special Topics in Applied Mathematics will depend on the availability of staff members.
Method of assessment: end of semester examination

MSP4224: Introduction to Stochastic Analysis (60 hrs) *(Credit Value 4)* Prerequisites MSP3184: 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 assessment: end of semester examination

MSP4234: Topics in Applied Mathematics I(60 hrs) *(Credit Value 4)*
(Eg. Dynamical Systems/Control Theory)
Course contents of Special Topics in Applied Mathematics will depend on the availability of staff members and shall be announced at the beginning of the academic year.

MSP4244: Topics in Applied Mathematics II (60 hrs) *(Credit Value 4)*
(Eg Geo-mathematics/Relativity Theory/ Electromagnetic Theory/Computational Fluid Dynamics)
Course contents of Special Topics in Applied Mathematics will depend on the availability of staff members and shall be announced at the beginning of the academic year.

MSP4254: Special Topics in Applied Mathematics (60 hrs) *(Credit Value 4)*
Course contents will depend on the availability of staff members and shall be announced at the beginning of the academic year.

MSP4263: Design and Analysis of Experiments/Operations Research (45 hrs) *(Credit Value 3)*
Introduction to the Design of Experiments, Analysis of Variance, One Factor Experiments, Randomized Complete Blocks, Latin Squares, Comparisons among treatments, Factorial Experiments (Two or More Factors) , The $2k$ factorial Experiments design, Confounding, Fractional Factorial Experiments, Higher Fractions and Screening Designs, Taguchi's Robust Parameter Design, Control and Noise Variables.
Method of assessment: end of semester examination

MSP4273: Special Topics in Statistics (45 hrs) *(Credit Value 3)*
Introduction to Distributions and Inference for Categorical Data: Categorical response data, distributions for categorical data, statistical inference for categorical data.
Describing Contingency Tables: Probability structure for contingency tables, comparing two proportions, partial association in stratified 2×2 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.

MSP4283: Introduction to Stochastic Processes (45 hrs) *(Credit Value 3)*
Discrete and continuous Markov chains, point processes, random walks, branching processes and the analysis of their limiting behaviour. Renewal theory, Brownian motion, Gaussian processes and martingales.
Method of assessment: end of semester examination

MSP4293: Medical statistics (45 hrs) *(Credit Value 3)*
Clinical Trials: Basic Concepts and designs: controlled and uncontrolled clinical trials, historical controls, protocol, placebo, randomization, blind and double blind trials, ethical issues. Multiplicity and meta-analysis: intern analysis, multi-center trials, combining trials. Cross over trials, Binary response data, Analysis of cohort and case-control studies
Survival Data Analysis:
Basic concepts: survival function, hazard function, censoring.
Single sample methods: life-tables, Kaplan-Meier survival curve, parametric models.
Two sample methods: log-rank test, parametric comparisons.
Regression model: inclusion of covariates, Cox's proportional hazards model, competing risks.

9 Department of Physics

The major commitment of the Department of Physics is to provide up to date Physics knowledge to undergraduate and graduate students through course work, practical classes, and research projects.

The department has facilities to offer B.Sc. General (three-year course) and B.Sc. Special (four-year course) degrees for undergraduates, and research based M.Phil. and Ph.D. Degrees for graduate students. At present Physics is offered as a subject to students in the Biology stream as well. In addition to standard Physics courses, the department offers optional course units on Electronics, Astronomy, Computational Physics and Miscellaneous Topics. Sufficient laboratory space (for 160 students in 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 and Atmospheric Physics, Instrumentational Physics, Computational Physics,Astrophysics and Astronomy.

9.1 Research Areas

Senior academic staff members continue research in their fields of specialization, which are indicated in the table under "Staff". The Department has laboratory and computing facilities to carry out post-graduate studies leading to M.Phil. and Ph.D. Degrees. Current major research areas are:

- Semi-conducting materials
- High Energy Physics
- Electronic and ionic conductivity measurements of inorganic compounds
- Modeling of ocean optical properties
- 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)
- Lightening Physics
- Instrumentational Physics
- Semiconducting Nanostructures
- Astronomy
- Astrophysics
- Magnetic Resonance Imaging
- Astrobiology

9.2 Computer Facilities

The department conducts Physics experiments using computers. The computer laboratory is used for teaching general and special degree laboratory classes, optional courses and for research work.

9.3 Link Programmes

University of Ruhuna and CMS (Compact Muon Solenoid) collaboration have signed an Expression of Interest in the participation of physicists from the University of Ruhuna in the CMS experiment at the CERN (Organization for Nuclear Research) Large Hadron Collider (LHC) accelerator. Physicists in the department have involved in research in the CMS experiment in collaboration with the High Energy Physics group at Florida State University. Furthermore, the department expects to train graduate students in HEP at TIFR (Tata Institute of Fundamental Research) in India. Also the department has a collaborative research programme with Sivarathnam Laboratories Inc., Illinois, USA. The other partners of the programme are the Institutes of Fundamental Studies, Kandy and the Department of Physics, University of Jaffna.

9.4 Head of the Department

Dr. G. D. K. Mahanama
B.Sc. (Ruhuna, S.L.), Ph.D. (London South Bank University, UK)

9.5 Members of the Academic Staff

Designation	Name	Specialization
Professors	Senior Professor W.G.D. Dharmaratna B.Sc. (P'deniya, S.L.) M.Sc., Ph.D. (Tufts, U.S.A.)	Theoretical Particle Physics, High Energy Physics Noise Pollution
	Professor (Mrs.) Kanthi K.A.S. Yapa B.Sc. (Kelaniya, S.L.) M.Sc., Ph.D. (Tufts, U.S.A.)	Bio Physics, Protein Folding Ocean Optics, Ocean Remote Sensing
Adjunct Professor	Prof. Chandra N. Wickramasinghe B.Sc. (Colombo, SL), MA, PhD, ScD (Cantab) Hon DSc (Soka-Tokyo), Hon DSc (Ruhuna, SL) FRAS, FRSA, FINA, C Math	Astrophysics, Astrobiology Astrochemistry Panopermia
Senior Lecturers	Dr. K. P. S. Jayatilleke B.Sc. (Kelaniya, SL) M.Sc., Ph.D.(Cincinnati, U.S.A.)	Experimental Particle Physics Computational Physics
	Dr. G. D. K. Mahanama B.Sc. (Ruhuna, SL) Ph.D. (London South Bank University, UK)	Solid State Physics
	Dr. J. A. P. Bodhika B.Sc. (Ruhuna, SL) M.Sc., Ph.D. (Colombo, SL)	Acoustics & Atmospheric Physics
	Mr. E. M. Ranatunga B.Sc. (Ruhuna, SL) M.Phil. (Ruhuna, SL) (Reading for PhD, on leave)	Instrumentational Physics
	Dr. H. A. D. S. D. Perera B.Sc.(Ruhuna, SL) M.Sc., Ph.D.(Cincinnati, U.S.A.)	Semiconducting Nano Wires, Heterostructures
	Dr. N. M. Wickramage B.Sc. (Ruhuna, SL) Ph.D. (Ruhuna, SL)	Experimental High Energy Physics

Designation	Name	Specialization
Senior Lecturers	Dr. N. T. Wickramasuriya B.Sc. (Ruhuna, SL) Ph.D.(Cincinnati, U.S.A.)	Condensed Matter Physics
	Dr. W.M.A.K. De Silva B.Sc. (Ruhuna, SL) Ph.D.(Cincinnati, U.S.A.)	Magnetic Resonance Imaging
	Mr. K. V. S. Prasadh B.Sc. (Ruhuna, SL) Ph.D. (North Darkota, U.S.A)	Astrophysics
Probationary Lecturers	Mr. S. S. Abeywickrama B.Sc. (Ruhuna, S.L.) B.Tech.Eng. (OUSL) M.Sc. in Applied Electronics (Colombo) (Reading for Mphil)	Electronics and Communication Engineering
	Mrs. K.M. Liyanage B.Sc.(Ruhuna, SL) (Reading for PhD at CERN)	Experimental High Energy Physics

9.6 Course Units in Physics for B.Sc. (General) Degree

B.Sc. Level I - Semester I

PHY1114: General Physics I (60 lecture hrs)

Classical Mechanics I: Particle Dynamics; Motion of a System of Particles; Conservation of Linear Momentum, Inertial and Non-inertial Frames of Reference, Rotation in Space, Conservation of Angular Momentum, Centrifugal and Coriolis Forces, Precession, Work-Energy; Conservative Forces, Equilibrium and Potential Energy, Bernoulli's Equation, Collisions and Reactions; Impulse, Center of Mass Reference Frame, Elastic and Inelastic Collisions and Their Conservation Laws, Reaction Threshold, Gravitation; Planetary Motion, Elasticity and Bending of Beams.

Wave Motion and Acoustics Mechanical Systems: Executing Simple Harmonic Motion; Wave Motion, Wave Propagation in Stretched Strings, Gases and Solids, Resonance Phenomena; Ear and Hearing; Intensity and Characteristics of Sound, Doppler Effect and Its Applications; Ultrasound, Shock Waves.

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.

B.Sc. Level I - Semester II

PHY1214: General Physics II (60 lecture hrs)

Electricity and Magnetism I : Electrostatics, Electric Force, Electric Field, Gauss' Law, Electric Potential, Equipotential Surfaces, Electric Dipole, Capacitors, Dielectrics, Polarization, Susceptibility, Electric Energy Density, Electric Force on Charged Surfaces. Current Electricity; Electric Current, Drift Velocity, Conductivity, Network Theorems; Kirchoff's Law, Maxwell's Cyclic Law, Supper Position 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

B.Sc. Level II - Semester I

PHY2114: General Physics III (60 lecture hrs)
Thermal Physics: Heat Transfer, Kinetic Theory of Gases, Real Gases, Equation of State, First and Second law of Thermodynamics, Heat Engines, Entropy, Enthalpy, Application of Principles of Thermodynamics to Special Systems, e.g. Latent Heat Equations, Specific Heats, Maxwell's Relations, Joule-Kelvin Effect, Liquefaction of Gases, Black Body Radiation.
Classical Mechanics II: Lagrangian Formulation, Lagrange's Equations and Their Application to Simple Systems, Small Oscillations, Coupled Oscillations and Normal Modes of Vibrations, Damped Vibrations, Forced Vibrations, Transient and Steady State Solutions. Motion Under a Central Force, Effective Potential.

PHY2b22: General Physics Practical I (45 hrs x 2)
A three-hour laboratory class will be conducted in each week. A minimum of 12 distinct relevant general experiments will be offered in each semester. Students are expected to submit a report for each experiment. The course runs through both semesters. Examination is held at the end of semester II.

PHY2112: Electronics (30 lecture hrs) *Op. (This course unit is a pre-requisite for those students who wish to follow the Special 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.

B.Sc. Level II - Semester II

PHY2214: General Physics IV (60 lecture hrs)
Electricity and Magnetism II: Mathematical Formulation of Electrostatics, Magnetostatics and Electromagnetic Induction, Boundary Value Problems, Maxwell's Equations, Plane Electromagnetic Waves in Free Space.
Atomic and Nuclear Physics: Quantum Theory of Radiation, Particle Properties of Light, Photoelectric and Compton Effects, Wave Properties of Material Particles, de Broglie Postulate and Its Experimental Verification, Rutherford Scattering, Structure of The Atom, Bohr Theory, Atomic Spectra, X-rays, X-ray Diffraction.
Radioactivity, Properties and Stability of Nuclei, Nuclear Reactions, Fission and Fusion, Nuclear Power, Structure of the Nucleus, Elementary Particles, Cosmic Rays, Quarks, Nuclear force, Applications in Medical Physics.

Special Theory of Relativity: Galilean Transformation, Michelson-Morley Experiment, Einstein's Postulates, Lorentz Transformation, Length Contraction, Time Dilation and Twin Paradox, Velocity Transformation, Space-time Diagrams, Minkowshki Space, Four Vectors and Tensors, Conservation of Four-Momentum, Relativistic Dynamics.

PHY2222: Electronics Practical (45 hrs) *Op. Prerequisite: PHY2112 (This course unit is a pre-requisite for those students who wish to follow the Special Degree in Physics)*

A minimum of 12 distinct electronic experiments will be offered. In addition, a project relevant to electronics has to be completed. Examination is held at the end of semester II.

B.Sc. Level III - Semester I

PHY3114: General Physics V (60 lecture hrs)

Quantum Mechanics: Failures of Classical Physics, Heisenberg Uncertainty Principle, Schrodinger Equation, Probability Interpretation of The Wave Function, Solution of The Schrodinger Equation for Piecewise Constant Potentials, Operators, Expectation Values and Eigen Value Problems, Angular Momentum, Hydrogen Atom.

Statistical Physics: Basic Probability Concepts; Binomial, Gaussian and Poisson distributions, Canonical Ensemble, Partition Function, Maxwell velocity distribution, Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein Distributions and Their Applications to Simple Systems.

Solid State Physics: Introduction to Crystallography; Crystal Structures, Crystal Defects, X-ray Diffraction, Free and Nearly Free Electron Theories, Electron Specific Heat, Band Theory of Solids, Metals, Semiconductors and Insulators, p-n Junction and Its Applications.

PHY3121: General Physics Practical II (45 hrs)

A three-hour laboratory class will be conducted in each week. A minimum of 12 distinct relevant general experiments will be offered during semester I. Students are expected to submit a report for each experiment. Examination is held at the end of semester I.

B.Sc. Level III - Semester II

PHY3232: Astronomy (30 lecture hrs) *Optional*

Solar System and Stars: The Earth, The Moon and Planets, Other Bodies of The Solar System, Comets, Asteroids. Classification, Formation and Evolution of Stars, Red Giants, White Dwarfs, Neutron Stars, Pulsars, Binary Stars and Black Holes.

Nature of The Universe: The Milky Way Galaxy, The Interstellar Medium, Formation, Evolution and Classification of Galaxies, Radio Galaxies, Quasars, Cosmological Models, Big Bang Theory

PHY3242: Computational Physics I (15 lecture hrs + 30 hrs of Computer Laboratory Classes) *(Op. Prerequisite: C++/Java Programming Knowledge)*

Computer Arithmetic, Error and uncertainties in computation, Numerical differentiation: first order and second order derivatives, 2-point, 3-point and 5-point formulae; Numerical integration: Trapezoidal and Simpson's rules, composite and recursive formulae; Solving non-linear equations: Bisection, Newton's and Secant methods; Interpolation: Lagrange, linear, polynomial, divided difference and cubic spline interpolation, Neville algorithm, least square fitting, Goodness of fit estimator, Maximum likelihood method.

PHY3252: Special Topics in Physics (30 lecture hrs) *Op. Prerequisite: Physics Core Courses*
Topics will vary depending on available resources and the topics will be announced at the beginning of the semester. Some possible topics: Medical Physics, Energy Technology, Renewable Energy (Solar, Wind, etc.), Particle Physics and Accelerators, Superconductors, Fibre Optics, Thin Films, Semiconductors, Satellite Remote Sensing, Atmospheric Physics and Nanotechnology.

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).

PHY3272: Computational Physics II (15 lecture hrs + 30 hrs of Computer Laboratory Classes) *Op. Prerequisite: PHY3242*
Solving systems of linear Equations: Gaussian elimination, Triangular Factorization, Jacobi and Gauss-Seidel iterative methods; Numerical Solution to Ordinary Differential Equations: Euler, Euler-Cromer, Improved Euler, Taylor Series and Fourth order Runge-Kutta methods; Carlo methods: Uniform and non-uniform random number generation, evaluation of multi-dimensional integration, Random Walk, Simulation applications; Solution of partial differential equations: Heat, Wave and Laplace equations.

PHY3282: Microcontrollers and Applications. (15 Lecture hrs + 30 Electronic Laboratory Classes) *Op. Prerequisite: PHY2112 and PHY2222*
Introduction to Microcontrollers, CISC and RISC Architectures, Microchip PIC Microcontrollers, Hardware Configuration, Memory Organization, Instruction Set, Assembly Language Programming, Programming Tools, Development Boards, I/O Ports, Basic I/O Programming, Software Delays, Lookup Tables, Interrupts Programming, Timers & Counters, Data Manipulating built-in EEPROM, Microcontrollers Programming in High Level Languages, A/D Conversion, D/A Conversions, Communications(USART Based serial communication ,, SPI and I2C), External EEPROMs, Interfacing the Sensors and Transducers, Keyboards, LCDs, PWM, Capture, Compare ,Sound Generating, Embedded System Development.

The details of optional course units that are offered during each semester will be announced before registration period - please consult the Head of the department before registration for any further clarification

9.7 Course Units in Physics for B.Sc. (Special) 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.

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.

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

PHY4044: Electromagnetic Theory (60 lecture hrs)

Conservation of charge, Scalar and vector potentials, Lorentz condition, Wave equations, Maxwell's equations, Electromagnetic Waves in free space, in non conductors, in conductors and in low pressure ionized gases, Reflection of electromagnetic waves; Snell's law, Fresnel's equations, reflection at air/dielectric interface, reflection at air/good conductor interface, Reflection by an ionized gas, Wave guides; Modes of propagation, critical frequency, phase velocity, group velocity, Energy Transmission, Transmission lines; equation of telegraphy, characteristic impedance, current and voltage distribution, impedance matching, Electromagnetic Radiation; retarded potentials, electric and magnetic dipole radiation, antennas

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.

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.

PHY4071: Practical Course Work

All practical course work are evaluated under this course unit. Students are required to submit all course work at the end of each experiment completed.

PHY4084: Nuclear and Particle Physics (60 lecture hrs)

Properties of nuclei including size, shape, spin, electric and magnetic moments, The deuteron, Nuclear reactions; Q 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.

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, Quasistatic 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.

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

PHY4112: Electronics II (30 lecture hrs)

Number systems and codes, BCD and ASCII codes. Designing of combinational logic circuits, Minimization of logic expressions using algebraic and Karnaugh map methods, Construction of a Full adder, Decoders, Encoders, Multiplexes, Demultiplexes, and their applications, Characteristics of TTL, ECL, PMOS, NMOS and CMOS gates, Open collector devices, Sequential logic circuits, Flip-Flops as a memory element, S-R, J, K, and Master-Slave Flip-Flops, D and T Flip-Flops, Applications of Flip-Flops, Asynchronous circuits, Registers, Shift registers, Serial and parallel data transfer (SISO, SIPO, PISO, and PIPO) Frequency division and counting, Asynchronous (ripple) counters, Counters with Mod numbers, Up counters, Down counters, Up/Down counters, IC Asynchronous counters, Digital arithmetic in the 2S complement system, Parallel binary adder, Complete parallel adder with registers,. Integrated Logic Circuits families, TTL series, Tristate TTL devices, Bus-oriented devices, MOSFET and CMOS series, Analysis and Synthesis of synchronous circuits, Memory systems, and Digital data communication.

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.

PHY4132: Miscellaneous Topics I (30 lecture hrs)

Topics (Eg: Remote sensing, Thin film deposition, Solar energy, Nanotechnology, Atmospheric Physics,Medical Physics etc.) will be announced at the beginning of each semester.

PHY4144: Miscellaneous Topics II (30 lecture hrs + 60 practical hours))

Topics (Eg:,Computational physics) will be announced at the beginning of each semester.

PHY4151: Learning Skills

Industrial practical training programmes and Special degree student's seminars will be considered as general course assessments.

PHY4166: Research Project

Special 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.

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.

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.

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.

10 Department of Zoology

The Department of Zoology conducts courses covering basic and applied fields of Zoology for undergraduate students registered for B. Sc. General Degree and B.Sc. Special Degree programs. The department has following infrastructure facilities for undergraduate students: one lecture theatre, two elementary laboratories to cater about 120 students, and two research laboratories. The department has well equipped research laboratories, instrument room, animal house, and indoor/ outdoor fish-ponds and a computer room to facilitate full time or part time postgraduate studies leading to M. Phil and/or Ph.D. The department has academics specialized in various fields including Aquatic Ecology, Fish Biology and Fisheries, Entomology, Environmental Science, Animal physiology, Genetics & Molecular Biology and Environmental Toxicology.

10.1 Research Areas

Current research activities of the department are in the following areas:

- Biodiversity of various groups of animals.
- Integrated Pest Management in vegetable crops in southern Sri Lanka.
- Tritrophic interaction of insect pests.
- Effects of entomopathogens on control of pests of vegetables.
- Phylogenetic relationships of various aquatic organisms in Sri Lanka.
- Effects of environmental pollutants (pesticides) on different groups of animals.
- Investigation of sperm maturation and storage in mammals (rats as a model).
- Assessment of water quality using bioindicators.
- Morphological and genetic markers in population differentiation of fish.
- Plant parasitic nematodes and their management.
- Toxicity assays and biological effects on fish.

10.2 Head of the Department

Professor (Mrs.) N. J. De S. Amarasinghe, (B.Sc., D. Sc., M.I. Biol., Chartered Biologist)

10.3 Members of Academic Staff

Designation	Name	Specialization
Chair Professor	Prof. (Mrs.) K.B.S. Gunawickrama B.Sc. (Ruhuna, SL), M.Phil. (Bergen, Norway) Ph.D. (Bergen, Norway), M.I.Biology (IOBSL)	Conservation Genetics, Biodiversity Research
Professor	Prof. (Mrs.) N.J. De S. Amarasinghe B.Sc. (Colombo, SL) D. Sc. (Namur, Belgium) M. I. Biol., Chartered Biologist	Fish population dynamics & Fisheries, Limnology, Bioindicators of water quality
	Prof. (Mrs.) W.T.S.D. Premachandra B.Sc. (Ruhuna, SL), M.Sc. (Hanover, Germany) Ph.D. (Hanover, Germany)	Entomology, Plant Nematology, Entomopathogenic nematodes

Designation	Name	Specialization
Professor	Prof. P.M.C.S. De Silva B.Sc. (Ruhuna, SL) M. Phil (Bergen, Norway) Ph.D. (Amsterdam, The Netherlands) (On Sabbatical Leave)	Environmental Toxicology
	Prof. (Mrs.) D.H.N. Munasinghe B.Sc. (Ruhuna, SL) Ph.D. (Deakin, Australia)	Systematics and Conservation Genetics
	Prof. E.P.S. Chandana B.Sc. (Ruhuna, SL), M. Phil. (Ruhuna, SL) Ph.D. (Kyoto, Japan)	Environmental Science, Molecular Medicine, Development Biology
	Prof. (Mrs.) M.P.K.S.K. de Silva B.Sc. (Kelaniya, SL), M.Sc. (Brussels, Belgium) Ph.D. (Ruhuna, SL)	Fish biology & fisheries, Molecular biology
Associate Professor	Prof. (Mrs.) H.C.E. Wegiriya B.Sc. (Kelaniya, SL) Ph.D. (Reading, UK)	Insect Physiology & Insect Pathology, Ecological Entomology
Senior Lecturer	Dr. W.A.H.P. Guruge B.Sc. (Ruhuna, SL) M.Sc. (Chiangmai, Thailand) Ph.D. (Ruhuna, SL)	Fish biology, Environmental Risk Assessment
	Mrs. K.A.M. Sudarshanie B.Sc. (Ruhuna, SL), M.Phil. (Ruhuna, SL) M.Sc. (Bremen, Germany)	Animal reproductive Biology, Ecology
Probationary Lecturer	Mrs. W. P. S. N. Wijeweera B.Sc. (Ruhuna,SL)	Entomology

10.4 Course Units in Zoology for B.Sc. (General) Degree

B.Sc. Level I - Semester I

ZOO1102: Core Zoology (30 Lecture hrs) Origin of life, Evolution, and Animal Cell Biology: Theories of origin of life on earth; Chemical evolution; Origin of cellular organisms; Concept of evolution; Theories of evolution and evidence; Role of natural selection and variation; Patterns of evolution; Modern synthesis of evolution. Animal cell biology - prokaryotic and eukaryotic organization; Structure, function and organization at subcellular level; Transmembrane transport processes; Cell division and cell cycle; DNA as the genetic material; Gene expression; Protein trafficking; Cancer; Integration of cells into tissues.
Animal Histology and Development: Tissues: covering epithelial tissues, glandular epithelia, nerve and muscle, connective tissues; Embryology: Oogenesis, Vitellogenesis, Fertilization; Cleavage; Cell movements; Gastrulation; Neurulation; Embryogenesis of a bird and a mammal.

ZOO1112: Invertebrate Diversity I (30 Lecture hrs) Introduction to Taxonomy of animals; Geological time scale and evolutionary organization of animals; General classification of animals; Major phyla of Kingdom Animalia. Invertebrate diversity: General invertebrate features, morphological and functional diversity, ecological importance and evolutionary trends in phyla Protozoa, Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida and minor phyla.

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.

B.Sc. Level I - Semester II

ZOO1202: Invertebrate Diversity II (30 Lecture hrs) Taxonomy, morphology, biology, diversity, and ecological, economic/medical importance, and evolutionary trends in Phyla- Mollusca, Arthropoda, and Echinodermata; Origin & Evolution of chordates, protochordates.

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.

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.

B.Sc. Level II - Semester I

ZOO2102: Mammalian Organization and Diversity (30 Lecture hrs) Evolution and classification of mammals, Prototherian and metatherian mammals, adaptative 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.

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.

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 haematological analysis; analysis of excretory products; mammalian reproductive systems and function, control methods of human reproduction (contraception).

ZOO2142: Conservation and Management of Biological Resources (20 Lecture hrs, 20 practical hrs) *Optional/ Open for all students; a prerequisite for Special 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.

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.

B.Sc. Level II - Semester II

ZOO2202: Human Biology & Genetics (30 Lecture hrs) Origin and evolution of humans, human anatomy and uniqueness of man, human races and their variability and adaptability, cultural evolution, human behaviour; man and the environment: human impact on the environment and health hazards, interaction between microbes and man.
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.

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.

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,

ZOO2232: Research Methodology (20 Lecture, 20 practical hrs) *Optional/Open for all students*
Introduction to scientific research methodology; Stages and steps of research: Review of literature, identification of problems, formulation of objectives, experimental design, experimentation, data collection, processing and presentation of data, analysis of data and statistical tests, use of computer packages in data analysis, interpretation of data, dissemination of results: how to write a research article; conclusions and recommendations; Critical appraisal of research papers; Ethics in research.

ZOO2262: Molecular Genetics & Biotechnology (20 Lecture hrs, 20 practical hrs) *Optional/ Open for Biology students;a prerequisite for Special 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.

B.Sc. Level III

According to the rules and regulations stipulated by the UGC, Department of Zoology also requires minimum of 24 credits obtained by a student during the period of three years. To fulfill this requirement all students following Zoology as a subject should offer course units amounting at least to four credits in the third year.

B.Sc. Level III - Semester I

ZOO3112: Basic Entomology (20 Lecture hrs, 20 Practical hrs) *Optional/ Open for Biology students*
Insects and the environment; Insect morphology and classification; Structural diversity of insects related to their modes of life; Morphological adaptations of insects; Basic physiological adaptations of insects: development, nutritional biology, insect behaviour; Insect ecology: Insect diversity and the tropic relationships; Role of insects in ecosystems; Sampling techniques for terrestrial and aquatic insects; Collecting and preserving insects for taxonomic studies.

ZOO3122: Applied Entomology (20 Lecture hrs, 20 Practical hrs) *Optional/ Open for Biology students*
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 control; Pest management strategies: cultural, chemical, biological control and resistant cultivars; Integrated Pest Management (IPM); Agrochemicals and their environmental impacts; Commercial utilization of insects: apiculture and sericulture; Arthropod Vector Management: medically

important arthropods, pathogens transmitted by arthropod vectors, vector biology, control of vector borne diseases.

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.

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.

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.

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.

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

ZOO3192: Biological Psychology I (25 Lecture hrs, 10 Practical hrs) *Optional/ Open for all students*
Biological and other psychological theories, fields in Psychology, Mind- Brain relationship, Human behaviour; biology, genetics and evolution, Nerve cells and nerve impulses, Synapses and hormones, Hormones and behaviour, development and plasticity of brain, sensory systems and perception, Rhythms of wakefulness and sleep, biological clocks, Regulation of internal body state, Temperature, taste and hunger regulation.

B.Sc. Level III - Semester II

ZOO3202: Biological Psychology II (25 Lecture hrs, 10 Practical hrs) *Optional/ Open for all students.*
Emotional behaviours; stress and health, abnormal behaviours, mood disorders and Psychotic disorders and therapies, Human psycho A social development; prenatal, postnatal, infantile, childhood, adolescence, Biology of learning and memory; learning theories, Personality theories, counselling skills and techniques.

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.

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.

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).

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.

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.

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.

10.5 Course Units in Zoology for B.Sc. (Special) Degree

Students are advised to follow relevant course units conducted in B. Sc. General Degree Level III.

ZOO4013: Entomology (30 Lecture hrs, 30 Practical hrs) Insect taxonomy, morphology and physiology; Morphological and functional adaptations of insects; Insect Behaviour; Insect Ecology; Insect diversity and the tropic relationship; Major insect groups of agricultural, medical and veterinary importance; Biology of beneficial insects.

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.

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.

ZOO4051: Practical Course in Invertebrate Biology (45 Practical hrs) Comparative study on the external morphology, internal anatomy, diversity and evolutionary trends in invertebrate fauna.

ZOO4061: Laboratory Techniques in Biology I (45 Practical hrs) Study on structure of different tissues; Staining techniques; Staining of embryos; Wax, plastic embedding and section cutting and preparation of slides.

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)

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

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.

ZOO4103: Animal Pathology/ Immunology (30 Lecture hrs, 30 Practical hrs) Micro organisms and man; Infectious diseases of man and livestock: Dynamics and modes of transmission, Susceptibility and host defences to infectious disease; Introduction to immunology: Innate and acquired immunity; Structure and function of immune system: Antibody structure and function, Humoral and cellular immunity; Parasitic adaptations to avoid the immune system, vaccines and vaccination.

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

ZOO4133: Subject Specialization (30 Lecture hrs, 30 Practical hrs) Students who are following Zoology Special 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.

ZOO4144: Molecular Biology and Genetics (45 Lecture hrs, 30 Practical hrs) DNA as a store of information; Genes; Importance of RNA; Amino acids and Proteins; Gene expression and its regulation; Molecular tools; Gene Technology; Genetic variation; Genes in population; Genetic screening and disease diagnosis.

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.

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).

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).

ZOO4184: Statistics and Computation (45 Lecture hrs, 30 Practical hrs) Introduction to statistics; Descriptive statistics; Binomial and Poisson distribution; Normal distribution, Application of normal distribution, Normal distribution of means and t- distribution, Hypothesis testing, Experimental designs, Regression, Multiple regression, F-tests, Analysis of variance, Factorial experiments, Use of computers for statistical analysis.

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.

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.

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.

ZOO4221: Laboratory Techniques in Biology II (45 Practical hrs) Training on the use of different types of microscopes, instruments for assessment of quality of environment; Analysis of constituents (Lipids, carbohydrates and proteins) of animal tissues and their food; Analytical techniques using TLC, GLC and HPLC, Analysis of DNA and proteins.

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.

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.

10.6 Credit Values

10.6.1 B.Sc. General Degree

Course Unit	**Duration (hrs)**		**Credits**		Total
	Theory	Practical	Theory	Practical	
ZOO1102: Core Zoology	30		2		2
ZOO1112: Invertebrate Diversity I	30		2		2
ZOO1121: General Zoology Practical I		45		1	1
ZOO1202: Invertebrate Diversity II	30		2		2
ZOO1212: Chordate Organization and Diversity	30		2		2
ZOO1221: General Zoology Practical II		45		1	1
ZOO2102: Mammalian Organization and Diversity	30		2		2
ZOO2112: Comparative Animal Physiology	30		2		2
ZOO2121: General Zoology Practical III		45		1	1
ZOO2142: Conservation and Management of Biological Resources	20	20	1.3	0.7	2
ZOO2152: Evolution and Zoogeography	20	20	1.3	0.7	2
ZOO2202: Human Biology & Genetics	30		2		2
ZOO2212: Animal Ecology	30		2		2
ZOO2221: General Zoology Practical IV		45		1	1
ZOO2232: Research Methodology	20	20	1.3	0.7	2
ZOO2262: Molecular Genetics & Biotechnology	20	20	1.3	0.7	2

Course Unit	Duration (hrs)		Credits		Total
	Theory	Practical	Theory	Practical	
ZOO3112: Basic Entomology	20	20	1.3	0.7	2
ZOO3122: Applied Entomology	20	20	1.3	0.7	2
ZOO3133: Wetlands & Aquatic Ecosystem	30	30	2	1	3
ZOO3152: Parasitology	20	20	1.3	0.7	2
ZOO3162: Immunology	20	20	1.3	0.7	2
ZOO3172: Ornithology	20	20	1.3	0.7	2
ZOO3182: Animal Behaviour	20	20	1.3	0.7	2
ZOO3192: Biological Psychology I	25	10	1.7	0.3	2
ZOO3202: Biological Psychology II	25	10	1.7	0.3	2
ZOO3211: Bioethics	15		1		1
ZOO3223: Fisheries & Aquaculture	30	30	2	1	3
ZOO3232: Principles of Pest Management	20	20	1.3	0.7	2
ZOO3252: Environmental Impact Assessment	20	20	1.3	0.7	2
ZOO3272: Environmental Pollution & Toxicology	20	20	1.3	0.7	2
ZOO3292: Human Health	25	10	1.7	0.3	2

10.6.2 B.Sc. Special 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: Animal Pathology/ Immunology	30	30	2	1	3
ZOO4121: Practical Course in Vertebrate Biology		45		1	1
ZOO4133: Subject Specialization	30	30	2	1	3
ZOO4144: Molecular Biology and Genetics	45	30	3	1	4
ZOO4152: Evolutionary Biogeography	20	20	1.3	0.7	2
ZOO4164: Conservation and Management of Environment	45	30	3	1	4
ZOO4172: Selected Topics in Biology	30		2		2
ZOO4184: Statistics and Computation	45	30	3	1	4
ZOO4192: Animal Rearing (Terrestrial)	20	20	1.3	0.7	2
ZOO4203: Fisheries Biology & Aquaculture	40	21	2	1	3
ZOO4213: Principles of Pest Management	30	30	2	1	3
ZOO4221: Laboratory Techniques in Biology II		45		1	1
ZOO4236: Research Project					6
ZOO4242: Assessment of Key Skills					2
Total number of credits					60

11 Optional Course Units (or FSCs) offered by the Faculty

The undergraduate programme in the Faculty of Science comprises of a large number of course units offered by individual departments. In addition to the course units under the subject areas, several other course units from different disciplines (for example management, sports, personnel development etc.) are also available as optional course units. These course units are offered by faculty of science and the denotations of such course units begin with FSC.

These interdisciplinary course units offered for both bioscience and physical science students. Course units are organized at two levels, namely level II and level III for the general degree. Theory course units consist of lectures, assignments and tutorials. Combined course units consist of both theory and practical components. In addition, students are also given the opportunity to conduct research projects in an area/problem of his/her interest under a particular course unit.

Lectures and practical classes of FSC course units are conducted from 4.00 p.m. to 6.00 p.m. on week days. Course units can be selected at the discretion of the student according to the selection criteria prescribed by the faculty.

11.1 Optional Course Units offered in Semester I

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 (*This course is offered to Level II students only.*)

Students who follow FSC214α are not eligible to follow FSC225α (Health related physical fitness and wellness) and vice versa

Time Allocation: 15 hrs of theory and 30 hrs of practical lessons

Course Objective: To achieve greater success in life by learning to integrate mind and body

Outline of the Syllabus:

1. **Assessment of personal potential:** Basic human physiology(a map of self), Mind body Dynamics, Principles of winning mind, Pathophysiology of disease
2. **Principals of life:** Science of Yoga in Physical Fitness & Health, Proper relaxation, Proper breathing, Proper Food, Maintaining a youthful mind, Eliminating toxins from your life, Cultivating flexibility and creativity
3. **Sports Nutrition for Health and Performance:** Importance of carbohydrate, lipid and protein as building blocks, role of vitamins and minerals in nutrition, role of nutrients in man, nutritional requirements for pre-, during and post competition

4. **Sports Injuries and Rehabilitation:** Incidence, severity and mechanisms of sports injuries, injuries due to extreme heat, Strategies for prevention of sports injuries, methods of recovery, Rehabilitation of skin, muscles, ligaments and bones
5. **First Aid**
6. **Basic Physiology of Sports and Exercises:** Proper Exercises, Avoid Exercises, Prevent of Injuries, Lever system and body mechanism
7. **Testing and Measurement:** Evaluation of Testing, Evaluation of Measurements
8. **Weight Training for Sports:** Physical Fitness through Weight Training, Schedule for Weight Training Programme for various sports
9. **Sports Skill:** Knowledge of Fundamental Skills, Rules of the Game, Competition

(80% attendance is required to be eligible for the final examination)

Assessment method: Theory and practical examination (also, a team project needs to be completed)

Marks: Theory - 50 marks and Practical - 50 marks.
A student should obtain a minimum of 20 marks from the theory paper and minimum of 20 marks from practical to be eligible for a grade C or better for the course. (When a student does not meet this minimum requirement, he/she will only be eligible for a maximum grade of D.)

FSC2122: Active Citizenship
Time Allocation: 32 hrs of lectures

Course Unit Objectives
The objectives of this course unit is

- to develop self- and social awareness
- to understand how identities and cultures form and to value different perspectives
- to build trust and understanding within and between communities through dialogue
- to recognize the nature of citizen rights and responsibilities
- to develop motivation to act for long term benefit of society
- to develop skills in social development project planning, management and delivery

Learning Outcomes
On completion of the course unit, students should be able to

- understand sense of identity and how cultures are formed, influenced and changed
- engage in respectful dialogue through active listening and responding appropriately
- arrive at good social decision
- recognize the need to uphold human rights

- demonstrate leadership skills and skills in social development project planning
- assess the benefits a project may bring and to measure achievements

Course Content
Introduction to Active Citizens, Me: Identity and culture, self-awareness, How identities and cultures form, Me and You: Intercultural dialogue, learn and share through dialogue, We together: Local and global communities, Interplay of culture, community and society, Citizen rights and responsibilities, Skills in social action project planning, management and delivery, Identify problems and approaches to bringing solutions

Methods of teaching and learning
Reading materials, Lectures, Problems Solving, LMS, Audio-Video and live demonstrations, group activities, presentations

Method of Assessment

- Continuous assessment 50%
- End Semester Examination 50%

References

British Council Active Citizens website
($http://activecitizens.britishcouncil.org$)

FSC3112: Management

- Introduction to Management
  - The Definition of Management
  - The four Management Functions
  - Management types and Skills
  - Management-and New Work place
- Managerial Decision making
  - Types of Decisions and problems
  - Decision making Models
  - Decision making steps
  - New decision approaches for the New Work place
- Change and Development
  - Forces for change
  - Need for Chance
  - Resistance to Change (force -field Analysis)
  - Organizational Developments

- Leadership is Organization
  - The Nature of Leadership
  - Leadership Vs Management
  - Leadership traits
  - Behavioural approach
  - Contingency approach
  - Change Leadership
- Motivation in Organization
  - The Concept of Motivation
  - Foundations of Motivation
  - Content Perspectives on Motivation
  - Price Perspectives on Motivation
  - Motivating is the new Workplace
- Team in Organization
  - Teams at Work
  - Types of Teams
  - Team Process
  - Managing Team Conflict
- Human Resource Management
  - The Strategic Role of HRM
  - Alternating an Effective Workplace
  - Developing an Effective Workplace

FSC3122: Accounting

- Introduction to Basic Accounting
  - Introduction of Business
  - Introduction of accounting equation
  - Theory of double entry
- Process of recording and preparing accounts
  - Document used in collecting information for book keeping purposes
  - Recording transactions in books of prime entry
  - Posting them to the ledger
  - Balancing of accounts and preparation of the trail balance
- Preparation of final accounts introducing minor adjustment.
- Bank transactions and related accounting work

- Opening of a current account
- Cheque transactions
- Preparation of cashbook with bank column
- Preparation of bank reconciliation statements

- Manufacturing Accounts
  - Transactions of manufacturing concerns
  - Preparation of manufacturing accounts

- Accounts of non- trading concerns.
  - Transactions of non-trading concerns
  - Introduction of receipts and payments accounts
  - Introduction of income and expenditure accounts
  - Preparation of statements of affairs

- Petty cash procedures
  - Recognize patty Expenses in an office
  - Introduction of imprest system
  - Posting the totals to the respective accounts

- Accounting Concepts.
  - Various aspects of accounting concepts

FSC3132: Speech Communication

- **Introduction to the theory of speaking**
  - **Speakers and Audiences:**
    Unity and communication, learning about audiences, Accommodation and civility

- **Foundations of speaking:**
  Dimensions of speech,
  - **The practical and formal;**
    The interpersonal, Roles speaking as a social action
  - **Speech communications:**
    Variables, speech communication noise, Human conditions and interactions Identification, Use of speech, Speaking situations
  - **Disciplines of speech communication:**
    Defensive response, Trust, Social nature, Questions about you, You and your group, you and society

- **Making choices about what to speak:**
  Audience, age, gender, cultural and ethnic Identity, speeches to inform, speeches persuade, The thesis of speech, Extemporaneous speech

- **Organizing the speech:**
  Preparing outlines, Headings and indentations, Coordinate points and subordinate points, Speech outline,
  - **Speech analysis:**
    The introduction, the thesis, The body, The conclusion
- **Face to face interaction:**
  Oral, writers written, commercial Interpersonal awareness. Forces against identifications Cohesive meaning and emphasis Model speech outlines.
- **Development of ideas:**
  materials and use of audio visual aids.
- **Verbal materials:**
  Use of statistics, quotations and authority, selecting materials finding material, citing sources, space of outlines
- **Persuasion:**
  Three assumption of persuasion
  - **Bases in modes of proof:**
    Logical proof, Psychological proof/Maslow's theory

  Personal proof:
  Credibility

  Bases in Organization:
  Direct Patterns, Indirect Patterns, Combined Patterns, Monroe's Patterns
  Bases in Language- clarify, liveliness, variety, acceptability, Bases in delivery, Answering Persuasive message, Sample analysis, Model speech outlines
- **Speaking and Listening:**
  Certainty Interaction Vs probability, Objecting Vs subjective forms of reasoning Obstacles to critical thinking, Cognitive emotional, strengthening critical thinking
- **Listener:**
  Goals of Listening:
  Listening Problems, Improving listening, Good audience
- **Language and purpose:**
  Language Symbols, Social agreement, Denotation Identification and Connotation, Facilitating
- **Identifying:**
  Your self, Nonverbal Behavior, Nonverbal strategies, Eye Contact Voice,

  Articulation, Pronunciation, and enunciation
- **Personal and Social goals:**
  Personnel and social growth, Subject of speaking, Wording the questions for discussion, Strategic format for discussion, Panel discussion, Symposium
  - **Interpersonal Problem:**
    Mob rule, Qualities of successful group Interaction

- **Speech Preparation for Special Occasions:**
  Impromptu speech, The announcement, Speech of introduction, After dinner speech, Nomination speech, Presentation speech, Acceptance speech, Welcome speech, Response to welcome speech
- **Types of public speaking:**
  Information speaking, Speech designs (spatial, categorical comparison and contrast, sequential, Causation combined historical combined causation), Persuasive speaking, Ceremonial speaking (Tribute, acceptance, introduction, inspiration after dinner)
- **Group communication:**
  Speeches for analysis, Model speech
- **Research in communication:**
  Library, Correspondence, Direct observations

Hours - 30; Practical Hours - 25

FSC3bP2: Research Project
A Student may do an individual research project under a chosen supervisor(s). A project report must be submitted. A presentation/viva will be held at the end of the semester.

11.2 Optional Course Units offered in Semester II

FSC225α	Health related physical fitness and wellness
FSC2212	Active Citizen Community Project
FSC3212	Marketing Management
FSC3242	Human Resource Management
FSC3252	Scientific writing and communication (Compulsary for B.Sc. Special Degree Students)

FSC225α: Health Related Physical Fitness and Wellness
This course is offered to Level II students during the first semester. Students who follow FSC214α are not eligible to follow FSC225α (Health related physical fitness and wellness) and vice versa
Time Allocation: 60 hrs of practical lessons

Course Objectives: Learning to prevent sports accidents and disease through regular exercise and weight training

- To detail the meaning and importance of health-related physical fitness
- To assist the student in the acquisition of basic knowledge related to resistance training, exercise programs and conditioning
- To improve the student's physical capacities through participation in specified training programs and experiences.
- To develop an appreciation for the importance of physical activity/exercise in maintenance of a healthy body

Outline of the Syllabus:

- Benefits of regular physical activity/exercise (e.g. prevention of disease)

- Use of weight training for increasing muscle strength and endurance
- Use of aerobic activity (e.g. running, fitness walking, aerobics) to improve cardio-respiratory function
- Use of range of motion exercise to improve flexibility and prevent injury
- Use of physical activity/exercise to improve body composition

Practical schedule: Students will be able to use the training facility at the gymnasium They are required to maintain an exercise/activity/weight-lifting chart

- 1st week: walking, running, aerobic dance
- 2nd week: Exercise principles & techniques, Prevention & care of injuries
- 3rd week: Introduction to Weight training & weight management
- 4th week: Weight training/lifting (step by step)
- 5th - 15th week: regular physical/aerobic activities, exercise program and weight training program (All students start with 12 min. of aerobic activity working towards reaching their individual Target Heart Rate and add 1-2 min. per session to reach 20-30 min. of continuous activity by the end of the course) (For weight training, students determine their individual 10-repetition maximum and work towards reaching the target in progression)
- Assessment method: Continuous assessments (30%) and final practical examination (70%)
- 80% attendance is required to be eligible for the final examination

FSC2212: Active Citizen Community Project
This course is offered to Level II students who follow FSC2122 (Active Citizenship).
Time Allocation: 60 hrs of practical lessons

Course Objective

- to workout needs assessment
- to develop skills in social action project planning
- to identify and consult key stakeholders
- to assess risks involved in a community project
- to experience implementation of a project
- to complete a project successfully

Learning Outcomes
On completion of the course unit, students should be able

- to conduct a needs assessment of a particular community
- to engage in respectful dialogue with community leaders and other stake holders

- to make right decisions
- to respect cultures, religions and communities
- to display skills in leadership and in social development project planning and implementation
- to assess the benefits of the project and to measure achievements

Course Content
Needs assessment, planning the project, project proposal submission, proposal revision, approval of the project, implementation, project presentation, Evaluation.

Methods of Teaching and Learning
and learning Reading material, community surveys, discussions, proposal writing, implementation, group activities, presentations.

Method of Assessment

- Continuous assessment - 50%
- Report and Presentation - 50%

References
British Council Active Citizens website
($http://activecitizens.britishcouncil.org$)

FSC 3212: Marketing Management

Course Objective
This course unit expects to provide students with an understanding of the key concepts of marketing philosophy by providing insights into the role of marketing in contemporary business organisations.

Learning Outcomes
Upon successful completion of the course unit, the students should be able to;

- Understand the Marketing Philosophy
- Understand the Marketing Management process
- Appraise the role of Marketing function in contemporary businesses

Course Content

1. **Understanding the Critical Role of Marketing**
   Introduction to Marketing, Evolution of Marketing
2. **Creating and Capturing Customer Value**
   Customer Value and Satisfaction, The Marketing Process, Marketing Mix

3. **Analyzing the Marketing Environment**
   The Companys Microenvironment, The Companys Macroenvironemnt

4. **Consumer Markets and Consumer Buying Behaviour**
   Model of Consumer Behavior, The Buyer Decision Process

5. **Business Markets and Business Buying Behaviour**
   Model of Business Behaviour, The Business Buying Process

6. Managing Marketing Information to Gain Customer Insights Marketing information system (MIS)

7. Customer-Driven Marketing Strategy: Creating Value for Target Customers Market Segmentation, Market Targeting, Differentiation and Positioning

8. Products, Services, and Branding Strategy Product and Services Decisions Branding Strategy: Building Strong Brands

9. New-Product Development and Product Life-Cycle Strategies New-Product Development Process Product Life-Cycle Strategies

10. Pricing Strategies Internal and External Considerations Affecting Price Decisions New-Product, Product Mix and Price Adjustment Strategies

11. Marketing Channels The Nature and Importance of Marketing Channels The Role of Retailing and Wholesaling

12. Integrated Marketing Communications Strategy The Promotion Mix Advertising, Sales Promotion, Personal Selling, Public Relations, Direct and Online Marketing The Communications Process

13. Creating Competitive Advantage Competitor Analysis Competitive Strategies

14. Ethics and Social Responsibility in Marketing

FSC3242: Human Resource Management

Course Objectives:
This course simply introduces the functions of Human Resources Management in the development of an effective work force in an organization and make the student capable of handling of issues in Human Resources Management with special reference to Sri Lankan context.

Expected Outcomes:
On completion of this module, students are expected to be able to:

- Explain the human resources management process and its importance to Organizational effectiveness
- Understand the processes related to the design, implementation and administration of human resource man- agement programs in an organization.
- Identify various challenges facing the management of human resources
- Explain the strategic role of human resources management

Method of Assessment:

- End semester examination- 60%
- Continuous assessment- 40%

Course content:

1. Introduction to Human Resource Management
2. Iob Design and Iob Analysis
3. Human Resource Planning
4. Recruitment & Selection
5. Hiring & Employee , Induction
6. Human Resource Development
7. Employee Performance Evaluation
8. Career Management
9. Employee Compensation & welfare Management
10. Employee and Labor Relations
11. Employee Movements
12. Employee Health and Safety Management
13. Employee Discipline Management
14. Employee Grievances Handling

Recommended readings:

1. Opatha H.H.D.N.P. (2009), Human Resource Management, Sri Lanka.
2. Dessler G, (2008), Human Resource Management, 11th ed, Prentice Hall of India; New Delhi.

FSC3252: Scientific writing and communication .

Target group: B.Sc. Special Degree student (Level I/ compulsory), B.Sc. General Degree student (Level III/ optional).

Time Allocation: 20 lecture hrs and 30 practical hrs.

Outline of the Syllabus: Communicating science; The ABC of science communication, Types of written communication (i.e. memo, report, letter, manual, description, popular article, thesis, scientific paper), Scientific and popular writing, Precise writing and Language (i.e. coherence, choice of words, active and tight writing, parallel structure, transitions to link ideas), Components of the scientific paper, Presenting statistics, Designing effective tables and figures, Writing abstracts, Literature search and referencing, Tools for effective

search (i.e. ISI web, Scopus and journal data bases), Planing and preparing oral presentations, Performing oral presentation, Designing an effective poster, Poster presentations, Ethics in publishing (i.e. fabrication, falsification and plagiarism), Ownership and authorship of data, Journal selection, Indexing and journal impact factors, Publication process.

Assessment method: Students will be evaluated on writing (50%) and communication (50%) skills. Writing assessment(s) may include writing a small review in their subject specialties or case studies based on critical evaluation/ analysis of published abstracts and scientific papers. Communication skills will be evaluated through oral/ poster presentations.

12 Learning Resources

12.1 Library Facilities

12.1.1 Introduction

The Library of University of Ruhuna being a central research library in the southern region of Sri Lanka caters for vast variety of communities in the country. The Ruhuna University Library has five branch libraries in addition to the Main Library,which serve the Faculty of Agricultural at Mapalana, Faculty of Engineering at Hapugala , Faculty of Medicine at Karapitiya ,Faculty of Allied Health Science at Mahamodara and Faculty of Technology at Karagoda Uyangoda.

Main Library located in the Wellamadama university premises which serves the communities of five faculties; Faculty of Humanities and Social Science, 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

Staff of the Library of University of Ruhuna consisted of 13 Academic staff members and two administrative staff members.

Academic Staff Members	
Librarian	Mr. Ananda Karunaratne B.Dev. Studies (Statistics) (Honours) (Colombo), Dip. in Lib. & Inf. Science (Kelaniya), MSSc. (Lib. & Inf. Science) (Kelaniya)
Senior Assistant Librarian (Faculty of Agriculture)	Mrs. S. L. Gammanpila B.Sc. Agri (Hons) (Ruhuna), MLS (Colombo)
Senior Assistant Librarian (Technical Services)	Mr. N. Hettiarachchi B.Sc.(Hons) (Ruhuna), MSSc. (Lib. & Inf. Science) (Kelaniya)
Senior Assistant Librarian (Reader Services)	Mr. U.A. Lal Pannila B.A. (Hons) (Peradeniya), MSSc. (Lib. & Inf. Science) (Kelaniya)
Senior Assistant Librarian (Faculty of Engineering)	Mr. J. J. GarusingArachchi B.A. (Hons) (Kelaniya) MLS (Colombo)
Senior Assistant Librarian (On study leave)	Mrs. T. KuruppuArachchi B.Sc.(Hons)(Ruhuna) MLS (Colombo) Reading for Ph.D. (Australia)
Senior Assistant Librarian (Faculty of Medicine)	Mr. K. T. S. Pushpakumara B.Sc. (Hons) (Ruhuna) MLS (Colombo)

Academic Staff Members	
Senior Assistant Librarian (Technical Service)	Mr. K.H. Ramanayaka B.Sc. (Hons) (Ruhuna), MSSc. (Lib. & Inf. Science) (Kelaniya), Reading for Ph.D. (China)
Senior Assistant Librarian (Digital Library and Periodical)	Mr. I.D.K.L. Fernando B.Sc. (Hons) (Ruhuna) M.ISM. (Colombo)
Senior Assistant Librarian (Cataloguing and Classification)	Mrs. Sakunthala Senevirathna B.A. -Lib Sci. (Hons) (Kelaniya), Dip. in Journalism (Colombo), MSSc. (Lib. & Inf. Science) (Kelaniya)
Assistant Librarian (Acquisition Division)	Ms. P. K. Jayasekara B.Sc. Agri (Hons) (Ruhuna) MLS(Colombo)
Assistant Librarian (Faculty of Allied Health Science)	Mr. P.G. Nishantha B.Sc. (Hons) (J'Pura) MLS (Colombo)
Assistant Librarian (Faculty of Technology)	Mr. J.A.Ajith B.A. (Hons) (J'Pura) MA(J'Pura) MIT(UCSC, Colombo)
Administrative Staff Members	
Senior Assistant Registrar (Library Services)	Mr. C.P.K. Edirisinghe BA. (Hons)(J'Pura) PDBA (Ruhuna)
Senior Assistant Registrar (Library Services)	Mrs. G.A. Jagathi Hemmali

12.1.3 Library Opening Hours

A description of hours of opening is given in the following table.

Description of the period	Days of opening	Hours of opening
Normal opening hours	Monday to Friday	8.00 a.m. to 6.00 p.m.
	Saturdays	8.30 a.m. to 5.00 p.m.
	Sundays	Closed
Public holidays and Poya days	–	Closed

Note: Opening hours of the library may be revised.

12.1.4 Library Collections

The library consisted of sections for lending, reference, periodicals and special collections. In detailed descriptions of library collections are given below.

- **Lending Section :** Lending section is located in the second floor of the Library. Lending section issues books for a period of two weeks to undergraduates. If needed which can be extended for another two weeks through the "ISURu" database.

- **Reference Section :** This section is located in the first floor of the Library. Reference section includes reference materials and permanent reference materials. Reference materials are issued to students for overnight use. Reference materials could be borrowed between 3.00 p.m. to 5.00 p.m. and should be returned before 10.00 a.m. of the due date.

  Permanent reference materials (such as encyclopaedias, dictionaries, glossaries and other valuable books) are intended strictly for reference within the library. Reading facilities are provided in this section.

- **Periodical Section :** Periodical section is located in the first floor of the Library. The periodical section consists with different kinds of printed and online resources, such as; back volumes of printed journals, newsletters, printed periodicals currently subscribed by University of Ruhuna Library, online databases subscribed through Consortium of Academic Libraries of Sri Lanka (CONSAL) and past examination papers.

  Printed periodicals currently subscribed by University of Ruhuna Library

  1. Scientific American
  2. National Geographic Magazine
  3. Time magazine
  4. Lanka Monthly Digest
  5. Journal of the National Science Foundation of Sri Lanka
  6. ගෙවිදුවරයා

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

  1. Emerald
  2. Taylor & Francis
  3. SAGE Research Methods Online
  4. Oxford University Press
  5. Science Direct
  6. Wiley online Journal
  7. HINARI
  8. AGORA
  9. OARE

  Printed materials available in periodical section are meant to be used within the Library. This collection is opened from 9.00 a.m. to 4.00 p.m. on weekdays.

- **The Sri Lanka Collection (Ceylon room) :** This collection is arranged in a separate room in the first floor. The library materials, which are useful to obtain various information about Sri Lanka, are arranged in this collection, such as;

  1. Government publications (Annual reports, statistical reports)

2. Rohana collection
3. Copies of Master's and Doctoral theses of Academic staff and students of the University of Ruhuna
4. Professor Justin Labrooy collection
5. Professor Alawaththagoda Premadasa collection
6. Newspaper collection

Readers may not allow 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 :** Legal Deposit Collection is located in the newly established library building in first floor and the second floor. Legal Deposit Collection is the latest collection in Main Library., University of Ruhuna. The University of Ruhuna has become fortunate to join the group of institutes in Sri Lanka that have been maintaining legal deposit collections since 2013. This collection consisted of all the publications published within Sri Lanka since 1990. Currently, this valuable collection consisting of 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 preservative conditions and only available for reference within the collection. This collection is opened 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 consisted 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 library materials in the University of Ruhuna Library is organized according to the Dewey Decimal Classification (DDC) system. DDC helps to arrange library materials by discipline. The main classes of DDC are shown in Table 2.

Table 3: Dewey Decimal Classification (DDC) system.

DDC Number	Discipline
000	Computer science and general works
100	Philosophy and Psychology
200	Religion
300	Social Sciences
400	Language
500	Natural sciences and Mathematics
600	Technology (Applied science)
700	Arts; Fine arts and decorative arts
800	Literature and rhetoric
900	Geography and history

12.1.6 Library Catalogue

An Online Public Access Catalogue (OPAC) is a computerized online database of all the resources held in the library. Users can use OPAC to search library materials available in the library. It can be accessed from URL: isuru.lib.ruh.ac.lk. 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(temoorarily closed) Library Auditorium - can be used for 80 users with the modern electronic facilities

- **Library Self Learning Area :** Library Self Learning Area is open from 8.00 a.m. to 8.00 p.m. throughout the year with free Wi-Fi 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.

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 following table.

Table 4: Number of books that can be borrowed by students

Degree program and Level	Lending books	Reference books	Electronic media
Level I	03	01	01
Level II	04	02	01
Level III	05	02	01
Level IV	06	02	01
Postgraduate	03	01	-

Note - Level I students are only allowed to borrow one 'Student centred learning' material.

- **Returning Library Resources :** Borrowed books must be returned by 9.00 a.m. on the due date. Borrowers remain responsible for books, which are issued to them.

  If an issued book is lost or damaged, the matter should be reported to the library immediately. Borrower has to replace it with a new copy of the same edition or subsequent edition within due date. 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.

  All library resources borrowed must be returned and all outstanding fines must be paid when a student leaves the university. Users who fail to fulfil their obligations may have their degree certificate withheld until they return the borrowed resources and pay the fine.

- **Fines and Payments :** A fine of Rs.1.00 per day will be imposed in respect of each book borrowed from lending section, if not returned by the due date. A fine of Rs.3.00 per day will be imposed in respect of each book borrowed from reference section, if not returned by the due date. All payments should be made to the Shroff of the University.

12.1.9 Science Faculty Library

This library was established on financial assistance provided by the Asian Development Bank. This is only a reference library, and possesses a specialized collection of Science Books, Periodicals and Journals. Several computers with internet access is available in the library. Undergraduate and postgraduate students of the Faculty are allowed to use this library.

- **Library Staff : Library Assistant**
  Mrs. Umane Bogahawatta

- **Opening Hours :** The library is open from 8.00 am to 12.00 noon and 1.00 pm to 4.00 pm on weekdays.

12.2 Department of English Language Teaching (DELT)

The Department of English Language Teaching (DELT), located in the Faculty of Humanities and Social Sciences, is common to all faculties of the University. It offers academic programmes aimed at developing in the undergraduates English Language Skills.

12.2.1 Staff of DELT

Designation	Name
Senior Lecturers - Grade II	Mr.K.S.G.S. Nishantha (Head/DELT) B.A.(Kelaniya), M.A. (Kelaniya) M.A. in Applied Linguistics-TESL(Newcastle) MPhil in Linguistics (Kelaniya)
	Mr. W. Wijesinghe B.A. (Colombo), M.A. (Kelaniya) Dilploma in ELT(Tertiary)(Colombo) MPhil in Linguistics (Kelaniya)
Probationary Lecturers	Mr. S.G.S. Samaraweera (P.L) B.A. (J'pura), M.A.(Kelaniya) MPhil in Linguistics (Kelaniya) PhD (Reading)
	Mrs. Indu Gamage B.A. (Kelaniya), M.A. (Kelaniya) MPhil (Kelaniya)
	Mr. Ruwan Gunawardene BA (Hon) (Sabaragamuwa), M.A. (Kelaniya) MPhil (J'pura)
	Miss. N. Dissanayake B.A.Hons (English) (Kelaniya)
	Miss. K.H.M.A.U. Kariyawasam B.A .Hons (English) Peradeniya, SL MA in TESL, PGIE, OUSL
	Miss. H.S. Hidellaarachchi B.A. Hons Eng & ELT (OUSL) MA in Linguistics- University of Kelaniya
	Miss. H.M.T.M.H. Molagoda B.A. Hons Languages (English),Sabaragamuwa University of Sri Lanka MA in Linguistics, University of Kelaniya (Reading)

Instructors	Mr.J.W. Gnanathilaka BA(Peradeniya),Dip. In TESL Dep. In TEST, CEELT (Cambridge)
	Miss. G.A.R.C. Jayarathna B.A.English (Hons) Degree (University of Sri Jayawardenapura) Reading for M.A. in TESL (Postgraduate Institute of English -OUSL)
	Miss. D.S. Anupama B.A. (Peradeniya), M.A. in Linguistics (Kelaniya)
	Miss. P.P.Samarawickrama B.A. (Kelaniya) Master of Human Resource Management (MHRM),University of Kelaniya Professional Qualification in HRM (PQHRM) Charted Institute of Personal Management
	Miss. Chakrangi A. Dahanayake B.A. Languages (Special) English Sabaragamuwa University of Sri Lanka,Master of Arts in International Relations
	Miss. S.T.W.M. Pushpananda Bachelor of Arts (University of Colombo) M.A. in Linguistics (University of Kelaniya) Postgraduate Diploma in Applied Sociology (University of Colombo) Reading for MA in English Studies (University of Colombo)
	Mrs. R.A.W.D.Jayawardhana B.A. University of Peradeniya M.A. in Linguistics, University of Kelaniya
	Miss. Saumya Batuwatta B.A. (J' Pura), M.A.(Kelaniya)

12.2.2 English Courses offered by DELT

- **Intensive Course in English :** The Department offers an intensive course in English for university entrants prior to the commencement of the first academic year depending on the time available. The duration of this course depends on the time permitted before the commencement of the academic prgramme.

- **Courses offered during academic years**

  Introduction:
  The DELT offers a three-year compulsory programme of English for the BSc undergraduates of the Faculty of Science in three levels termed as Preliminary, Intermediate and Advanced. In this programme the students are provided with handouts prepared by the DELT based on lesson materials extracted from textbooks. 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: Preliminary English for Science Students

  This non-credit course unit will continue for the second semester. A grade will be given at the end of the final examination.
  Course Outline for Semester I: Preliminary English I

1. **Listening & Speaking**

Information gap	-	Listening & speaking activities
Descriptions	-	Describing events & things
		Properties & shapes
		Location structure
Interviews	-	Formal & informal interviews
Giving instructions	-	Use of the imperative form
Situational Dialogues	-	How to adapt unconsciously to various language situations

2. **Reading**
   Students are trained to understand and extract required information from a variety of simple written texts. Texts providing a sound basis for the study of Scientific and technological subjects in English are used.
3. **Writing**
   Mechanics of writing, Sentence writing, Paragraph writing
   Preparing a variety of charts, tables, graphs etc. and describing/filling them
   Describing: Properties & shapes
   Location & structure
4. **Grammar** Simple sentence, Identifying parts of speech, Nouns countable/uncountable Adjectives, Subject-Verb agreement, 'be' - 'do' - 'have', Present Simple (active-passive)
   Past simple (active passive), Present Continuous (active-passive)
   Past Continuous (active-passive), Adverbs, Transforms of above (negative & interrogative), Determiners, Prepositions.

- **Course Outline for Semester II: Preliminary English II**

1. **Listening & Speaking**
   Information gap listening & speaking
   Listening comprehension, listening to different genres of English
   Note-taking, Developing the efficiency of note-taking & note taking
   Speaking on given topic
   Describing a process using notes & diagrams
2. **Reading**
   Students are trained to understand and extract required information from a variety of written texts. Texts providing a sound basis for the study of scientific and technological subjects in English are used. In addition they are exposed to academic texts with various registers and general reading material.
3. **Writing**
   Writing definitions, Paragraph writing, Cloze writing, Guided writing
   Parallel writing, Organizational writing, Report writing, Describing processes & measurements
4. **Grammar**
   Present Perfect, Past Perfect, Future Simple Perfect, Relative Clauses /Pronouns
   Passive Voice of above forms, Transforms of above, Complex sentences
   Conditionals

- **Level II**
  ENG2b10: Intermediate English for Science Students

This non-credit course unit will continue for the second semester. A grade will be given at the end of the final examination.

Course Outline for Semester I: Intermediate English I

1. **Listening and Speaking**
   - Listening Comprehension, Listening to different genres and accents of English.
   - Further development of the efficiency of note-taking and note-making
   - Speaking and conducting a discussion on a given topic.
2. **Reading**
   Students are trained to do intensive and extensive reading related to their respective field of study. They are also expected to read the texts provided by the ELTU and do the relevant exercises.
3. **Writing**
   - Further practice in, Paragraph writing ,Cloze writing and Report writing
   - Information transfer - (Describing graphs, charts etc., and constructing them based on a given description)
4. **Grammar**
   - Revision of passive forms
   - Passive perfect aspects
   - Relative clauses
   - Combining sentences
   - Participles
   - The Infinitive and the Gerund
   - Order of words
5. **Teaching Process**
   End Semester Exam: 100 marks

Course Outline for Semester II: Intermediate English II

1. **Listening and Speaking**
   - Listening Comprehension, Listening to a variety of speeches and discussions in English.
   - Listening to lectures in English and making notes in real life situations
   - Training students to deliver a paper.
2. **Reading**
   - Reading and understanding academic texts related to the students' field of study.
   - Getting them to read and understand selected extracts from scientific journals and reports.
3. **Writing**
   - Writing a detailed report on scientific experiments.
   - Using notes prepared by the students to write a comprehensive passage on a given topic.

- Preparing a paper which is to be presented.

4. **Grammar**
   - Complex sentences
   - Simultaneous actions
   - Words followed by prepositions
   - lauses of time, place, manner etc.

   In addition to the teaching process followed in the previous semester, students will be exposed to audio and video cassette recordings.

- **Level III**
  ENG3b10: Advanced English for Science Students

  This non-credit course unit will continue for the Second Semester. A grade will be given at the end of the final examination.
  Course Outline for Semester I: Advanced English I

  1. **Listening and speaking**
     - Listening Comprehension: Listening to reports, presentations at Seminars conferences etc. (international level)
     - Using Internet and other electronic media to listen and make notes and follow up with discussions
     - Conducting discussions and debates on controversial issues.
  2. **Reading**
     Students are further trained to do intensive and extensive reading related to their respective field of study. They are also expected to read extracts taken from the (Library) books and other reading material and practice note making, paraphrasing and summarizing.
  3. **Writing**
     - Practice writing essays composed of several related paragraphs .
     - Preparing presentations and reports.
     - Writing reports based on a survey or research.
     - Further practice in analytic writing based on graphs, charts tables etc.
     - Writings letters or etc.
  4. **Grammar**
     Analyzing complex and compound sentences Identifying the head noun and the main verb of a sentence.
     Different types of clauses.
     Comparative sentences.
     Direct and indirect speech.
  5. **Teaching process**
     The students are provided with handouts prepared by the ELTU and lessons copied from the course texts. The four skills, VIZ listening, speaking, reading and writing are integrated into the lessons. As learning a language is basically a skill, a limited number of students are allocated to a class in order to provide them with sufficient opportunity for practice.

  End semester Exam: 100 marks

- **Course Outline for Semester II: Advanced English II**

  1. **Listening and Speaking**
     - Listening comprehension: Listening to a variety of speeches and discussions in English.
     - Listening to lectures in English and making notes in real life situations .
     - Training students to deliver a paper.
  2. **Reading:**
     - Reading selected extracts from scientific writing paying special attention to style and organization.
     - Further practice in understanding new words by identifying Prefixes stems and suffixes and also longer sentences by identifying clauses and phrases.
     - Further practice in paraphrasing and summering
  3. **Writing**
     - Writing lab reports
     - Writing a detailed report or scientific experiments.
     - Using notes prepared by the students to write a comprehensive passage on a give topic.
     - Preparing a paper, which is to be presented.
  4. **Grammar:**
     - Revision of all major aspects of grammar done so far.
     - Exercises on analyzing sentences (finite , non-finite and verb less clauses)
     - Phrasal and prepositional verbs
     - Transformation of sentences
  5. **Teaching process**
     The students are provided with handouts prepared by the ELTU and lessons copied from the course texts. The four skills, viz., listening, speaking, reading and writing are integrated into the lessons. As learning a language is basically a skill, a limited number of students are allocated to a class in order to provide them with sufficient opportunity for practice.

  Duration: For each Semester: 30 hours (02 hours/week $\times$ 15 weeks)

  Assessment: Year end examination

  i. Students can sit both Level I & II examinations in the second year. If Level II is passed then the certificate would not be issued until Level I is completed in a repeat attempt. In such cases they can repeat only Level I examination.

  ii. If a final year student has failed Level I but passed Level II then he/she may be allowed to sit both Level I and Level III examinations in the final year. However, Level I should be passed to receive certificate.

- **Requirement of English Language for obtaining the B.Sc. Degree :** In order to obtain the B.Sc. (General) Degree, it is compulsory that students pass Level I and Level II examinations in English. In the case of Bachelor of Science (Special) Degree, in addition to the above levels, they should also obtain a pass in Level III examination.

12.3 Department of Physical Education

Activities pertaining to sports and recreation are conducted by the Department of Physical Education. The Department is advised by a sports advisory board, which consists of officials of the department and two academics from each of the faculties. Whenever necessary, external assistance is sought for coaching on part time basis.

Staff of Department of Physical Education

Designation	Name
Director	Mr. P. N. Weerasinghe, B.Com. Sp. (Sri J'Pura), Sports Dip. (Ministry of Sports)
Instructors	Mrs. S. V. K. de Silva, Sports Dip. (Ministry of Sports)
	Mr. K. H. Keerthi Kumara, B.A. (Kel)
	Mr. P. K. Sanath Chandana, Teacher Training (Ministry of Education)
	Mr. J.P.A.N.M. de Silva, (B.Sc. Kelaniya)
	Miss. D.D.Priyadarshani B.Sc.(Physical Education Special) (Sabaragamuwa)

Our Vision

"To socialize a law-abiding and socially productive graduate with the ability of effective leadership qualities and fair decision making, who is physically and mentally well balanced"

There are numerous student sports activities organized by the Department of Physical Education including both indoor and outdoor sports. A gymnasium with training facilities is located in the Wellamadama University Complex for indoor sports and it is open for the students after 10.00 a.m. on weekdays up to 7.00 p.m. The department has well equipped Strength Training Hall to develop the Physical Fitness for specially Sportsmen/women and other students.

13 Sports and Recreation

Facilities for Sports

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

- Basketball (Men and Women)
- Badminton (Men and Women)
- Table Tennis (Men and Women)
- Weight Lifting (Men and Women)
- Volleyball (Men and Women)
- Chess (Men & Women)
- Taekwondo (Men & Women)
- Carrom (Men & Women)
- Netball (Women)
- Wrestling (Men)
- Karate (Men, Women)
- Power Lifting (Men, Women)
- Scramble (Men & Women)

Outdoor sports facilities are provided to students at Wellamadama University grounds. Following sports facilities are made available free of charge to all students.

- Athletics (Men and Women)
- Hockey (Men and Women)
- Elle (Men and Women)
- Cricket (Men)
- Football (Men)
- Rugger (Men)
- Swimming (Men and Women)
- Tennis
- Baseball (Men)
- Swimming (Men, Women)
- Softball Cricket (Women)
- Kabadi (Men, Women)

There are annual sports events such as Inter-Faculty and Inter-University tournaments. In addition, Sri Lanka University Games (SLUG) is held at a selected University once in three years. Students are able to participate in the World University Games and Asian University Championships, which is held once in two years. At the end of each two years, Colours Award Ceremony is held and those who excel in these sports activities at Inter University tournaments and meets are awarded colours.

The University provides several facilities for those who participate in sports events. Sports goods are freely available to students who participate in Inter University tournaments/meets and also for practice sessions. A subsistence of Rs. 500.00 is paid per day when a student participates in an event held outside the University. For team events, the required clothing is provided to students at a cost of only 20% of the value. For practice sessions of Inter University Championships, the University provides an allowance of Rs.50.00 per day per student to have a nourishment.

We have already started two academic courses for Level II students named "Physical Fitness & Health Management" and "Health Related Physical Fitness and Wellness". Fifteen (15) hours of theory classes and thirty (30) hours of practical classes includes for the first course and sixty (60) hours of practical classes for the second course.

14 Examinations

14.1 Bachelor of Science Degree Programmes

14.1.1 The Bachelor of Science (General) Degree

The Bachelor of Science (General) Degree will include six semesters during which students will have to follow Core Course Units (CCU) offered by respective departments and Optional Course Units (OCU) acceptable to the Faculty of Science, University of Ruhuna. The Bachelor of Science (General) Degree Examination will consist of end of semester examinations for theory Course Units. In the case of practical course units, examinations will be held as desired by respective departments.

A candidate shall be eligible for the conferment of the Bachelor of Science (General) Degree after the successful completion of all requirements (as specified in the Sections 14.2 and 14.3) within a maximum period of five academic years from the date of entry to the University of Ruhuna.

14.1.2 The Bachelor of Science (Special) Degree

The duration of the special degree programme is four academic years (eight semesters), inclusive of Levels I & II of the General Degree and Levels I & II of the Special 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 Special Degree programme subjected to the approval of the department of his/her subject of specialization. Furthermore, a special 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 B.Sc. (Specail) Degree students to pass FSC3252-Scientific Writing and Research Course Unit.

The Special 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 (Special) Degree after the successful completion of all requirements (as specified in the Sections 14.2 and 14.3) within a maximum period of six academic years from the date of entry to the University of Ruhuna.

14.1.3 Attendance:

The minimum attendance for theory and/or practical classes should be 80% for a student to be eligible to appear for the examination(s) of relevant course unit. Those who do not fulfill this requirement will be considered as to have failed in that particular Course Unit.

B.Sc. (General) Degree: In the event if a student fails to maintain at least 40% attendance for any of the practical course units of Level I of the general degree programme, he/she will not be allowed to sit for the examination of that particular course unit even as a repeat student and hence he/she has to leave the university.

B.Sc. (Special) 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 special 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 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.

14.2.3 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.

14.2.4 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:

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

14.2.5 Award of Honours for B.Sc. (General) Degree

A candidate who has satisfied conditions given in Section 14.2.4 is eligible for an award Honours Degree if he/she completes the requirements indicated below within three academic years from the date of first registration securing grades of C or better aggregating to a minimum of 75 credits with grades of C or better for a minimum of 40% credits of practical Core Course Units.

1. First Class Honours
   (a) a minimum GPA of 3.70 and
   (b) grades of A or better in Course Units aggregating to a minimum of 40 credits.
2. Second Class (Upper Division)
   (a) a minimum GPA of 3.30 and
   (b) grades of B or better in Course Units aggregating to a minimum of 40 credits.
3. Second Class (Lower Division)
   (a) a minimum GPA of 3.00 and
   (b) grades of B or better in Course Units aggregating to a minimum of 40 credits.

Subject Certification Requirement: The minimum number of credits required for a subject to be called a main subject of a three year degree would be 24 credits.

14.2.6 Bachelor of Science (Special) Degree Examinations

Minimum Requirements for the Completion of the Bachelor of Science (Special) Degree A student shall be deemed to have passed the Bachelor of Science (Special) 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 Special 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 Special Degree Course Units.

14.2.7 Award of Honours for B.Sc. (Special) Degree

A student who has fulfilled all the stipulated conditions in Section 14.2.6 shall be awarded honours, if he/she fulfills the following additional requirements within four academic years from the date of first registration (it shall be within the power of the Senate to declare for some specified reason that a student is eligible for the award of the honours at a subsequent occasion) securing grades of C or better aggregating to a minimum of 48 credits from Special Degree Course Units.

1. First Class Honours
   (a) a minimum GPA of 3.70 for Special 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 Special Degree Course Units aggregating to a minimum of 30 credits
2. Second Class (Upper Division)
   (a) a minimum GPA of 3.30 for Special 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 Special Degree Course Units aggregating to a minimum of 24 credits
3. Second Class (Lower Division)
   (a) a minimum GPA of 3.00 for Special Degree Course Units, and
   (b) a minimum GPA of 3.00 for all course units of the subject of specilization

14.2.8 Option of reverting to B.Sc. General Degree

A student reading for a B.Sc. Special Degree may request for the award of the B.Sc General Degree foregoing the special 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 Special Degree programme. The student shall satisfy the following conditions:

1. The results of the B.Sc General Degree shall be determined solely on the basis of course units he/she has followed in the first three academic years.
2. A student shall be deemed to have passed the Bachelor of Science (General) Degree Examination if he/she has satisfied the requirements of the section 7 of the Bachelor of Science (General) Degree By-Law.
3. The minimum number of credits required for a subject to be called a main subject of a three year degree would be 24 credits.
4. A student shall be eligible for an award of Honours for the B.Sc. (General) Degree if he/she has completed the requirements within first three academic years from the date of first registration in accordance with the section 8 of the Bachelor of Science (General) Degree By-Law.

14.3 Other requirements for the completion of a Degree

14.3.1 Attendance at Practical Course Units:

Students are required to maintain a minimum of 80% attendance at theory and/or practical classes of a Course Unit to be eligible to sit for the relevant examination. Those who do not fulfil this requirement will be considered as to have failed in the particular Course Unit.

N.B. The procedure that should be followed when a student gets absent at classes and examinations due to an illness is described under Section 16.3.

14.3.2 Release of Final Results

B.Sc. (General) Degree: In addition to the examination Criteria stated under Section 14.2, the candidates have to fulfill the following in order to release the final results of the B. Sc. (General) Degree.

1. Pass in English Proficiency Level I (ENG1b10) and Level II (ENG2b10) tests.
2. Pass in Course Unit "MAT1142: Mathematics for Biology". This requirement is applicable only for Biological Science candidates.
3. Pass the examination of Computer Literacy Course (ICT1b13 (CLC)) conducted by Computer Unit. This requirement is applicable only for students who do not follow computer science as a subject.

B.Sc. (Special) Degree: In addition to the examination Criteria stated under 14.2, the candidates have to fulfill the following in order to release the final results of the B.Sc. (Special) Degree.

1. Pass in English Proficiency Level I, Level II and Level III (ENG1b10, ENG2b10, and ENG3b10) Examinations.
2. Pass in Course Unit "MAT1142: Mathematics for Biology". This requirement is applicable only for Biological Science candidates.
3. Pass the examination of Computer Literacy Course (ICT1b13 (CLC)) conducted by Computer Unit. This requirement is applicable only for students who do not follow computer science as a subject.
4. Pass in course unit(c- or better) FSC3252: Scientific Writing and Research.

14.4 Fees

14.4.1 Fees Levied for Registration for a Degree Programme

Following table provides the details of fees to be paid for different activities by each undergraduate on registration for a degree programme.

Degree Programme	Fees per Level	Amount (Rs.)
Undergraduate	Registration fee:	
	B.Sc. (General) Degree - Level I	450.00
	B.Sc. (General) Degree - Level II	200.00
	B.Sc. (General) Degree - Level III	200.00
	B.Sc. (Special) Degree - Level I	200.00
	B.Sc. (Special) 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 (Special) 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 (Special) Degree Examination in Physical Science is awarded this Gold Medal.

- Mallika de Mel Memmorial gold Medal by the Ronie de Mel Funded Trust Fund
  A student who obtained a First Class Honours with the highest aggregate marks in the final Examinations leading to the Degree of Bachelor of Science is awarded this Gold Medal.

- Professor Isabelle Attali Memorial Gold Medal
  A student who scored the highest aggregate marks at the B.Sc. (Special) Degree Examination in Mathematics with a First Class Honours is awarded this Gold Medal.

- Dr. Jude Peiris Memorial Gold Medal
  A student who scored the highest aggregate for the Industrial Mathematics Course at the B.Sc. (General) Degree in Physical Science Examination with at least a Second Class honours (Upper Division) Honours is awarded this Gold Medal.

- Industrial and Financial Systems(IFS)Gold Medal
  A student who followed Computer Science as a subject achieving grade A for at least 50% of Computer Science core course units and obtained the highest aggregate mark with at least a Second Class honours (Upper Division) pass at the B.Sc. General Degree final examination in Physical Science.

- Tissaweera Siriwardene Jinasena Memorial Gold Medal
  A student who obtained the B. Sc. (General) Degree with at least a Second Class (Upper Division) Honours, securing the highest overall GPA for Chemistry (core and optional) Course Units registered for the degree is awarded this Gold Medal

- Professor Alawattagoda Pemadasa Memorial Gold Medal
  A student who obtained the B.Sc. (Special/General) Degree with a First Class Honours securing the highest GPA for Botany Course Units with at least 24 core and optional Botany Course Units registered for the degree is awarded this Gold Medal.

15.2 Annual Student Awards

Vice Chancellor's and Dean's awards shall be awarded annually to the students with the best overall performance in each faculty under the approved marking scheme. These awards are funded by the University and administered by the office of the Deputy Vice Chancellor with the collaboration of faculties and assistance of the Examinations and the Student Affairs branches.

15.2.1 Dean's Awards and Dean's List for Overall Performance

Best five students in each batch from each faculty shall be selected under the approved marking scheme.

- **Dean's Awards for Overall Performance** Dean's awards shall be awarded to the best student in each batch under following categories at an award ceremony held at the faculty.

  For non medical students

  - Best first year students
  - Best second year student
  - Best third year student (including both general and special students)
  - Best fourth year student (For special students of Faculties of Science and Humanities and Social Sciences , and students from Faculties of Agriculture, Engineering, Fisheries and Marine Science & Technology, Management and Finance and Faculty of Graduate Studies and Allied Health Science degree programme)

  For medical students

  - Best 2nd MBBS student
  - Best 3rd MBBS student
  - Best Final MBBS Student

  A certificate of achievement (and a cash prize of Rs.10,000.00) will be awarded annually at an Awards Ceremony held at faculty level.

- **Dean's List for Overall Performance** Next four students in each batch who top the list under the approved marking scheme shall be included in the Dean's list and announced at the relevant Faculty Board. A certificate of achievement will be awarded to each student at an awards ceremony held at the faculty.

15.2.2 The Vice Chancellor's Awards and Vice Chancellor's List for Overall Performance

Best overall student who completed the degree from each faculty shall be selected under the approved marking scheme. Next two best students from each faculty shall be included in the Vice Chancellors's list.

- **Vice Chancellor's Award for Overall Performance** A Gold Medal and a Certificate of Achievement shall be awarded. Students of graduating batch will be 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**
  For Non-Medical students: The students obtaining an average GPA required for a Second Class Upper Division or above in the first attempt of the relevant examination of the courses of study in each academic year will be eligible for an award.
  For Medical students: Students obtaining 2nd Class Upper division or above in the first attempt of the relevant examination of the courses of study will be eligible for an award.
- Other Requirements
  - Any student who has been punished by the University and/or warned (in writing) by the Vice Chancellor or Deputy Vice Chancellor as found guilty for any misconduct shall not be eligible for an award.
  - The overall score achieved by the applicant shall be 70 marks or above for the Vice Chancellor's Award/ List and 65 marks or above for the Dean's Award/ List.

15.2.5 Selection Criteria

- **Academic Achievements (Maximum 60 marks)**
  - **For Non- Medical students:**
    Case 1: If the applicant has the highest GPA above the required GPA for first class or the required GPA for the first class which is higher shall be given 60 marks and other student shall be given marks which are scaled down according their GPA.
    Case 2: If there no applicant having highest GPA above the required GPA for first class or the required GPA for the first class, 60 marks shall be given for the required GPA for the first class and the other eligible students shall be given marks which are scaled down according to their GPA.

The average of the GPA obtained at each examination of relevant academic year shall be considered separately for the Dean's Award. The overall GPA obtained for all examinations shall be considered for the Vice Chancellor's Award.

- **For Medical students:**
  Case 1: The applicant with the highest total aggregate above the required marks for the first class or the required marks for the first class which is higher shall be given 60 marks. The other eligible students shall be given marks which are scaled down according to their total aggregate.
  Case 2: If there no applicant having highest aggregate above the required marks for first class or the required marks for the first class, 60 marks shall be given for the required total aggregate for the first class and the other eligible students shall be given marks which are scaled down according to their total aggregate.

  The total aggregate obtained at each examination of relevant academic year shall be considered separately for the Dean's Award, the total aggregate obtained for all examinations (2nd MBBS, 3rd MBBS and Final MBBS) shall be considered for the Vice Chancellors Award.

- **Sports Achievements (Maximum 20 marks)** Maximum twenty marks shall be allocated for Sports achievements as follows:

Description	**Marks**
World University Games/National Games	
First Place	20
Second Place	15
Third Place	10
Participation for an event (maximum up to 10 marks)	5
International Sports event representing the University	
First Place	10
Second Place	8
Third Place	6
Participation for an event	3
Inter University Events	
First Place	6
Second Place	5
Third Place	4
Participation for an event (Maximum up to 04 Marks)	2
Inter Faculty Events	
First Place	1.5
Second Place	1
Third Place	0.5
University Colors/ Best Athlete/ Player of the year	3
Post of President, Vice President, Secretary, Junior Treasurer, Editor of Sports Council	1/position/year

- **Other Achievements (Maximum 20 marks)** Maximum twenty marks shall be allocated for extracurricular activities other than sports.

Description		Marks
Post of President, Vice President, Secretary, Junior Treasure and Editor of Student Unions/Societies/Associations		1 position for year
Participation at the "Kavitha" Talent Show or Equivalent event	First Place	10
	Second Place	8
	Third Place	6
Participation for an Event	Final Round	4
University approved event /competition/Orator/Singing/Dancing/ Poetry Writing/Scrip Writing etc.) (Solo or Group)		
University Level	First Place	5
	Second Place	4
	Third Place	3
Faculty Level	First Place	2
	Second Place	1.5
	Third Place	0.5
Recipient of Patent		8
University approved Event Organizing		0.5
Inter University Level Competition/Awards	First Place/Best Award	6
	Second Place	5
	Third Place	4
Approved University representation at International Forum / Event		5
Paper accepted/presented at any Conference/Symposia		3
Publication of Books / Holding of Individual Exhibition (Paintings/Arts/Handcrafts/etc.)		2
Contribution to official function of the University		0.5

Special Note:

- If the overall score achieved by two or more candidates for the Vice Chancellor's Awards is identical, special panel consisting Vice Chancellor, Deputy Vice Chancellor and Dean of the relevant Faculty shall reevaluate the candidates to select the best student

16 Student Service Facilities

There is a Student Affairs Branch with a Senior Assistant Registrar at the University to look after the needs of the students outside their courses. It is located in the second floor of the administration building. Many services such as registration of students, Mahapola scholarships, bursaries, student hostels and cafeterias are operated by the Student Affairs branch.

In addition, this branch coordinates two other important services, Student Counselling Service and Health Service.

16.1 Counselling Service Centre

The counselling centre is located in the Science Faculty Complex. Counselling service centre's mission is to provide services and programmes, which promote the personal development and psychological well being of students, and to encourage a university atmosphere which is conducive to growth and which maximizes students' educational attainments. Students have the opportunity to discuss their various mental, social, economical problems or any other matters which they face during their University education. Counsellors, who are Senior academics, offer their assistance, advice and guidance to those students in need. Each faculty has its own group of Student Counsellors. In addition, students also have the opportunity to discuss their problems with other academics.

Senior Student Counsellor of the University
Prof. E. P. S. Chandana

Deputy Senior Student Counsellor of the Faculty
Dr. S. Wanniarachchi

Student Counsellors of the Faculty of Science

Name	Department	Mobile No/Email Address
Dr. N. Yapage	Mathematics	0779516475 nihal@maths.ruh.ac.lk
Dr. N.P. Dissanayake	Botany	0718209475 nandapd@bot.ruh.ac.lk
Dr. H.D. Jayasekara	Chemistry	0718254310 himali@chem.ruh.ac.lk
Dr. A.S. Ranaweera	Chemistry	0714445180 samantharan@chem.ruh.ac.lk
Dr. W.S. Hemalika	Chemistry	0714936125 hemalika@chem.ruh.ac.lk
Dr. W.M.A.K. De Silva	Physics	0766612348 desilva@phy.ruh.ac.lk
Dr. W.A. Indika	Computer Science	0717796910 waindika@dcs.ruh.ac.lk
Dr. N.M. Wickramage	Physics	0718194500 monohari@phy.ruh.ac.lk
Dr. B.G.S.A. Pradeep	Mathematics	0715335106 sampath@maths.ruh.ac.lk
Dr. E.J.K.P. Nandani	Mathematics	0703080345 nandani@maths.ruh.ac.lk

16.2 Career Guidance Unit

16.2.1 Introduction

Career for undergraduates in Universities was recently recognized as a matter of policy by the Government of Sri Lanka. At the University of Ruhuna, the Career Guidance Unit was set up in March 2000 to provide career guidance services to the undergraduates. Since then, the unit has organized various types of workshops, programmes and events to develop the attitudes and skills of the undergraduates to make them best suited for the employment opportunities in the industry and many training sessions were conducted to make undergraduates ready to capitalize career opportunities and to perform smart while managing both employed and personal life. The unit has developed a wide range of network and industry links with many private sector organizations and the government institutions to facilitate productive interaction between the undergraduates and such institutions with the purpose of providing industrial training and career opportunities for the benefits of the undergraduates.

16.2.2 Staff of Career Guidance Unit

This unit comprises of a Director, Faculty Career Advisors and Career Guidance Counselors as mentioned below.

Director	A. C. Karunaratna/Senior Lecturer Tel. Office: 041-2222681, Ext: 2132, Mobile: 071 6054017 E-mail: acruhuna@gmail.com
Career Guidance Counselors	Ms. Sujeewa Vidanagamage BA (Hons), MA (Sociology), PGD (Counseling), Dip. in Counselling(IPC), MPC Mobile: 071 4475666 E-mail: sujeewapt@gmail.com
	Mrs. Pubudu Mallawarachchi B.Sc. (Hons) (Ruhuna), Dip. in Counseling (Ruhuna), Industrial Training(Korea) Mobile: 071 8359365 E-mail: bpkcgu@gmail.com
	Ms. R. M. Anusha Rathnayaka BA (Image Art), Dip. in Career Guidance, Dip. in Photography Mobile: 071 0473119 E-mail: anushshamali@gmail.com
	Mr. W.P. Nilanka Srinath BA(Hons)(Ruhuna), MA(BPU), MA(Kelaniya), Royal Pandith(OSS), PGD in Counseling(Colombo), PGD in Education(OUSL) Mobile: 071 4395787 Email: wpnilankasrinath@gmail.com
Computer Application Assistant	Mr. N. B. R. Madhushanka
Office Assistant	Mr. H.P.V. Prasil Priyantha

Faculty Career Advisors

Faculty of Agriculture	Ms. K.S. Nadeeshani De Silva / Senior Lecturer Department of Agricultural Economics Faculty of Agriculture Mobile: 071 7553936 E-mail: nadee@agecon.ruh.ac.lk
Faculty of Engineering	Dr. Ruwan Gallage / Senior Lecturer Department of Mechanical & Manufacturing Engineering Tel: 076 6450433 E-mail: rgallage@gmail.com
Faculty of Fisheries and Marine Science & Technology	Dr. P. N. Ranasinghe / Senior Lecturer Department of Oceanography & Marine Geology Faculty of Fisheries and Marine Science & Technology Tel: 071 8425475 E.mail: nalakaranasinghe@hotmail.com

Faculty of Humanities & Social Sciences	Mr. Nandasiri Keembiyahetti/ Senior Lecturer Department of Economics Tel: 071 5359388 Email: Nandasiri@gmail.com
Faculty of Management & Finance	Mr. A. G. Deepal /Senior Lecturer Department of Accounting and Finance Tel: 071 2168524 E.mail: deepalguru@gmail.com
Faculty of Medicine	Dr. Avindra Jayawardane/Senior Lecturer Department of Medical Education & Staff Development Unit Mobile: 0770530249 E.mail: avindrajaya@gmail.com
Faculty of Science	Dr. K.K.G.U. Hemamali / Senior Lecturer Department of Botany Faculty of Science Mobile: 071 8209489 E.mail: upekshahe@yahoo.com
Faculty of Technology	Mr. E.A. Dinesh Kumara/ Lecturer Department of Engineering Technology Mobile: 071 3940689 Email: dinesh@etec.ruh.ac.lk

16.2.3 Activities of the Career Guidance Unit

Career Planning	**Career Development**	**Skill Development**
1. Soft skills and personality development 2. Workshop on CV writing & interview facing 3. How to plan your life 4. How to achieve your targets 5. Identify yourself and your friends 6. Good behavior & sex education for young university students 7. Job fair	1. Blossm your life (06 weeks program) 2. New trends of job market 3. How to succeed 4. "Oba Asirimathya" 5. How to become a leader 6. Positive attitudes	1. First Aid training 2. Table manners 3. Community Services 4. Leadership program 5. Educational Magazine 6. Telephone Skills 7. Communication Skills 8. Seven habits of higly effective people

16.3 University Medical Facilities

The medical center and the Dental Clinic are located in a building close to the Department of Physics. There is an also ayurvedic medical center located near Bachelors Quarters. These centers provides health care to staff and students.

Medical Officers:

University Medical Officers	Dr. (Mrs) K.Rathnayaka
Dental Surgeon	Dr. (Mrs.) S. Atapattu
Ayurvedic Medical Officer	Dr. M. A. T. T. Wickramasinghe

Every student of the university at the first enrollment must face a medical test. The aim of this test is to determine whether the student has suitable health condition to continue the academic career without difficulties. If a student is found to be suffering from a severe decease, he/she is directed to special clinics in the hospital for treatments. During the academic year, the medical centre is open for treatment for students as well as staff from 8.00 am to 5.00 pm on weekdays. All drugs are free of charge. If a prescribed drug is not available in the clinic, the University will reimburse the expenses.

16.3.1 Illness During Examination Period

If a student is unable to sit for the exam due to an illness he/ she should inform the University medical officer and examination branch immediately. The medical certificates obtained from outside medical officers should be submitted to the examinations branch within three days with the approval of the University medical officer.

Whenever necessary students should follow the above procedure in producing medical certificate for smooth functioning of their education during stipulated period of study.

16.4 Miscellaneous Facilities

- **Cafeterias (for students & Staff)**
  There are three cafeterias located in the Wellamadama University Complex.
- **Shops**
  - The 'World University Service' maintains a bookshop (WUS Book Shop), which stocks stationary goods.
  - The University also maintains a co-operative store (SANASA) in university premises, and daily provisions can be bought from it.
  - Facilities of Barbour Saloon and Shoe repair are also available inside the university.
- **Monthly Season Tickets**
  Ruhuna University students are able to buy monthly season tickets at concessionary rates for the train service and for the public bus service.
- **Postal Service**
  Ruhuna University post- office is located opposite to the main entrance gate. It is open from Monday through Saturday from 8.00 am to 5.00 pm.
- **Banks**
  Branches of Bank of Ceylon and People's Bank are located at the University premises. The usual banking hours apply to these branches.

17 Student Unions and Societies

17.1 Science Faculty Students' Union

According to the amended University act of 1988, Section 26, students of each faculty can form a Faculty Union comprised of all students of the faculty. The main objective of this union is to promote academic actions, to safeguard the rights of the student population, to work for the advancement and welfare of the students and the faculty.

17.2 Student Societies

In addition to the Faculty Union, there are other registered societies, which are affiliated to different departments.

- Nature Explorers' Society
- Science Faculty Kala Hawula
- Buddhist Society
- Scientific Martial Arts & Yoga Exercise society
- Botanical Society
- Zoological Society
- Birder's Club
- Physics Society
- Research Circle
- Chemical Society
- Photography Society
- Ruhuna University Mathematics and Statistics Society (RUMSS)
- Sports Club

18 Other Information

18.1 The Cultural Centre

This center functions in collaboration with the Ministry of Cultural Affairs. It consists of an Aesthetic Unit and a Research Unit.

Aesthetic Unit helps to promote aesthetic sensitivity, creative skills among the university population. The unit conducts classes on oriental music, western music, violin, dancing, cinematic study, literacy efficiency, drawing and sculpting from 4.00 p.m. to 6.00 p.m. on weekdays and from 9.00 a.m. to 4.00 p.m. at weekends. Research Unit researches and conserves the regional cultural features and heritage of national importance. It is further expected to undertake activities to conserve the regional folk arts and folklore, to collect and conserve the cultural features endemic to this region, to publish classical articles and make documentary films on the traditional performing arts of the South and the artistes of the South.

Mr. Jayantha Amarasinghe officiates as the coordinator of the center and Mr. Mahinda K. Udawela who has been appointed by the Cultural Ministry functions as Cultural Officer.

18.2 Resource Centre for Modern Languages

Resource Centre for Modern Languages was established in April 2002 with the aim to provide students with opportunities to study various languages other than "Sinhala" and "English". The activities of this centre are (coordinated & looked after by) a committee of academics, which includes a Coordinator (Mr. N.A.D. Jayasinghe) and one representative from each Faculty of the University.

Presently, the Language centre conducts classes 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 M.Phil. and Ph.D.

19 Appendix - Administrative Officers of the University

Registrar
Mrs. P.S. Kalugama, *B.A. (Econ) (Sp.) Hons. (SJP), M.A. (Edu) London, UK, MBA (RUH)*
Bursar
Mr. A.M.A. Siriwardhana, *B.Sc. (SJP), Inter Mediate(ICASL)*
Deputy Bursar

Administrative/Finance Officers of Wellamadama Complex

1. **Legal & Documentations**
   Mr. G.L. Erathna, *LL.B. (Sri Lanka) Attorney-At-Law, P.G. Dip. in Conflict Resolution (CMB)*
   Deputy Registrar (Legal & Documentation)
2. **General Administration**
   Mrs. T.D.G. Pathirana, *B.Sc. (General) Hons. (RUH),PG Dip. in Business Management (CMB)*
   Senior Assistant Registrar
   Mr. E.G.Ajith Dhammika,*PG Dip. in Marketing Management (SJP),MBA(SJP)*
   Assistant Registrar
3. **Examinations**
   Mrs. C. Seneviratne, *B.Sc. (General) Hons. (RUH), PDBA (RUH), Dip. in English (CMB)*
   Deputy Registrar
   Mrs. T.S.Nanayakkara, *PG Dip.in Information Managemenent (NILLIS)*
   Assistant Registrar
4. **Non Academic Establishment**
   Mrs. K.G.C.A. Bandarathilake, *B.Sc. Management (Public) (Sp.) Hons. (SJP), ICASL , Executive Dip. in Accounting & Finance Part I (ICASL) ,PG Dip. in Business Management (CMB)*
   Senior Assistant Registrar
5. **Academic Establishment**
   Mrs. H.G.N. Devika, *B.A. (KLN),MA (Sociology)(RUH)*
   Senior Assistant Registrar
6. **Distance and Continuing Education Unit**
   Mrs.G.N.P.Mallika , *B.Sc. Management (Public Administration -External)(SJP)*
   Assistant Registrar
7. **Corporate Management Division**
   Mrs.P.M.S.P.Yapa, *B.Sc.(Sp.) Hons.(RUH), MBA(RUH)*
   Deputy Registrar
8. **Salaries & Loan**
   Mrs. K.V.R. Vidyaratne, *B.B.A. (Sp.) Hons (RUH), CBA (ICASL), MAAT, Dip. in English for Employment (RUH)*
   Senior Assistant Bursar
9. **Accounts**
   Mr. De Zoysa, *D.L.R., B.Sc. (Sp.) Hons. Accounting (SJP), ACA*
   Assistant Bursar
10. **Payments** Mrs. D.V.L.Krishani, *B.B.A. (Sp.)(Accounting)(RUH), Strategic Level I (ICASL)*
    Assistant Bursar
11. **Supplies**
    Mrs. B.H. Chintha, *B.Com. (Sp.) Hons. (KLN), PDBS (RUH), Dip. in English for Employment (RUH)*
    Senior Assistant Bursar

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

12. **Internal Audit**
    Mr. O.V.L.P. Anura, *BBA (Sp.) Hons. (RUH)*
    Senior Assistant Internal Auditor
    Mr. S.W. Kodithuwakku, *B.Com. (Sp.) (RUH), PG Dip. in ICASL*
    Senior Assistant Internal Auditor

13. **Library**
    Mrs. G.A.J. Hemmali
    Senior Assistant Registrar (Library Service)

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

14. **International Affairs Unit & Internal Quality Assurance Unit**
    Miss. M.I. Dilhani, *B.Sc. Agric.Hons. (RUH)*
    Assistant Registrar

    Mrs. C.D. Amarathunga, *BA (General)(KLN),PG Dip. in Writership & Communication (SJP)*
    Assistant Registrar

15. **Student Affairs**
    Mr. W.W.Anura, *B.A.Hons.(PDN), M.A. (CPDS) Tribhuwan, Nepal, Dip. in English for Employment (RUH), Dip.in Psychological Counseling (RUH)* Senior Assistant Registrar(Acting)

16. **Security Section**
    Mr. H.N. Dias
    Chief Security Officer

17. **Physical Education**
    Mr. P.N. Weerasinghe, *B.Com (Sp.) (SJP), Dip. in Sports (SCHOOL OF SPORTS)*
    Director of Physical Education

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

Administrative/ Finance Officers of Faculties

1. **Faculty of Humanities & Social Sciences**
   Mr. P.A. Piyal Renuka, *B.A. Statistics (SJP), P.G. Dip. in Comty Devt (CMB), PG Dip. in Business Administration(RUH)*
   Deputy Registrar

2. **Faculty of Science**
   Miss. K.D.De.S. Jayasekara, *B.Sc. (Zoology)(Sp.)Hons.(CMB)*
   Assistant Registrar

3. **Faculty of Management & Finance**
   Mr. K.G. Nalintha Kumara
   Assistant Registrar

4. **Faculty of Fisheries & Marine Sciences and Technology**
   Mrs. D.M.H.C. Dasanayake, *B.Sc.Hons in Business Information Technology(Uni.of Greenwich)*
   Assistant Registrar

5. **Faculty of Graduate Studies**
   Mr.W.W.Anura, *B.A.Hons. (PDN), M.A.(CPDS) Tribhuwan, Nepal, Dip. in English for Employment (RUH), Dip. in Psychological Counseling (RUH)*
   Senior Assistant Registrar

   Miss. W.Dinushi Sirisena, CIMA, B.Sc. in Business Management (NIBM)
   Assistant Bursar

6. **Faculty of Agriculture**
   Mrs. S.K.K. Mudalige, *B.Sc. Agric. Hons. (RUH), M.Sc. (PDN), Certificate in Human Resource Management (MASSEY), MBA (RUH)*
   Deputy Registrar

   Miss. H. Pushpika Hewaratne, *P.B. Mgt (KLN), Dip in Accountancy (SLIATE), Dip in Com.Software (TECHNICAL EDUCATIONAL INSTITUTE), , Intermediate Level(ICASL)*
   Assistant Bursar

   Mr. U.P. Belpagodagamage, *B.Sc. Agric. (RUH)*
   Farm Manager

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

7. **Faculty of Engineering**
   Mrs. G.H.C. Nadeeshani, *B.Sc.HRM(Sp.)Hons.(SJP),CIMA(Final)*
   Assistant Registrar
   Mrs. A.S.I. Fernando, *B.Com. (KLN), ACA*
   Assistant Bursar

   Mr. A.G.K.M.S. Sriyantha, *B.Sc. (Eng.) (Production) (PDN)*
   Workshop Engineer

8. **Faculty of Medicine**
   Mr. L.Isuru Kalpage, *B.Sc. (Finance) (Sp.) Hons.(SJP), Intermediate Level (ICASL)*
   Senior Assistant Registrar

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

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

   Mr.R.C. Katipearachchi, *B.Sc. Accounting (Sp.), AAT, ICASL (Intermediate Level)*
   Assistant Bursar

10. **Faculty of Allied Health Science**
    Mrs. V.Hiroshini Piyadasa, *B.Sc. Hons. Agric(RUH)*
    Senior Assistant Registrar

    Mrs. E.H. Manjula Ranasinghe, *B.Sc. Chemistry (Sp.) (KLN), M.Sc. in Analytical Chemistry (CMB)*
    Assistant Registrar

    Miss. A.G.K. Chandraratne, *B.B. Management Accountancy (Sp.) (KLN),AAT (Passed Finalist), Business Level (ICASL)*
    Assistant Bursar