Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

Students Handbook 2019/2020

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The Students' Handbook contains University and Faculty policies, procedures and other information in effect as of the date of issuance or publication. Any subsequent changes in policies, procedures or any other information are effective as of date of implementation or issuance by the University Senate and/or the Council.

CONTENTS

SABARAGAMUWA UNIVERSITY OF SRI LANKA

Background

The Sabaragamuwa University of Sri Lanka (SUSL) was established under the Universities Act Number 16 of 1978 on 7th November 1995 and ceremonially inaugurated on 2nd February 1996. Assigned to the University currently are the Faculties of Agricultural sciences, Applied Sciences, Geomatics, Management Studies, Social Sciences and Languages, Technology and Graduate Studies set up at Belihuloya in Rathnapura district of the Sabaragamuwa Province while the Faculty of Medicine is located at Kuruwita.

SUSL has ten academic centres/units viz. Center for Computer Studies, Staff Development Center, Career Guidance Unit, Center for Indigenous Knowledge and Community Studies, Centre for Research and Knowledge Dissemination, Center for Open and Distance Learning, Center for Gender Equity and Equality, Center for Quality Assurance, University Business Linkage Cell and Department of Physical Education established within the University.

Vision and Mission of the University

The University has expressed the vision "to be an internationally acclaimed center of excellence in higher learning and research, producing dynamic managers, leaders and nation builders to guide the destiny of Sri Lanka".

The mission of the University is "to search for and disseminate knowledge, promote learning, research and training to produce men and women proficient in their respective disciplines possessing practical skills and positive attitudes enabling to contribute towards sustainable development of the country".

The Faculties and Degree Programs

The Sabaragamuwa University of Sri Lanka offers the following degree programs through its eight faculties.

The Faculty of Agricultural Sciences offers B.Sc. Hons. Degree programs in Agricultural Sciences and Food Business Management through its three departments: the Department of Livestock Production, the Department of Export Agriculture and the Department of Agribusiness Management.

The Faculty of Applied Sciences offers B.Sc. (Hons.) degree programs in Food Science and Technology, Environmental Sciences and Natural Resource Management, Chemical Technology, Computer Science and Technology, Applied Physics, Sport Sciences and Management, Physical Education, Information Systems and Software Engineering through its five departments: The Department of Food Science and Technology, The

Department of Natural Resources, The Department of Physical Sciences and Technology, The Department of Computing and Information Systems and The Department of Sport Sciences and Physical Education. However, there is a possibility to exit at the end of the third year (completing a general degree) for students who enrol for B.Sc. degree programs in Environmental Sciences and Natural Resources Management and Physical Sciences.

The Faculty of Geomatics offers a B.Sc. Hons. Degree program in Surveying Sciences, through its two departments: the Department of Surveying and Geodesy and the Department of Cartography, Photogrammetry, Remote Sensing and Geographic Information Systems (GIS).

The Faculty of Management Studies offers B.Sc. Hons. Degree programs in Business, Financial, Marketing, Tourism and Eco-Business Management through its four departments: the Department of Business Management, the Department of Accountancy and Finance, the Department of Marketing Management and the Department of Tourism Management.

The Faculty of Social Sciences and Languages offers B.A. degree programs in Social Sciences and Languages through its five departments: the Department of Social Sciences, the Department of Languages, the Department of Economics and Statistics, the Department of English Language Teaching and the Department of Geography and Environmental Management.

The Faculty of Technology offers bachelor of Bio Systems Technology Honors Degree and Bachelor of Engineering Technology Honours Degree through its two departments: the department of Bio Systems Technology and the Department of Engineering Technology.

The Faculty of Medicine Offers the Degree of Bachelor of Medicine and Bachelor of Surgery. It consists of the Department of Anatomy, Department of Biochemistry, Department of Physiology, Department of Community Medicine, Department of Forensic Medicine and Toxicology, Department of Medicine, Department of Microbiology, Department of Obstetrics and Gynaecology, Department of Paediatrics, Department of Parasitology, Department of Pathology, Department of Pharmacology, Department of Primary Care and Family Medicine, Department of Psychiatry and Department of Surgery.

The Faculty of Graduate Studies awards Research Higher Degrees (MPhil and PhD) and conducts MSc Degree programs in Ayurvedic Hospital Management, Surveying Sciences, Master of Information Technology, Master of Business Administration (Specialization: Finance, marketing and Tourism) and Master of Arts in English and Education. The Faculty also offers Postgraduate Diploma Programs in Business Administration and English and Education.

University Logo and the Flag

The University logo comprises a traditional oil lamp, rays of light, books, the Samanala (peak wilderness) mountain, gems, and sheaves of paddy, symbolizing the region and the people that it serves and the ideas for which they stand. The traditional oil lamp and the rays of light denote the imparting of knowledge and enlightenment; books represent education; the Samanala Mountain and gem stand for the Sabaragamuwa Province and Rathnapura District respectively, and the sheaves of paddy symbols prosperity.

University flag comprises two colors maroon and gold, and the logo is in the centre of the flag. The maroon color in the flag indicates maturity and the gold color indicates the knowledge.

OFFICERS AND ADMINISRATIVE STAFF OF THE UNIVERSITY

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FACULTY OF APPLIED SCIENCES

Information at a Glance

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Location

The University is situated about 18 kilometers from the Balangoda town along the Badulla-Colombo road. It is located on the Samanalawewa Road, around 500 metres from the Pambahinna junction, situated 162 km from Colombo and 76 km from Badulla. (*Other distances:* 60 km to Ratnapura, 50 km to Bandarawela)

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Head/ Department of Food Science and Technology	: 045-3454514
Head/ Department of Natural Resources	: 045-3454528
Head/ Department of Physical Sciences and Technology	: 045-3454527
Head/ Department of Sport Sciences and Physical Education	: 045-3609846
Assistant Registrar/ Faculty of Applied Sciences	: 045-3454513

Hospital:	Rural Hospital, Pambahinna
Post Office:	Sabaragamuwa University Sub Post Office
Nearest Police Station:	Samanalawewa Police Station
Railway Station:	Haputale 31 km., One hour by bus
Police Division:	Balangoda
Grama Sewa Division:	Muttettuwegama
Divisional Secretariat:	Imbulpe
District:	Ratnapura
Province:	Sabaragamuwa
Elevation:	606 m above MSL
Avg. Annual temperature:	22 ºC
Annual Rainfall:	1500 mm
Accommodation for Visitors:	University Guest House, Belihuloya Rest House, Pearl Inn, River Garden Hotel, Citrine River Residencies, Terico Resort.

The History of the Faculty of Applied Sciences

The Faculty of Applied Sciences of the Sabaragamuwa University of Sri Lanka was initially started as the Buttala Affiliated University College (BAUC) on 21st June, 1993 and was located at Buttala. The BAUC offered two diploma courses, one in Food Science and Technology and the other in English Language. With the elevation of the Affiliated University Colleges to fully fledged national Universities in early 1996, three Affiliated University Colleges; Sabaragamuwa Affiliated University College, Uva Affiliated University College and Buttala Affiliated University College were amalgamated to form the Sabaragamuwa University of Sri Lanka and the BAUC became the Faculty of Applied Sciences of the Sabaragamuwa University of Sri Lanka. With effect from March 2008, the faculty has been relocated in the main university premises at Belihuloya.

Present Situation

Presently the Faculty of Applied Sciences comprises five departments: The Department of Natural Resources, The Department of Physical Sciences and Technology, Department of Food Science and Technology, The Department of Computing and Information Systems and The Department of Sport Sciences and Physical Education. The Faculty offers BSc (Honours) degree programs (SLQF Level 6) in Food Science and Technology, Environmental Sciences and Natural Resource Management, Chemical Technology, Computer Science and Technology, Applied Physics, Computing and Information Systems, Software Engineering, Sport Sciences and Management and Physical Education for the students who gain direct entry to the Faculty on the basis of their performance at the GCE (Advanced Level) examination. Students for Food Science and Technology degree program are selected through a separate window from the GCE (Advanced Level) Bio Science stream, while students selected from the Applied Sciences Window from the GCE (Advanced Level) bio science stream and GCE (Advanced Level) physical science stream are entitled for degree program on "Environmental Sciences and Natural Resources Management" and "Physical Sciences and Technology" respectively.

The selection of the students for the B.Sc. degree programs in Sport Sciences and Management and Physical Education is done on the basis of the GCE (A/L) results as well as the performance at a selection test. The students who wish to get enrolled for the degree programs in Sport Sciences and Management and Physical Education are also required to face an examination for physical fitness (aptitude test) in addition to the written selection test. Even though the faculty conducts four-year BSc (Honours) degree programs, students who enrol in the Department of Natural Resources and Department of Physical Sciences and Technology have an option to receive a BSc (General) degree after completing three years of study. All degree programs are designed to suit the needs of the rapidly changing socio-economic environment while taking into consideration employment opportunities for graduates who pass out from the university. The programs are conducted exclusively in English. The Faculty also contributes to the development of the community and the nation through its extension and outreach programs.

Vision and Mission of the Faculty of Applied Sciences

Vision

"To extend its' facilities and services to develop as a premier centre for higher education and advanced research in the field of technology, thus enabling students following the degree program to obtain a sound knowledge and acquire multi-disciplinary skills"

Mission

"To search for and disseminate knowledge in the areas of learning that will make a useful contribution to the development of critical manpower requirements of the nation; contribute to education, science and technology and socio-economic upliftment of the communities of the nation"

Aims of the Faculty

- To provide students with an atmosphere that is conducive to successful study and attainment of a degree in their respective field of specialization.
- To offer the people of the nation through community outreach programs by providing facilities and personnel that enable them to begin or continue with their education through seminars, workshops, short courses or programs covering a variety of subjects that serve to the needs of the community.

Objectives of Degree Programs

- To ensure that all students who obtain the degree are well acquainted with their fields of study and demonstrate this by the successful completion of examinations in each particular subject area, research as well as projects.
- To ensure that all students who obtain the degree would be readily able to be employed in their chosen field because of the practical experience received in the classroom, laboratory or field through practical training during the course of study.

Objectives of Community Outreach Programs

- To ensure that programs provided respond to a need expressed by the people of the community.
- To ensure that these needs expressed by the community are fulfilled by the content of the seminars, short courses, workshops and programs provided and that this content is clearly conveyed under the direction of the various project leaders.

Student Services and Amenities

Bank Facilities

Students can open accounts with the Bank of Ceylon's branch near the main entrance and the People's Bank branch at Pambahinna junction. They provide nearly all of the services of a regular bank branch office. Two ATM machines are located near the main entrance to the university.

Bursary and Mahapola

Bursary and Mahapola Scholarship payments will be made through bank. Exact date of payment is subject to change from month to month, but will be notified in advance. For further information please contact the Assistant Registrar (Student Affairs).

Canteen

The University student canteen offers breakfast, lunch and dinner as well as tea, soft drinks and various snacks throughout the day. Hours of operation are from 7.00 a.m. to 9.30 p.m. It may be necessary to order main meals in advance. Two Hostel canteens are available for hostellers.

Libraries

There are about 127,000 books and about 150 periodicals, including hansards, Acts Gazette and daily newspaper in Sinhala, Tamil and English available throughout the library network and many online databases are available for research purposes. The University has three branch libraries in addition to the main library.

The faculty collection in the library has also been gradually improving. The faculty has a total collection of about 15000 printed materials, which includes textbooks, journals, magazines, final year project reports, bulletins and a reference collection. Lending and Reference book collection has about 9500 and 5000 books, respectively. The library consists of a collection of 09 local and international journals as well. In addition, it includes gazettes and daily newspapers in Sinhala, Tamil and English. Students are given the opportunity of obtaining photocopies for educational purposes from the library at a reasonable rate. The library also has CD ROM unit where both staff and student can read CDs available at the library as audio visual aids for effective learning. General decisions regarding the library are made by the Library Committee, which meets once a month.

Hours are: Weekdays and Saturdays from 8.00 a.m. to 4.00 p.m. unless otherwise announced.

Books can be borrowed for a period of two weeks from the Lending Library: Books in the Reference Library are available for overnight use only; they can be taken after 3.00 p.m. and returned before 10.00 a.m. the following day.

Penalties for overdue books are as follows: Lending Library books, one rupee (Rs.1) per day; Reference Library, books two rupees (Rs.2) per hour.

Regular Mail

Incoming mail is sorted at the Main Office and then kept in student mailboxes near the department offices or at the Student Centre. To ensure that your letters reach you quickly, please request the sender to use the following address including postal code No.:

Your name
Relevant Department or Faculty
Sabaragamuwa University of Sri Lanka
P.O. Box 02
Belihuloya 70140
Sri Lanka

Regular postal services are available at the Sabaragamuwa University Sub-Post Office. Note that to receive a money order at this post office; the sender must indicate the "Sabaragamuwa University Post Office" as the paying office. The post office is located just outside the main gate.

Medical Facilities

A student can obtain basic medical care at the University Medical Centre, which is open from 8.00 a.m. to 4.00 p.m. on weekdays. In addition, the Belihuloya divisional hospital is located close to the university.

Sports Facilities

The sports facilities include 25 metre swimming pool, two tennis courts, badminton, squash, volleyball, basketball and netball courts, weight lifting and exercise equipment. Please contact the Physical Education Department for details (Tel: 0452280036).

Student Centre

The Students Centre building serves as a student recreation hall, with facilities to play table tennis, carom, chess etc.

Telephone Calls

You can make outgoing telephone calls from the Telephone Operator's Room, located opposite the Main office. Messages from incoming calls (Tel: 045-2280014) will be forwarded to you as soon as possible. To help speed up the process, the caller should leave recipient's name and specify which degree programme he or she is following.

Welfare Shop

You can purchase groceries, stationery, toiletries, soft drinks and snacks at the Welfare Shop. Opening Hours are: weekdays from 7.00 a.m. to 8.00 p.m. and Sundays from 2.00 p.m. to 8.00 p.m.

Psychological Counselling Centre (Sith Arana)

This centre provides counselling to students on the various problems encountered during their studies. Services are offered by academic staff members trained in professional counselling.

Carrier Guidance Unit

This unit offers services in the area of developing undergraduates' career prospects.

Laboratories

Sixteen laboratories, four computer centers and a field station are available in the Faculty in the areas of Chemistry, Physics, Food Science and Technology, Natural Resources and Environmental Sciences and Computer Science/Information Systems which are equipped to cater to practical sessions of the study programmes.

Chemistry laboratories: These two laboratories are equipped with the necessary instruments and apparatus and the required chemicals for chemistry practical at Bachelor's Degree level.

Chemistry Research laboratory: This is equipped with advanced instruments and apparatus and the required chemicals for research at undergraduate level.

Physics laboratory: The physics laboratory has essential instruments and apparatus for undergraduate physics practicals.

Natural Resources laboratories: There are seven laboratories namely the Biology and Environmental Science laboratory, Earth Science laboratory, Soil and Hydrology laboratory, Gemmological Research laboratory (jointly operated by the Departments of Natural Resources and Physical Sciences and Technology), Biodiversity and Ecology laboratory, Advanced Research laboratory and a Geology museum that are equipped for practical exercises in the relevant fields. In addition, a dedicated Biodiversity and Environmental Study Centre (Field Station) is available for field studies in the discipline.

Food Analysis laboratory: This laboratory is equipped with the required instruments, chemicals and other facilities to perform general chemical analysis related to food commodities and products. A section of this laboratory houses advanced instruments for food analysis.

Food Microbiology and Biotechnology laboratory: This laboratory is equipped with the equipment and required chemicals to conduct undergraduate microbiology and biotechnology practical classes.

Meat and Fish processing laboratory: This laboratory is equipped with the required instruments and utensils used in meat and fish processing.

Food Processing Laboratory: This laboratory is equipped with most of the required equipment and chemicals used in fruits, vegetable and cereal/grain processing.

Dairy Processing Laboratory: This Laboratory is equipped with most of the required equipment and processing aids used in dairy processing.

Computer Centres: There are four computer centres in the faculty, having a number of state-of-the-art computers and utilities. The required application packages are available. Software facilities are available for various types of computer applications. The Local Area Network provides e-mail and Internet facilities through a leased line and Wi-Fi.

English Language Unit: The English Language Teaching Unit conducts English programmes for all study programs including the General English, Academic English and Business English components.

Employment Opportunities for Graduates from the Faculty

Graduates of the Faculty of Applied Sciences are expected to secure employment opportunities in the local job market in both the private and state sectors in their relevant disciplines. A fair percentage of our graduates are pursuing post-graduate studies with a reported high rate of success. Some of the graduates from the Faculty are employed in industries as well as key decision-making organizations as consultants, managers, executives as well as technocrats in Computing and Information Systems, Food Science and Technology, Natural Resource Management, Physical Sciences and Sport Sciences related professions. Some graduates have represented Sri Lanka in International symposiums, workshops, games and competitions as well.

According to the results of a recent tracer study conducted by the Faculty on graduate employment, with a sample of 114 graduates, it was revealed that the relevance of the degree programs to the field of employment is high (65%) among Applied Sciences graduates. 90% of the graduates were already employed and six out of them were reading for their post-graduate degrees. Out of the graduates who claimed to be permanent employees, 58% was employed in the private sector and 42% was employed in the government and semi-government sector and self-employed. The data on waiting period reveals a percentage employability of 80% within the first three months, 83% within the first six months and 94% within the first year. This gives an average waiting time of about three months for the Applied Sciences graduates. The rate of employment and the waiting period for a graduate for their first employment is satisfactory as expressed by all the respondents, indicating the demand for Applied Sciences graduates in the job market. Based on the above self-evaluation, the Faculty has taken several steps to further enhance the quality and relevance of undergraduate education, in order to cater the job market demands.

Academic, Administrative & Academic Supportive Staff of the Faculty

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Faculty Board

The Faculty Board is responsible for recommending and reporting to the Senate on matters relating to teaching, examinations, courses of study and research in departments of the Faculty, for appointing committees (excluding members of the Faculty) to report on any special subjects, and for recommending suitable persons for appointment as examiners.

The Faculty Board of Applied Sciences shall consist of the following members:

- The Dean of that Faculty;
- All permanent Senior Professors, Professors, Associate Professors, Senior Lecturers and Lecturers of the Departments of Study comprising the Faculty;
- Two members elected by the Lecturers (Probationary) of the Faculty from among such Lecturers;
- Two members of the permanent staff attached to the Faculty and who are imparting instructions;
- Two students elected by the students of the Faculty from among their number; and
- Three persons not being members of the staff of the University elected by the Faculty Board from among persons of eminence in the areas of study relevant to the Faculty.

Overview of the Degree Programs Offered by the Faculty of Applied Sciences

Designator & Qualifier	Abbreviation	SLQF Level	Total Credits
Bachelor of Science Honours in Computing and Information Systems	BScHons (CIS)	6	124
Bachelor of Science Honours in Software Engineering	BScHons (Software Eng)	6	128
Bachelor of Science Honours in Food Science and Technology	BScHons (Food Sc & Tech)	6	120
Bachelor of Science in Environmental Sciences and Natural Resource Management	BSc (Env Sc & NR Mgmt)	5	93
Bachelor of Science Honours in Environmental Sciences and Natural Resource Management	BScHons (Env Sc & NR Mgmt)	6	124
Bachelor of Science in Physical Sciences	BSc (Phy Sc)	5	93(94)
Bachelor of Science Honours in Applied Physics	BScHons (App Phy)	6	131
Bachelor of Science Honours in Chemical Technology	BScHons (Chem Tech)	6	130
Bachelor of Science Honours in Computer Science and Technology	BScHons (Com Sc & Tech)	6	129
Bachelor of Science Honours in Physical Education	BScHons (PEd)	6	120
Bachelor of Science Honours in Sport Sciences and Management	BScHons (Sport Sc & Mgmt)	6	120

SLQF – Sri Lanka Qualifications Framework

According to SLQF, 1 Credit equals 50 notional learning hours for a taught course, laboratory studies course or field studies course. In case of industrial training, and in case of research, one credit equals 100 notional hours.

Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

Department of Computing and Information Systems

https://www.sab.ac.lk/app/cis

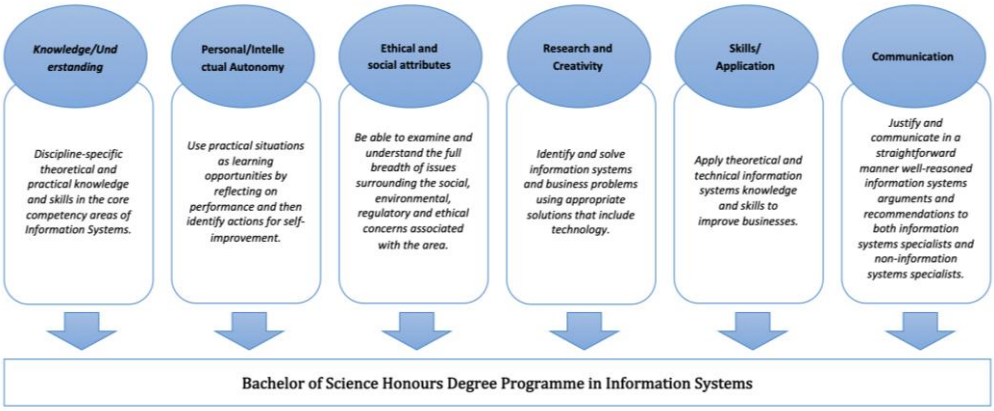
https://www.linkedin.com/company/faculty-of-applied-sciences-sabaragamuwa-university-of-sri-lanka/

DEPARTMENT OF COMPUTING & INFORMATION SYSTEMS

Degree Program:

Bachelor of Science Honours in Computing and Information Systems

Anticipated Graduate Profile



Guidelines for course codes and credits

- Each course code consists of four digits together with the prefix (alphabet letters)
- Prefix alphabet letters denote the abbreviation to the name of degree program (IS)
- The first digit of each course code is the corresponding semester of study (1-8).
- Second digit represents the revision of the subject and it will increment if the subject is revised.
- Third and fourth digits represent the subject code

Example: The course code of IS1101 denotes the following;

Abbreviated name of degree program	Semester	Revision Number	Subject Code
IS (Information Systems)	1	1	01

Note: There are no spaces or special characters in the course code.

Summary of the courses

Table 1: Courses offered in the Semester I			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
IS1101	Fundamentals of Information Systems	2	Compulsory
IS1102	Structured Programming Techniques	2	Compulsory
IS1103	Structured Programming Practicum	1	Compulsory
IS1104	Theories of Information Systems	2	Compulsory
IS1105	Computer System Organization	2	Compulsory
IS1106	Foundations of Web Technologies	2	Compulsory
IS1107	Personal Productivity with Information Technology	1	Compulsory
IS1108	Fundamentals of Mathematics	2	Compulsory
IS1109	Statistics & Probability Theory	2	Compulsory
IS1110	Communication Skills I		Compulsory
IS1111	Academic Integrity		Compulsory
IS-EGP-1101	General English I		Compulsory
	Total	16	

Table 2: Courses offered in the Semester II			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
IS2101	Object Oriented Programming	2	Compulsory
IS2102	Object Oriented Programming Practicum	1	Compulsory
IS2103	Emerging IS Technologies	1	Compulsory
IS2104	Database Systems	2	Compulsory
IS2105	Database Management Systems Practicum	1	Compulsory
IS2106	System Analysis & Design	1	Compulsory
IS2107	Social & Professional Issues	1	Compulsory
IS2108	Human Computer Interaction	2	Compulsory
IS2109	Information Assurance & Security	2	Compulsory
IS2110	Software Project Initiation & Planning	1	Compulsory
IS2111	Advanced Mathematics	2	Compulsory
IS2112	Communication Skills II	-	Compulsory
IS-EGP-1201	General English II		Compulsory
	Total	16	

Table 3: Courses offered in the Semester III			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
IS3101	Object Oriented Analysis & Design	2	Compulsory
IS3102	Data Structures & Algorithms	2	Compulsory
IS3103	IT Governance	2	Compulsory
IS3104	Software Engineering	2	Compulsory
IS3105	IS Risk Management	2	Compulsory

IS3106	IS Sustainability	1	Compulsory
IS3107	Management Information Systems	2	Compulsory
IS3108	E-Business	1	Compulsory
IS3109	Digital Innovation	2	Compulsory
IS-EAP-2101	Academic English I		Compulsory
	Total	16	

Table 4: Courses offered in the Semester IV			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
IS4101	IT Auditing	2	Compulsory
IS4102	Web Application Development	2	Compulsory
IS4103	Operating Systems	2	Compulsory
IS4104	System Administration and Maintenance	2	Compulsory
IS4105	IT Procurement Management	1	Compulsory
IS4106	Software Architecture	2	Compulsory
IS4107	Professionalism & Ethics in Computing	1	Compulsory
IS4108	IS Strategies	1	Compulsory
IS4109	Agile Software Development	2	Compulsory
IS4110	Capstone Project	2	Compulsory
IS-EAP-2201	Academic English II		Compulsory
	Total	17	

Table 5: Courses offered in the Semester V			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
IS5101	Entrepreneurship & Innovation	1	Compulsory
IS5102	Enterprise Architecture	1	Compulsory
IS5103	High Performance Computing	2	Compulsory
IS5104	Software Process Management	1	Compulsory
IS5105	Business Process Management	2	Compulsory
IS5106	UI/UX Practicum	1	Compulsory
IS5107	Project Management Practicum	1	Compulsory
IS5108	Business Intelligence	2	Compulsory
IS5109	IS Project for Community	1	Compulsory
IS5110	Advanced Database Systems	2	Elective
IS5111	Data Communication & Networks	2	Elective
IS5112	Design Patterns & Anti-patterns	2	Elective
IS5113	Software Quality Assurance	2	Elective
IS5114	Data Mining & Analytics	2	Elective
IS-EBP-3101	Business English		Compulsory
	Total (Core + Electives) (12 + 10)	22	

Table 6: Courses offered in the Semester VI			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
IS6101	Professional Practice	6	Compulsory
	Total	6	

Table 7: Courses offered in the Semester VII			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
IS7101	Research Methodologies	2	Compulsory
IS7102	IT Law	1	Compulsory
IS7103	Business Process Simulation	2	Compulsory
IS7104	Enterprise Modelling Ontologies	2	Compulsory
IS7105	Organizational Behavior & Management	1	Compulsory
IS7106	Cloud Computing	2	Compulsory
IS7107	Mobile Application Development	1	Elective
IS7108	Web Service Technologies	2	Elective
IS7109	Geographical Information Systems	2	Elective
IS7110	Statistical Distribution & Inferences	1	Elective
IS7111	Advanced Programming Practicum	1	Elective
IS7112	Machine Learning	2	Elective
	Total (Core + Electives) (10 + 9)	19	

Table 8: Courses offered in the Semester VIII			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
IS8101	Research Project in IS	8	Compulsory
IS8102	Business/IT Alignment	2	Compulsory
IS8103	Human Resource Management	2	Compulsory
IS8104	Scientific Communication	1	Compulsory
IS8105	IS Economics	2	Compulsory
IS8106	Computer System Security	2	Compulsory
IS8107	Supply Chain Management	2	Elective
IS8108	Advanced Computer Networks	2	Elective
IS8109	Process Mining	2	Elective
IS8110	Digital Business Model	1	Elective
IS8111	Game Development	2	Elective
	Total (Core + Electives) (17 + 9)	26	

Summary of credits required

Semesters	Credits Required
Semester I	16
Semester II	16
Semester III	16
Semester IV	17
Semester V	18
Semester VI	06
Semester VII	14
Semester VIII	21
Total	**124**

Detailed Syllabus

N.B.

T - Theory
P - Practical
F - The department organizes the field visit relevant to the particular subject area.
W - The department organizes workshops relevant to particular course unit.
TH - Thesis

Semester I				
IS1101	Fundamentals of Information Systems	T	-	-
Information concepts: Data, Information, Knowledge, and Wisdom. Cost/value & quality of information, System concepts, System performance, and standards. System components & relationships. Organizations & information systems, Systems development, Competitive advantage of information systems. Global challenges in information systems, IS career paths.				

IS1102	Structured Programming Techniques	T	-	-
Introduction to Programming: Introduction to compilers & interpreters, Data types, Variables, Expressions & Assignment Statements, Console Input/Output, Libraries & Namespaces. Flow Control: Branching Mechanisms, Loops. Function Basics: Predefined Functions, User-Defined Functions, Scope Rules. Parameters: Parameters, Default Arguments. Arrays: Introduction to Arrays, Array manipulation, Multidimensional Arrays. Pointers: Introduction to pointers, Pointer arithmetic. Recursion: Recursive functions. Exception Handling: Testing & Debugging. File Reading & Writing.				

IS1103	Structured Programming Practicum	-	P	-
Identify & describe uses of Data types, Variables, Expressions & Assignment Statements, Console Input/ Output and Libraries. Modify & expand short programmes that use standard conditional & iterative control structures. Write programmes using functions, parameter passing, choose appropriate conditional				

& iteration constructs for a given programming task. Write programmes using arrays, standard conditional & iterative structures & pointers. Demonstrate the concept of recursion by examples, identify the base case & the general case of a recursively-defined problem. Demonstrate file handling & exception handling.

IS1104	Theories of Information Systems	T	-	-

Set of theories centered around the IS lifecycle, including: DeLone and McLean's Success Model, Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology, User Resistance Theories, Task-Technology Fit Theory, Process Virtualization Theory, Theory of Deferred Action. Strategic and economic theories, including: Resource-Based View, Theory of Slack Resources, Portfolio Theory, Theory of the Lemon Markets, Technology – Organization – Environment Framework, Contingency Theory, Porter's Competitive Forces Model, Business Value of IT, Diffusion of Innovations, Punctuated Equilibrium Theory, Discrepancy Theory Models, Institutional Theory, A Multi-level Social Network Perspective, Expectation Confirmation Theory, Stakeholder Theory. Socio-psychological theories including: Personal Construct Theory, Psychological Ownership and the Individual Appropriation of Technology, Transactive Memory, Language-Action Approach, Organizational Information Processing Theory, Organizational Learning, Absorptive Capacity, and the Power of Knowledge, Actor-Network Theory, Structuration Theory, Social Shaping of Technology Theory, An IT-Innovation Framework, Yield Shift Theory of Satisfaction, Theory of Planned Behavior, An Interpretation of Key IS Theoretical Frameworks using Social Cognitive Theory. Methodological theories including: Critical Realism, Grounded Theory and Information Systems: Are We Missing the Point?, Developing Theories in Information Systems Research – The Grounded Theory Method Applied, Narrative Inquiry, Work System Method

IS1105	Computer System Organization	T	P	-

Basic Concept and Computer evolution: Organization and Architecture, the evolution of the Intel x86 Architecture, Embedded Systems, ARM architecture. Computer Performance Issues: Multicore, MIC and GPGPUs, Basic Measures of Computer Performance, benchmark and SPEC. Computer Function and interconnection: Computer Bus Interconnection, Point to Point Interconnection. Computer Memory System: Cache Memory Principles, Semiconductor main memory, External memory. Input/output: External Devices, I/O Modules, Interrupt Driven I/O, Programmed I/O, I/O channels and processors, External Interconnection Standards. Arithmetic and Logic: number system, Integer Representation, Floating Point representation, Digital logic, Combinational Circuits, Sequential Circuits, Programmable Logic Devices. The central Processing Unit: Machine Instruction Characteristics, Addressing Modes, Assembly language, Processor, Instruction Level Parallelism and superscalar Processor. Parallel Organization: Parallel processing, Multicore computers, General purpose Graphic processing Unit. Practical using graphical simulation tool for designing and simulating logic circuit Digital Logic Design Implementation and Simplification of Boolean Functions Combinational Logic Modules – Adders and Subtractors

Sequential logic, flip flops, FSM analysis and design Introduction to Assembly Language Programming

IS1106	Foundations of Web Technologies	T	P	-
Internet fundamentals. HTML. Cascading Style Sheets (CSS). Client-side Scripting: JavaScript, Typescript and pug, AJAX. Introduction to UI Frameworks with responsive front-end design. Introduction to Browser based developer tools. Hands on experience in web tools.				

IS1107	Personal Productivity with Information Technology	T	-	-
Knowledge work productivity concepts. Advanced functions and features of productivity tools to support personal and group productivity: DAX, Power BI (Pivot, Charts, Tables), What-if analysis. Professional document design (latex implementation). Conduct effective communication using digital tools (Emails, shared documents). Effective presentation design (Example: formatting tool like Latex, Power point). Presenting scientific materials to lay audience. Ethics and plagiarism.				

IS1108	Fundamentals of Mathematics	T	-	-
Linear Algebra. Matrices, Vector spaces & subspaces. Linearly independent & dependent vectors, Dimension rank & the basis of vector spaces. Linear transformations, Systems of linear equations, Determinants. Diagonalization of matrices, Functions & relations. Sets, cardinality Cartesian product. Ordered pairs, Bijective mappings, Equivalence relations. Logic Propositions, Truth tables, Symbolic statements, Disjunctive & conjunctive normal forms. Karnaugh maps				

IS1109	Statistics & Probability Theory	T	-	-
Probability: Venn diagrams. Tree diagrams & Cartesian diagrams. Conditional Probability - The occurrence of an event given that another event has already occurred. Bayes' theorem & applications - An extension of conditional probabilities. Statistics: Population & Sample - Population: all the objects that a person is interested in. Sample: a subset of the population which is used to make inferences about the population. Types of random variables - Discrete & continuous random variables. Data Collecting - Experimental studies & observational studies. Data Summarizing Techniques - Descriptive statistics: mean, median, mode, inter quartile range, standard deviation etc. Data Visualizing Techniques - Techniques to visualize continuous & discrete variables. Measure of Central tendency - Mean, median, mode, Measure of Dispersion - Standard deviation, variance & inter quartile range. Mean & Variance of Random Variables - Relationship between the mean & the variance of random variables				

IS1110	Communication Skills I	T	-	-
Introduction to Communication: Purpose of Communication; Process of Communication; Importance of Communication in Business; Differences between Technical and General Communication; Barriers to Communication; Measures to Overcome the Barriers to Communication, Types of Communication: Types of				

Communication; Verbal Communication-Importance of verbal communication-Advantages of verbal communication- Advantages of written communication; Significance of Non-verbal Communication, Listening Skills: Listening Process; Classification of Listening; Purpose of Listening; Common Barriers to the Listening Process; Measures to Improve Listening; Listening as an Important Skill in Work Place, Language for Communication: Language and Communication; General Principles of Writing; Improving Writing Skills; Essentials of good style; Expressions and words to be avoided; Grammar and Usage, Communication in Organizations: Internal Communication; Stake Holders in Internal Communication; Channels of Internal Communication; External Communication; Stake Holders in External Communication; Channels of External Communication, Communication Network: Scope and Types of Communication Network; Formal and Informal Communication Network; Upward Communication; Downward Communication; Horizontal Communication; Diagonal Communication, Writing Business Letter: Importance of Business Letters; Difference between Personal and Business Letters; Structure and Format of Business Letters; Types of Business Letters.

IS1111	Academic Integrity	T	-	-
Introduction to academic integrity, Academic integrity policies, Plagiarism, collusion and contract cheating, Putting academic integrity into practice, Research ethics, Citing and referencing, Reading and Note-making, Critical Thinking				

IS-EGP-1101	General English I	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester II				
IS2101	Object Oriented Programming	T	-	-
Fundamentals of Object-Oriented Programming; Classes & Objects. Data Abstraction. Information Hiding & Encapsulation. Methods: Void methods, return methods, argument passing. Inheritance. Polymorphism: Method overloading and method overriding. Abstract Classes. Exception Handling. Files & Database connections.				

IS2102	Object Oriented Programming Practicum	-	P	-
Installation & configuring an IDE for OOP language: setting up path, environmental variable. Implement Class, Objects, Variables, Identifiers, Keywords, Data types, Arithmetic/logical Operators. Demonstrate Control statement (If-else, Switch), Loops (while, do-while, for). Implementation of Arrays. Implementation of Methods, Passing parameters, Arguments, Constructors. Implementation of OOP Concepts: Abstraction, Encapsulation, Inheritance (Specialization and Generalization) and Polymorphism. Applications of OOP concepts to solve real life problems.				

IS2103	Emerging IS Technologies	T	-	W
Emerging technologies: Contrasts between traditional & emerging technologies.				

Driving forces behind emerging technologies and technology life cycles. Adoption rates & assessment process. Disruptive technologies: Communication Communities, Collaboration, Hosted services (e.g., social networks, web culture, virtual workforce). Blockchain. DevOps. Cloud edge computing. Computer-Supported Cooperative Work and Tools. Tracking, Searching, Advertising & publishing on the web.

IS2104	Database Systems	T	-	-

Introduction to Databases: Definition of the database, database system, data models, database applications. Database system architecture, characteristics of database approaches. Database development process. Data models. Relational model. ER model. Schema Mapping. Designing: Logical design: Relational database model, Logical view of data, keys, integrity rules, Normalization. Relational algebra: Introduction, Selection & projection, set operations, renaming, Joins, Division, syntax, semantics, Operators, Grouping & ungrouping, relational, Triggers.

IS2105	Database Management Systems Practicum	-	P	-

Database Management tools: Installation and Setting up the environment. Create Databases & Tables, Modifying Databases & Tables. Inserting Table Data, Modifying Table Data. Querying Data. Functions (String Functions, Date & time functions, Numeric Functions, Aggregate Functions). Joining Tables (Querying Multiple Tables, Joining Tables with SELECT, Table Name Aliases, Inner Joins, and Outer Joins).

IS2106	System Analysis & Design	T	-	-

System Analysis Fundamentals: Fundamentals System Analysis and Design (SA&D) concepts, Roles of system analyst, System development life cycle, depicting system graphically, determining feasibility, activity planning and control. Evolution of software development models. Information requirements analysis. Process requirements analysis. The essentials of design. Deployment and maintenance

IS2107	Social & Professional Issues	T	-	-

History of computing, social context of computing. Methods & tools of analysis: consequence, duty and right based ethical theories. Professional & ethical responsibility. Risks & liability of computer-based systems. Intellectual property, privacy & civil liberties. Computer crime, customs & law. Economical issues in computing. Philosophical frameworks.

IS2108	Human Computer Interaction	T	-	-

HCI Principles. Usability principles. Building a simple GUI, Human abilities. Human-centered software development, cultural aspects, human-centered software evaluation. GUI design, GUI programming. HCI aspects of multimedia systems. HCI aspects of collaboration & communication. Validation of usability & user experience. Handling errors & help.

IS2109	Information Assurance & Security	T	-	-
Fundamental aspects of security: CIA, security mindset, design principles, system/security life cycle. Security Implementation Mechanisms (Guards, Gates, Cryptography, steganography). Information Assurance Analysis Models (Threats, Vulnerabilities, Attacks, Countermeasures). Disaster and Recovery. Security Mechanisms: Cryptography, Authentication, Redundancy, Intrusion Detection. Operational Issues: Trends, Auditing, Cost-Benefit analysis, Asset Management, Standards, Enforcements, Legal Issues. Policy: Creation & Maintenance of Policies, Prevention, Avoidance, Domain, Integration. Attacks: Social Engineering, Denial of Service, Protocol Attacks, Active & Passive Attacks, Buffer Overflow Attacks, Malware. Forensics: Legal Systems, Digital Forensics, Rules of Evidence, Search & Seizure, Digital Evidence, Media Analysis				

IS2110	Software Project Initiation & Planning	T	-	W
Develop Project Charter (Inputs, Tools & Techniques, Outputs). Develop Project Management Plan (Inputs, Tools & Techniques, Outputs). Direct & Manage Project Work (Inputs, Tools & Techniques, Outputs). Manage Project Knowledge (Inputs, Tools & Techniques, Outputs). Monitor & Control Project Work (Inputs, Tools & Techniques, Outputs). Perform Integrated Change Control (Inputs, Tools & Techniques, Outputs), Close Project or Phase (Inputs, Tools & Techniques, Outputs).				

IS2111	Advanced Mathematics	T	-	-
Functions & relations - relations: an association between two or more sets. Functions: a binary relation. Sequences - An enumerated collection of objects in which repetitions are allowed & order does matter. Series - The addition or multiplication of multiple quantities, Errors Numerical Solution of Nonlinear Equations. Interpolation Theory - The theory of estimating data points within a known data set. Numerical solution of systems of Linear Equation. Numerical Differentiation & integration. Numerical methods for differential equations. Graph theory				

IS2112	Communication Skills II	T	-	-
Writing Memos Circulars and Notices: What is a Memo?- Principles of précis writing- Approaches to memo writing- Characteristics of a memo- Guidelines for writing memos- Language and writing style of a memo- Format of a Memo; Circulars- Guidelines for writing a circular- Languages and writing style of a circular- Format of a circular; Notices- Purpose- Format- Important points to remember while writing a notice, Report Writing: Features of Writing a Good Report; Purpose of Report Writing; Difference between Business Report and Engineering Report-Characteristics of writing a good report-Importance of communication in report writing; Guidelines for Report Writing; Steps in Report Writing; Structure of Report; Types of Reports and Different Formats, Writing E-mail: Principles of E-mail; E-mail Etiquette; Overcoming Problems in E-mail Communication, Oral Communication Skills: Oral Business Presentation- Purpose				

–Audience-Locale; Steps in Making a Presentation- Research and planning-Structure and style-Preparation –Presentation; Delivering a Presentation, Meetings: Types of Meetings; Importance of Business Meetings; Different Types of Business Meetings; Conducting Meetings-Selecting participants-Developing agendas-Opening meetings-Establishing ground rules for meetings-Time management-Evaluations of meeting process-Evaluating the overall meeting-Closing meetings; Common Mistakes Made at Meetings, Reading Skills: Reading Skill; Purpose of Reading; Types of Reading; Techniques for Effective Reading, Employment Communication – Resume: Contents of Good Resume; Guidelines for Writing Resume; Different Types of Resumes; Reason for a Cover Letter to Apply for a Job-Format of Cover Letter; Different Types of Cover Letters, Employment Communication – Job Interview: Importance and Factors Involving Job Interview; Characteristics of Job Interview; Job Interview Process; Job Interview Techniques-Manners and etiquettes to be maintained during an interview; Sample Questions Commonly asked During Interview

IS-EGP-1201	General English II	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester III				
IS3101	Object Oriented Analysis & Design	T	P	-
Managing design complexity with OOAD. Evolution of the object oriented paradigm. Classes & Objects: Associations, Aggregation, Inheritance; Polymorphism, Abstraction, Encapsulation. Unified process. Notation: Unified Modeling Language. Use Case Diagrams. Class Diagrams. Sequence Diagrams. Activity and component diagrams. Behavioral State Machine Diagrams. OOAD in Agile. Hands on experience using CASE tools.				

IS3102	Data Structures & Algorithms	T	P	-
Primitive data types: arrays, structures, pointers, memory allocation, iteration & recursion. Singly & doubly linked lists. Stack and Queue. Trees, binary search trees & basic operations. Hash tables. Graphs & basic algorithms on graphs: depth first & breadth first search, Dijkstra's algorithm. Sorting algorithms: quick sort, bubble sort, selection sort, merge sort, tree sort. Complexity analysis of algorithms. Hands on experience on data structures & algorithms.				

IS3103	IT Governance	T	-	-
Introduction to Governance: Corporate Governance, Enterprise Governance, Business Governance. IT Governance: Business IT Alignment, Necessity for IT Governance. Drivers for IT Governance: Information Economy & Intellectual Capital, Governance Convergence. Strategic & Operational Risk management in IT Governance: Compliance Risk, Information Risk. Strategic & Operational Risk management in IT Governance: Issues of Inadequate IT Governance. Achieving IT Governance: Objectives of IT Governance, Structural Issues in IT Governance, Maturity in IT Governance. IT Governance Frameworks: Constructing IT Governance Frameworks, Third Party governance frameworks, proprietary				

Governance Frameworks, Benefits of IT Governance Frameworks. Effective implementation of IT Governance. Future of IT Governance.				

IS3104	Software Engineering	T	-	-
Software Engineering concepts. Introduction to Software engineering frameworks. Requirements & Specification. Software Design. Software implementation. Software Testing & Quality Assurance. COTS & Reuse. CASE Tools. Software metrics & Reliability Assessment. CMMI. Team Organization & people management. Software Estimation. Software Maintenance. Software evolution				

IS3105	IS Risk Management	T	-	-
Background of Risk Management, Risk Management Processes: Risk Identification, developing a Risk Management Plan, Analyse & Prioritize Risks: Qualitative Risk Analysis, Quantitative Risk Analysis, Develop Risk Responses, Risk Monitoring & Control. Risk Assessment Frameworks (OCTAVE, FAIR, NIST SP800-30, and ISO 27005). Application of Risk Assessment Frameworks. Authentication & Authorization. Intrusion Detection.				

IS3106	IS Sustainability	T	-	-
Introduction to Sustainability. Adaptability of systems. Legal issues surround reusing data collected for another purpose. Processes to support ethical behavior to the society /to an individual/ in organizations. Activities to support ethical behavior in organizations/ for an individual/ to the society. Performance criteria to support ethical behavior by a person / in organizations/ to the society.				

IS3107	Management Information Systems	T	-	-
Management within the organization: Management activities, Roles and Levels; Management Planning, Controlling and Strategic planning. Decision making and using MIS: Measurement of MIS performance and capabilities. MIS applications and relationships: Introduction to different types of Computing and Information Systems. Databases and data warehouses and their relevance to MIS; Networks, Internet and MIS. Development of MIS: Managing MIS Project, Techniques and methodologies for supporting MIS development. Customer Relationship Management (CRM) and Supply Chain Management (SCM). Financial Systems and E-Commerce, Business Process Redesigning using new trends in MIS (ERP, Mobile and Cloud enabled MIS etc.).				

IS3108	E-Business	T	-	-
E-business and e-commerce. E-business Infrastructure: Internet technology, Web Technology, Internet-access software applications, Managing e-business infrastructure. E-business Strategy: What is e-business strategy? Strategic analysis, Strategic objectives, Strategy definition, Strategy implementation. Analysis and Design: User-centered site design, Security design for e-business. Social commerce. Analytics and reporting. Search engine optimization. Orders management. Customer Relationship Management. Product management. E-marketing.				

IS3109	Digital Innovation	T	P	W
Internet Impact on Business: New business forms and models: brokerage, advertising, merchant, on-demand, utility. Digital Innovation: Digital Innovation vs. IT Innovation. Strategy and Digital Innovation. Digital Innovation and Business Models. Digital Platform Exploitation for Business. Building Digital Capabilities. Organizational Engagement. Leveraging Crowds for Innovation. Digital Business Transformation. Characteristics of Digital Disruptors. Validating the Value Proposition. Conducting Competitive Research and Analysis for Innovation. Information Systems Design for the Web: Enterprise Resource Planning, Customer Relationship Management, Document Management Systems. Networked Applications and their impact on business processes: e-mail, file-sharing, collaboration tools. Driving digital innovation using Networked Applications. User Experience Strategy: Definition of UX Strategy: UX Design vs. UX Strategy, UX Strategy vs. Business Strategy; Conducting Competitive Research and Analysis; Conducting User Research; Prototypes; Storyboarding. Collecting requirements from any business organization and develop an e-Commerce web solution as group activity.				

IS-EAP-2101	Academic English I	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester IV				
IS4101	IT Auditing	T	-	-
IT Audit Overview: Roles of the IS auditor and IS audit functions, Auditing and Internal Control. Auditing IT Governance Controls. Auditing Operating Systems and Networks. Auditing Database Systems. Computer-Assisted Audit Tools and Techniques. Business Ethics, Fraud, and Fraud Detection IT auditing frameworks.				

IS4102	Web Application Development	T	P	-
Server-Side Scripting and Technologies. Client server communication with Scripting Language. Integrated scripting with Data. Sessions and Cookies in PHP. Web development frameworks. Web security. Implementation of Server-Side Scripting Languages.				

IS4103	Operating Systems	T	P	-
Operating Systems Overview (Historical development, Operating system objectives and functionalities, Major achievements). Process & Thread Management (Process concepts, Thread concepts, Descriptions, structures, and controls, Multiprocessors and Multi Thread programming). CPU Scheduling. Concurrency Control (Mutual exclusion, Synchronization, Deadlock, Starvation). Memory Management (Multiprogramming and partitions, Paging and segmentation, Virtual memory, Demand paging, Page replacement algorithms). I/O & File Management (I/O devices, Disk scheduling, File organization, Directory structures). Case Studies. Shell Programming: a) Unix Commands b) Editor Commands c) Unix Shell programming commands a) Concatenation of two strings b) Comparison of two strings c) Maximum of three numbers d) Fibonacci				

series e) Arithmetic operation using case. System Calls a) Process Creation b) Executing a command c) Sleep command d) Sleep command using getpid e) Signal handling using kill k) Wait command. Introduction to MIPS Programming with Mars simulation tools- (Exception and interrupt handling).

IS4104	System Administration and Maintenance	T	P	-

Shell Programming: a) Unix Commands b) Editor Commands c) Unix Shell programming commands a) Concatenation of two strings b) Comparison of two strings c) Maximum of three numbers d) Fibonacci series e) Arithmetic operation using case. System Calls a) Process Creation b) Executing a command c) Sleep command d) Sleep command using getpid e) Signal handling using kill k) Wait command. Introduction to MIPS Programming with Mars simulation tools- (Exception and interrupt handling). Foundation Elements of System Administration, Operating systems: Installation, configuration, maintenance, and server services, client services, support. Administrative activities: content management & deployment, server administration and management, user & group management, backup management, security management, disaster recovery, automation management, user support & education. Administrative domains: web, network, database, OS, support domains. Introducing system administration on cloud computing & hybrid usage. Help desk concepts. System monitoring. Hands on experience with related latest tools.

IS4105	IT Procurement Management	T	-	W

Procurement processes. Procurement documents. Different types of contacts. Procurement negotiation. Procurement performance review. Contract change control systems. National procurement guideline

IS4106	Software Architecture	T	-	-

Basic concepts & principles about software architecture. Introduction to Software Architectural pattern. ADL. 04: 4+1 Architecture. Practical approaches & methods for Create & Analyse software architecture. Quality attributes of software architectures. Examples in architectural design applications & case studies in software architecture (N tier architecture, SOA, Cloud, etc.).

IS4107	Professionalism & Ethics in Computing	T	-	-

Role & functions of professional bodies. Professional bodies for computing practitioners. Impact of computing professional bodies on vocational areas of work. Codes of conduct relevant to computing practitioners, Professional integrity and ethics. Duty of computing practitioners in social, political & environmental areas. Computing legislation in the context of job roles for computing practitioners, Other relevant legislation that impacts on computing practitioners. Sources of ethical advice out with professional bodies for computing practitioners. Social, political & environmental computing principles, Ethical conflict resolution.

IS4108	IS Strategies	T	-	-

Role of Information Systems in Organizations. An Overview of Strategic

Management. Process for Developing Information Systems Strategies. IS Strategic Analysis. Innovating with Technology, Systems & Information. Exploiting Information Systems for Strategic Advantage. Determining the Business Information Systems Strategy. Managing the Portfolio of Business Applications. Justifying & Managing Information Systems Investments. An Organizing Framework for the Strategic Management of IS.

IS4109	Agile Software Development	T	-	W
Plan Driven Development Methodologies Vs Agile Software Development. Agile Manifesto: Values & Principles. Agile Software Development Frameworks. Scrum: Roles, Artifacts, Events, Values & Rules. Extreme Programming (XP); Practices, Values & Principles. Lean Software Development: Kanban & Kaizen. Agile Project Management: Planning, Estimation, Communication, Scrum. Agile Testing. Scale up and out in Agile. Agile Tools. Naked objects				

IS4110	Capstone Project	-	-	TH
Study the basic concepts of programming concepts & application to design & implement the mini project intended solution for project-based learning.				

IS-EAP-2201	Academic English II	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester V				
IS5101	Entrepreneurship & Innovation	T	-	W
Role of entrepreneurs in national development. Training of entrepreneurs. Essential characteristics of techno-entrepreneurs. Business proposal & assessing criteria. Making business proposals. Technology & innovation: Invention, Commercialization & Diffusion, Technology push & market pull. Business models for innovation.				

IS5102	Enterprise Architecture	T	-	-
An Introduction to Enterprise Architecture (EA). EA Frameworks, Component Architectures. Enterprise Application Service Delivery. Systems Integration. Content Management. Inter-Organizational Architectures. Processes for Developing EA. Architecture Change Management. Implementing EA. EA & Management Controls.				

IS5103	High Performance Computing	T	P	-
Introduction to Parallel & Distributed Programming (definitions, taxonomies, trends). Parallel Computing Architectures, Paradigms, Issues, & Technologies (architectures, topologies, organizations). Parallel Programming (performance, programming paradigms, applications). Parallel Programming Using Shared Memory I (basics of shared memory programming, memory coherence, race conditions & deadlock detection, synchronization). Parallel Programming Using Shared Memory II (multithreaded programming, OpenMP, pthreads, Java threads). Parallel Programming using Message Passing - I (basics of message				

passing techniques, synchronous/asynchronous messaging, partitioning & load-balancing). Parallel Programming using Message Passing - II (MPI), Advanced Topics (accelerators, CUDA, OpenCL, PGAS). Introduction to Distributed Programming (architectures, programming models). Distributed Programming Issues/Algorithms (fundamental issues & concepts - synchronization, mutual exclusion, termination detection, clocks, event ordering, locking). Distributed Computing Tools & Technologies I (CORBA, JavaRMI). Distributed Computing Tools & Technologies II (Web Services, shared spaces), Distributed Computing Tools & Technologies III (Map-Reduce, Hadoop). Parallel & Distributed Computing – Trends & Visions (Cloud & Grid Computing, P2P Computing, Autonomic Computing). Cloud based tool will be used to conduct the practical.

IS5104	Software Process Management	T	-	-

Project Quality Management - Plan Quality Management, Manage Quality, Control Quality. Project Resource Management - Plan Resource Management, Estimate Activity Resources, Acquire Resources, Develop Team, Manage Team, Control Resources. Project Communications Management - Plan Communications Management, Manage Communications, Monitor Communications. Project Stakeholder Management - Identify Stakeholders, Plan Stakeholder Engagement, Manage Stakeholder Engagement, Monitor Stakeholder Engagement.

IS5105	Business Process Management	T	-	-

Business Processes (basic concepts, modeling). Design, analysis, verification & refinement methods. Workflow Systems (organization & architecture). Synchronization, control, communication & monitoring of process enactment. Workflow Analysis. Workflow Patterns. Workflow development tools & software.

IS5106	UI/UX Practicum	-	P	-

Identify User Experience Design as a field & how it relates to Computer Science. Distinguish between Human-Centered Computing and Human-Computer Interaction. Design Graphics for computer interfaces. Explore User Experience Design Techniques: scenarios, personas, storyboards, wireframing, information architecture. Explore User Experience Design methods: focus groups, design probes, affinity diagramming, speed dating for UI concepts. Use Prototyping tools (both low-fidelity & high-fidelity). Develop designs for small screens: responsive design, Non-GUI design (e.g., auditory interfaces, gesture interfaces).

IS5107	Project Management Practicum	-	P	-

Master WBS Creation and Resource Planning: Work Breakdown Structure, Identify Stakeholders, Analyzing Stakeholders. Resource Utilization Planning and Master Schedule Development: Dedicated and Shared Resources, Shared Resource Management, Resource Utilization Planning, Master Schedule.

IS5108	Business Intelligence	T	-	-

Decision Support Systems and Business Intelligence: Business Environment Factors (markets, consumer demands, technology, and societal, etc.), Decision

Support Frameworks (Degree of Structuredness vs. Types of Control), Automated Decision Making, Evolution of BI Capabilities, DSS & BI Architectures, Styles and Benefits of BI, Elements of a Work Systems, Major Tool Categories for Management Support Systems. Decision Making, Systems, Modeling, and Support: Introduction to Decision-Making Disciplines, Characteristics of Decision Making and Decision Styles, Types and Benefits of Decision-Making Models, Decision-Making Process, New Technologies to Support Decision Making, Key Data Issues and Key Ingredients of Data (Information) Quality Management, Decision Support Systems Concepts, Methodologies, and Technologies: DSS Characteristics and Capabilities, DSS Classifications, Major DSS Components and Web Impacts, Future/current DSS Developments. Emerging Trends and Impacts: RFID and BI (RFID for BI in Supply Chain, RFID + Sensors for Better BI, etc.), Reality Mining and Virtual Worlds in BI applications, Web X.0 Revolutions, Virtual (Internet) Communities and Types, Online Social Networking and Social Network Analysis, Implications of Business and Enterprise Social Networks, Cloud Computing and BI, Issues of Legality, Privacy and Ethics. Collaborative Computer-Supported Technologies and Group Support Systems: Why (business) collaboration is difficult?, Time/Place Communication Framework, Groupware for (business) collaboration, Group Support Systems and Important Features, GSS Enabling Technologies, Collaborative Planning, Forecasting, and Replenishment (CPFR) and Collective Intelligence, Introduction to Taxonomy of Collective Intelligence.

IS5109	IS Project for Community	-	-	TH
Independent Topics related to Software development will be conducted.				

IS5110	Advanced Database Systems	T	P	-
Database Design & Implementation - Relational Database Design, Database Implementation & Tools, Advanced SQL, Database System Catalog. DBMS Advance Features - Query Processing & Evaluation, Transaction Management & Recovery, Database Security & Authorization. Distributed Databases - Enhanced Database Models, Object Oriented Databases, Database & XML. Emerging Trends & Example of DBMS Architecture - Emerging Database Models, Technologies & Applications, Big data. Advanced SQL - Temporary table, Views, Stored procedures, Stored function & Triggers.				

IS5111	Data Communication & Networks	T	P	-
Fundamental concepts of data communications: Application, Physical, Data Link and Network/Transport layer, Principles of communication and connecting to the network, Network Services. Network Technologies: Local Area Network (LAN) and Wireless LAN. Wireless technologies: Wide Area Network (WAN) and Metropolitan Area Networks (MAN), Internet standards and services. Network Management: Security, Design and Management of the network. Research on data communications and networking. Understand the networking concepts using simulation tools. Hands on experience in the laboratory.				

IS5112	Design Patterns & Anti-patterns	T	P	-
Introduction to Design Patterns: A Brief History, How Design Patterns Solve Design Problems, How to Select & Use a Design Pattern. The Catalog of GoF (Gang-of-Four) Design Patterns. Creational Patterns: Abstract Factory, Factory Method, Singleton. Structural Patterns: Adapter, Composite, Decorator. Behavioral Patterns: Observer, Strategy, Template Method Pattern. Model-View-Controller (MVC) Pattern. Design Principles for creating software that is flexible, reusable, and maintainable. Symptoms of bad design (anti-patterns). Hands on experience in modelling using a UML professional design software and OOP programming.				

IS5113	Software Quality Assurance	T	P	-
Introduction to Software Quality and Software Quality Assurance (SQA). The components of the software quality assurance system, Software project life cycle components, Infrastructure components for error prevention and improvement, Management SQA components, SQA standards, system certification, and assessment components. Testing Concepts Definition, Types and Levels of testing, Black vs. White Box testing. Test Techniques, White Box techniques, Black Box techniques, Test Planning. Test Design Specifications, Test Cases, Test Metrics, Pre-process metrics: Estimation, In-process metrics: Process Management, End-process metrics: Process Improvement. Test Management, Test planning, resource management, test reporting, tools. Test Automation: Web test automation, Mobile test automation, Test script writing. SQA Standards, certification and assessment. Organizing for quality assurance, Management and its role in software quality assurance. Hands on experience with a SQA Tool for authoring functional tests.				

IS5114	Data Mining & Analytics	T	P	-
Clustering Algorithms: K-mean, Agglomerative algorithm. Classification Algorithms: Decision Tree, Support Vector Machine. Association rule mining. Topic extraction. Implementation of datamining algorithms using python and Weka tools.				

IS-EBP-3101	Business English	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester VI				
IS6101	Industrial Training	-	-	TH
Students will be required to complete industrial training related to Information Systems at a relevant industry or research institution. The duration of the project period should be a minimum of 15 weeks. A project report (thesis if it is a research) should be submitted at the end of the semester & should be presented & defended by the respective student in front of an evaluation panel appointed by the department.				

Semester VII				
IS7101	Research Methodologies	T	-	-
Introduction to the notion of research. Literature review. Research designs. Identifying data requirements, sources, & instruments for data gathering. Undertaking 'experiments'. Validation: Types of validation. Analysing research data. Writing Strategies. Ethical Consideration				

IS7102	Information System Law	T	-	-
Introduction to Information System Law. Communications Law: Policy and regulation of electronic communications, focusing particularly on the Internet and its most current challenges. Electronic Commerce Law: Legal issues surrounding electronic commerce - including business-to-consumer (B2C), business-to-business (B2B), and consumer to consumer (C2C) forms - and digital applications to support the sharing economy, creative processes and the public sector. Information Technology Law: Impact information technology and the Internet have had, and are having, on substantive law. Legal Aspects of Managing Intellectual Property: Intellectual Property Law: Copyright and Related Rights & Industrial Property. Information technology law and Sri Lanka's response-computer and information technology council of Sri Lanka act No. 10 of 1984, computer crime act no 24 of 2007, Electronic transaction act no 19 of 2006 information and communication technology act no. 27 of 2003				

IS7103	Business Process Simulation	T	P	-
Simulation in management decision making. Queuing theory. Concepts of discrete-event simulation. Construction of models: Modeling issues, Verification & Validation of models. Use of computer simulation tools.				

IS7104	Enterprise Modelling Ontologies	T	P	-
Introduction to the Semantic Web. Introduction to Ontologies. Ontology Languages for the Semantic Web. Resource Description Framework (RDF). Lightweight ontologies: RDF Schema. Web Ontology Language (OWL). A query language for RDF: SPARQL. Ontology Engineering. Semantic web & Web 2.0. Applications of Semantic Web. Hands-on experience with Protégé tool.				

IS7105	Organizational Behavior & Management	T	-	-
Fundamental concepts & overview of Organizational Behavior & Management. Understand Individual Behavior (Attitude, Values, Perception, Learning, Personality. Motivation, Psychological Capital, Multiple Intelligence, Emotional Intelligence). Team dynamics, Planning, Organizing, Leadership, Controlling. Organizational Conflict Management, Stress Management, Interpersonal & Organizational Communication. Organizational Culture & Managing Change.				

IS7106	Cloud Computing	T	P	-
Cloud Computing Concepts: Introduction to cloud computing, Properties, characteristics & disadvantages, Gossip, Membership & Grids, P2P Systems, Key-Value Stores, Time & Ordering Classical Distributed Algorithms. Cloud Systems				

& Infrastructure: Cloud computing stack, Service model, Deployment models, Containers, virtual machines, MAAS, PAAS, Web Services. Storage: Ceph, SWIFT, HDFS, NAAS, SAN, Zookeeper. Big Data & Applications in the Cloud: Spark, Hortonworks, HDFS, CAP, Streaming Systems, Graph Processing & Machine Learning. Cloud Resource management & Service management in cloud computing. Cloud Networking: Introduction to cloud networking SDN with cloud, Data center networking. Cloud security: Identity & Access management, Access control, Authentication in cloud computing. Developing application in cloud platform, Introduction to Cloud Computing with AWS, Azure google's cloud platform. Research trends in cloud: Edge & Fog computing, cloud & IoT. Hands on experience using a cloud-based tool.

IS7107	Mobile Application Development	-	P	W

Native & Cross-platform Development. Mobile Application Development Languages & Frameworks. Development Tools & Version controlling. Mobile Application Architectures and Design Patterns. Graphics & User Interface Design. Data Persistence, APIs & Libraries, Files & Media. Camera & Motions sensors. GPS/ location sensing & Maps. Network programming. Future Trends (Augmented Reality, M-Commerce, Low Code Development). Security, & Marketplace deployment.

IS7108	Web Service Technologies	T	P	-

Introduction to SOA. Communication Protocols: RESTFul services, SOAP services (WS-* protocols). Serialization Formats: XML (XML Schema, XPath & XSLT), JSON, Text Encoding Formats, Binary Formats (Protobuf). Web services with tools (Postman). Security: OAuth, JWT, SWT, Distributed Web applications development using a Java Web Framework. Implementation of web services.

IS7109	Geographical Information Systems	T	P	-

Introduction to GIS - What is Geographic Information Systems, Different components of GIS, Different types of vector data, Raster data models & their types, TIN data model; Data Representations - Advantages & disadvantages associated with vector, raster & TIN, Non-spatial data (attributes) & their type, Raster data compression techniques, Different raster data file formats, Spatial database systems & their types; Map Projections - Pre-processing of spatial datasets, Different map projections, Spatial interpolation techniques, Different types of resolutions, Digital Elevation Model (DEM). Geographic Phenomena. Hands on experience with GIS. Hands on experience with different spatial related APIs (Geo Coding API, LocationIQ API, Google Maps API etc.).

IS7110	Statistical Distribution & Inferences	-	P	-

Probability distributions - Normal distribution, Poisson distribution, exponential, distribution, binomial distribution etc. An overview of statistical inference. An introduction to statistical inference. Sampling Distributions - Statistical inference: Estimation of population parameters based on the data obtained through a suitable sample. Sampling distribution: The probability distribution of a particular statistic

of an obtained sample. Estimation - Approximation of values for a particular parameter. Hypothesis testing - Evaluation of a particular assumption made. Correlation & simple linear regression analysis - Correlation: Measuring the strength of the association between the independent & the dependent variables. Simple linear regression: measuring the relationship between the independent & the dependent variable.

IS7111	Advanced Programming Practicum	-	P	-
Advanced programming features available in OOP languages: Model-View-Controller & design patterns, multithreading, exception handling, file handling & file I/O, abstract classes & interfaces, collections framework, event driven programming model & Java layout managers for GUI design, various categories of design patterns including but not limited to Behavioral Patterns, Creational Patterns & Structural Patterns. The emphasis will be on design, implementation & testing of object-oriented solutions to a specified problem using above techniques. Choosing an appropriate design pattern for a particular situation..				

IS7112	Machine Learning	T	P	-
Introduction to machine learning & neural networks: supervised learning, linear models for regression, basic neural network structure Deep learning. Neural networks: Forward Propagation, Cost Functions, Error Backpropagation, training by gradient descent, bias/variance & under/ overfitting, regularization, Exercises on NNs, solving a problem with NNs on TensorFlow. Exercises on CNN, solving a problem with CNN on TensorFlow. Exercises on RNNs, solving a problem with RNNs on TensorFlow.				

Semester VIII				
IS8101	Research Project in IS	-	-	TH
The course starts with a reflection and discussion about interdisciplinary research, where students define their research topics. Throughout the course, the students work in developing their research questions and choose the appropriate methodological approaches for their research and analyze the results. Students should be able to provide valid findings in selected research domains and report in a format of thesis and submit it to the department. They are encouraged to present their findings in local and international research forums.				

IS8102	Business/IT Alignment	T	-	-
IT Solutions in Organizations. Frameworks for the Analysis of IT Solutions in Organizations. Business-IT Alignment - Theoretical Background and Hypotheses Formulation. Business-IT Alignment - Empirical Research. Roadmaps for Business-IT Alignment (Models).				

IS8103	Human Resource Management	T	-	-
Uniqueness of Human Resource, Human Resource Management, Purpose of HRM, Importance & Responsibility for functions of HRM, Jobs, job designing & Job analysis. The necessity for Job re-designing, Job redesigning methods, Alternative				

work schedules. Value of Job Analysis, Job Description & Job Specification, HR Planning, HR Planning Process Recruitment & process of recruitment, Employer branding, New trends in recruitment – Active Sourcing/SNS recruitment. Significance of employee selections, Selection methods & selection process, Errors in employee selection Process of hiring, Probationary period, Employee orientation. Definition of Employee Performance Evaluation (EPE), Significance of EPE, EPE methods, Developing PE system. Definition–Learning, Education, training, development, Learning Principles, Training needs analysis. Training programme designing, Effective implementation of training programs, Evaluation of training programmes. Reward & total reward, Basic Salary determination - Job evaluation, Pay survey, Performance based pay, Employee benefits, Legal provisions for reward management in Sri Lanka. Grievance Handling (GH), Importance of GH, Methods of GH, Practical tips in HG. Discipline management, Hot Stove Model, Misconducts, Domestic Inquiry. The concepts of occupational health & safety, Hazards & factors affecting health & safety, Interventions for improving health & safety. Human Resource Information Systems. Green HRM, HR Analytics, HR Scorecards

IS8104	Scientific Communication	T	-	-

The nature of scientific writing; the scientific paper as argument. Writing proposals (Kinds of proposals, Standard formats for proposals, etc.). Strategies for making the proposal persuasive. Writing lab reports, project reports, and journal articles. Standard formats for research reports. Principles of structuring the report. Strategies for presenting data logically and persuasively.: Writing abstracts (Kinds of abstracts; structuring the abstract, Strategies for making the abstract concise, specific, and detailed). Academic writing (research significance, flow, making claims and argumentation model). Maintaining objectivity. Using jargon, Presenting equations. Rhetorical principles and conventions of presenting data graphically. Documenting the scientific paper. Presenting scientific material to a lay audience. Ethics and Plagiarism

IS8105	IS Economics	T	-	-

Economic Aspect of Information & Information Systems. Problem of Asymmetric Information: Adverse Selection & Moral Hazard. Macroeconomic & Microeconomic Aspects of Information Systems. Basic Economic Principles on Firms, Markets, Industries & Organization; Demand & Supply Analysis. Economic Impacts of Telecommunication & Digital Media. Sustainable Development & Information Technology. Intellectual Property Rights & Knowledge Based Economy. The Impact of Information Systems on Employment /Unemployment. Pricing & Marketing of Information Goods.

IS8106	Computer System Security	T	P	-

Threats & attacks on security. Crypto Basic. Symmetric Key Cryptography. Public-Key Cryptography. Key Distribution & Hash function. Authentication - Biometric Authorization – Access Control. Simple Authentication Protocols and Real world Security Protocols. Wireless Network Security. Operating System and Security.

Software Security. Network Management Security. Hands on experience with related latest tools

IS8107	Supply Chain Management	T	-	-
Overview of Supply Chain Management. Integrated Supply Chain Management. Procurement Management, Inventory Management & Manufacturing. Packaging & Handling, Distribution & Warehouse Management. Transportation. Supply Chain Logistics Planning & Design. Global Supply Chains & Network Design. Performance Measurement & Risk & Security Management.				

IS8108	Advanced Computer Networks	T	P	-
Device to Device Communication Architectures - Algorithm & protocols designed for MANET, mesh, cellular & opportunistic networks. Students will read several classic research papers to understand the design choices & vision. Content based Network Architectures - Principles of data dissemination, aggregation & caching that are applied to sensor networks, Internet of Things & other content-based paradigms. Students will survey recent research publications on opportunistic networks & next generation content-based networking ideas. Applications - P2P, Social Networks, Cloud computing applications will be discussed for the IP network & similar applications for next generation networks. These discussions will be mainly led by students & moderated by the instructor. Simulation & Experimentation - Introduction to performance analysis of new networking ideas using the Network Simulator -v3 (ns3), Click Modular Router & the GENI testbed. Students will complete lab exercises that demonstrate various capabilities of the aforementioned tools. Hands on experience with related latest tools.				

IS8109	Process Mining	T	P	-
Introduction to Process Mining. Process Modeling & Analysis. Getting the Data. Process Discovery: Advanced Process Discovery Techniques Conformance Checking. Mining Additional Perspectives. Operational Support. Tool Support. Hands on experience with related latest tools.				

IS8110	Digital Business Model	T	-	-
Introduction to Digital Business Models. How Internet companies use digital business models. Key actors and stakeholders in the digital economy. The emergence of new digital spaces and business models. Adopting digital business models and disrupting established market sectors. Developing digital business models that capture value and sustain their competitive advantage. Build your own Digital Business Model.				

IS8111	Game Development	T	P	-
A Brief History of Video Games. Games and Society. Game Design (with 3D Characters: Animation & control). Teams and Processes in Games. Programming Fundamentals for Game Development. Debugging Games. Game Architecture. Memory and I/O Systems in Game Development Environments Mathematical Concepts for Games. Collision Detection and Resolution. Graphics for Games.				

Artificial Intelligence in Games. Networks and Multiplayer Mode for Game. UI Development, Connecting games to services Databases. Global illumination, code library. This module laboratory session is covered by using a suitable gaming library and develop simple gaming applications on given scenario.

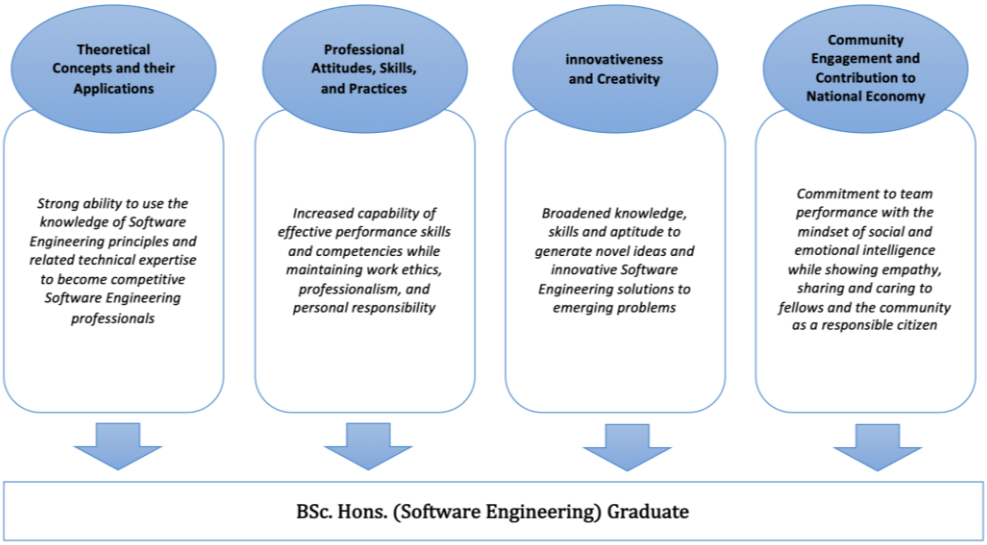
Rules and regulations

1. Students should complete (obtain at least D+ grade) the non-credited compulsory courses General English I, General English II, Academic English I, Academic English II and Business English to obtain the degree.
2. Student should follow at least courses which are not less than total credits of six (06) out of ten (10) credits elective course in the Semester V.
3. Student should go for the Industry Placement in the Semester VI, which is compulsory for all. Also, students should submit Internship Placement Offer Letter to the Department prior to the commencement of Semester VI.
4. Student should follow at least courses which are not less than total credits of four (04) out of nine (09) credits elective course in the Semester VII.
5. Student should follow at least courses which are not less than total credits of four (04) out of nine (09) credits elective course in the Semester VIII.
6. Compulsory non-credited Industrial visit will be organized during the Semester V.
7. Depending on the availability of the resources, elective courses will be conducted in the Semester V, VII and VIII.
8. Students should submit the Research Proposal for the B. Sc. Research Project during the first part of the semester VII through the course Research Method (IS7101) and the Research will commence thereafter and there will be regular progress presentations from Semester VII to the end of the semester VIII. This is completely a research project and not an internship in the industry.

Degree Program

Bachelor of Science Honours in Software Engineering

Anticipated Graduate Profile



Guidelines for course codes and credits

- Each course code consists of four digits together with the prefix (alphabet letters)
- Prefix alphabet letters denote the abbreviation to the name of degree program (SE)
- The first digit of each course code is the corresponding semester of study (1-8).
- Second digit represents the revision of the subject and it will increment if the subject is revised.
- Third and fourth digits represent the subject code

Example: The course code of SE1101 denotes the following;

Abbreviated name of degree program	Semester	Revision Number	Subject Code
SE (Software Engineering)	1	1	01

Note: There are no spaces or special characters in the course code.

Summary of the courses

Table 1: Courses offered in the Semester I			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
SE1101	Computer Organization	2	Compulsory
SE1102	Programming Fundamentals	2	Compulsory
SE1103	Requirements Fundamentals	2	Compulsory
SE1104	Software Process Concepts	2	Compulsory
SE1105	Social and Professional Issues	2	Compulsory
SE1106	Fundamentals of Mathematics	2	Compulsory
SE1107	Fundamentals of Statistics	2	Compulsory
SE1108	Communication Skills I		Compulsory
SE1109	Academic Integrity		Compulsory
SE-EGP-1101	General English I		Compulsory
	Total	14	

Table 2: Courses offered in the Semester II			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
SE2101	Algorithms, Data structures, and Complexity	2	Compulsory
SE2102	Database Management Systems	2	Compulsory
SE2103	Operating Systems Basics	2	Compulsory
SE2104	Object Oriented Programming	2	Compulsory
SE2105	Requirement Specification and Documentation	2	Compulsory
SE2106	Software Process Implementation	2	Compulsory
SE2107	Analysis Fundamentals	2	Compulsory
SE2108	Advanced Mathematics	2	Compulsory
SE2109	Communication Skills II		Compulsory
SE-EGP-1201	General English II		Compulsory
	Total	16	

Table 3: Courses offered in the Semester III			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
SE3101	Network Protocols	2	Compulsory
SE3102	Formal Methods	2	Compulsory
SE3103	Object Oriented Analysis and Design	2	Compulsory
SE3104	Requirements Validation	2	Compulsory
SE3105	Software Design Concepts	2	Compulsory
SE3106	Web Systems and Technologies	2	Compulsory
SE3107	Software Engineering Foundations	2	Compulsory
SE-EAP-2101	Academic English I		Compulsory
	Total	14	

Table 4: Courses offered in the Semester IV			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
SE4101	Security Fundamentals	2	Compulsory
SE4102	Software Verification and Validation	2	Compulsory
SE4103	Software Configuration Management	2	Compulsory
SE4104	Software Project Management	2	Compulsory
SE4105	Human Computer Interaction Design	2	Compulsory
SE4106	Projects in Web Systems and Technologies	3	Compulsory
SE4107	Industrial Inspection	1	Compulsory
SE4108	Risk Management	2	Compulsory
SE4109	Communication Skills	2	Compulsory
SE4110	Management Information Systems	2	Compulsory
SE-EAP-2201	Academic English II		Compulsory
	Total	20	

Table 5: Courses offered in the Semester V			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
SE5101	Computer and Network Security	2	Compulsory
SE5102	Software Testing	2	Compulsory
SE5103	Product Assurance	2	Compulsory
SE5104	Mini Project	3	Compulsory
SE5105	Evolution processes and activities	1	Compulsory
SE5106	IT Auditing	2	Elective
SE5107	Human Resource Management	2	Elective
SE5108	Geographic Information Systems	2	Elective
SE5109	Logistic System and Transportation Management	2	Elective
SE5110	Business Intelligence	2	Elective
SE-EBP-3101	Business English		Compulsory
	Total (Core + Electives) (10+10)	20	

Table 6: Courses offered in the Semester VI			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
SE6101	Community Project	3	Compulsory
SE6102	Cloud Computing	2	Compulsory
SE6103	Parallel and Distributed Systems	2	Compulsory
SE6104	Advanced Database Management Systems	2	Compulsory
SE6105	Software Architecture	2	Compulsory
SE6106	Software Design Patterns	2	Compulsory
SE6107	Software Design Evaluation	2	Compulsory
SE6108	Current Topics in Software Engineering	1	Compulsory
SE6109	Enterprise Modeling Ontologies	2	Elective

SE6110	Software Engineering Economics	2	Elective
SE6111	Social Computing	2	Elective
SE6112	Semantic Web	2	Elective
SE6113	Robotics	2	Elective
	Total (Core + Electives) (16+10)	26	

Table 7: Courses offered in the Semester VII			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
SE7101	Industrial Training	6	Compulsory
	Total	6	

Table 8: Courses offered in the Semester VIII			
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**
SE8101	Research Project	8	Compulsory
SE8102	Research Methods	2	Compulsory
SE8103	Service Oriented Architecture	2	Compulsory
SE8104	Problem Analysis and Reporting	2	Compulsory
SE8105	Machine Learning	2	Compulsory
SE8106	Mobile Computing	2	Compulsory
SE8107	Refactoring	2	Compulsory
SE8108	Game Designing and Development	2	Elective
SE8109	Data Mining	2	Elective
SE8110	Big Data Analytics	2	Elective
SE8111	Artificial Intelligence	2	Elective
	Total (Core + Electives) (20+8)	28	

Summary of credits required

	Credits Required
Semester I	14
Semester II	16
Semester III	14
Semester IV	20
Semester V	14
Semester VI	20
Semester VII	06
Semester VIII	24
Total	**128**

Detailed Syllabus

N.B.

T - Theory
P - Practical
F - The department organizes the field visit relevant to the particular subject area.
W - The department organizes workshops relevant to particular course unit.
TH - Thesis

Semester I				
SE1101	Computer Organization	T	P	-
Basic Concept and Computer evolution: Organization and Architecture, the evolution of the Intel x86 Architecture, Embedded Systems, ARM architecture. Computer Performance Issues: Multicore, MIC and GPGPUs, Basic Measures of Computer Performance, benchmark and SPEC. Computer Function and interconnection: Computer Bus Interconnection, Point to Point Interconnection. Computer Memory System: Cache Memory Principles, Semiconductor main memory, External memory. Input/output: External Devices, I/O Modules, Interrupt Driven I/O, Programmed I/O, I/O channels and processors, External Interconnection Standards. Arithmetic and Logic: number system, Integer Representation, Floating Point representation, Digital logic, Combinational Circuits, Sequential Circuits, Programmable Logic Devices. The central Processing Unit: Machine Instruction Characteristics, Addressing Modes, Assembly language, Processor, Instruction Level Parallelism and superscalar Processor. Parallel Organization: Parallel processing, Multicore computers, General purpose Graphic processing Unit. Practical using graphical simulation tool for designing and simulating logic circuit. Digital Logic Design Implementation and Simplification of Boolean Functions Combinational Logic Modules – Adders and Subtractors Sequential logic, flip flops, FSM analysis and design Introduction to Assembly Language Programming.				

SE1102	Programming Fundamentals	T	P	-
Introduction to Programming: Introduction to compilers & interpreters, Data types, Variables, Expressions & Assignment Statements, Console Input/Output, Libraries & Namespaces. Flow Control: Branching Mechanisms, Loops. Function Basics: Predefined Functions, User-Defined Functions, Scope Rules. Parameters: Parameters, Default Arguments. Arrays: Introduction to Arrays, Array manipulation, Multidimensional Arrays. Pointers: Introduction to pointers, Pointer arithmetic. Recursion: Recursive functions. Exception Handling: Testing & Debugging. File Reading & Writing. Write programmes using functions, parameter passing, choose appropriate conditional & iteration constructs for a given programming task. Write programmes using arrays, standard conditional & iterative structures & pointers. Demonstrate the concept of recursion by examples, identify the base case & the general case of a recursively-defined problem. Demonstrate file handling & exception handling. Identify & describe uses of Data				

types, Variables, Expressions & Assignment Statements, Console Input/ Output and Libraries. Modify & expand short programmes that use standard conditional & iterative control structures. Write programmes using functions, parameter passing, choose appropriate conditional & iteration constructs for a given programming task. Write programmes using arrays, standard conditional & iterative structures & pointers. Demonstrate the concept of recursion by examples, identify the base case & the general case of a recursively-defined problem. Demonstrate file handling & exception handling.

SE1103	Requirements Fundamentals	T	-	W
Definition of requirements (e.g., product, project, constraints, system boundary, external, and internal), Requirements process, Layers/levels of requirements (e.g., needs, goals, user requirements, system requirements, and software requirements), Requirements characteristics (e.g., testable, unambiguous, consistent, correct, traceable, and priority), Analyzing quality (nonfunctional) requirements (e.g., safety, security, usability, and performance), Software requirements in the context of systems engineering, Requirements evolution, Traceability, Prioritization, trade-off analysis, risk analysis, and impact analysis, Requirements management (e.g., consistency management, release planning, and reuse), Interaction between requirements and architecture.				

SE1104	Software Process Concepts	T	-	-
Introduction to software process, themes and terminologies of software process and the concepts. Introduction and applications of software engineering process infrastructure. Detail view of modeling and specification of software process. Quality analysis control: defect prevention, review process, quality metrics and root cause analysis of critical defects. Introduction to systems engineering model life cycle.				

SE1105	Social and Professional Issues	T	-	-
History of computing. Social context of computing. Methods & tools of analysis: consequence, duty and right based ethical theories. Professional & ethical responsibility. Risks & liability of computer-based systems. Intellectual property, privacy & civil liberties. Computer crime, customs & law. Economical issues in computing. Philosophical frameworks.				

SE1106	Fundamentals of Mathematics	T	-	-
Linear Algebra. Matrices, Vector spaces & subspaces. Linearly independent & dependent vectors, Dimension rank & the basis of vector spaces. Linear transformations, Systems of linear equations, Determinants. Diagonalization of matrices, Functions & relations. Sets, cardinality Cartesian product. Ordered pairs, Bijective mappings, Equivalence relations. Logic Propositions, Truth tables, Symbolic statements, Disjunctive & conjunctive normal forms. Karnaugh maps.				

SE1107	Fundamentals of Statistics	T	-	-
Probability: Venn diagrams, Tree diagrams & Cartesian diagrams, Conditional				

Probability - The occurrence of an event given that another event has already occurred, Bayes' theorem & applications - An extension of conditional probabilities, Statistics: Population & Sample - Population: all the objects that a person is interested in, Sample: a subset of the population which is used to make inferences about the population, Types of random variables - Discrete & continuous random variables, Data Collecting - Experimental studies & observational studies, Data Summarizing Techniques - Descriptive statistics: mean, median, mode, inter quartile range, standard deviation etc., Data Visualizing Techniques - Techniques to visualize continuous & discrete variables, Measure of Central tendency - Mean, median, mode, Measure of Dispersion - Standard deviation, variance & inter quartile range, Mean & Variance of Random Variables - Relationship between the mean & the variance of random variables.

SE1108	Communication Skills I	T	-	-
Introduction to Communication: Purpose of Communication; Process of Communication; Importance of Communication in Business; Differences between Technical and General Communication; Barriers to Communication; Measures to Overcome the Barriers to Communication, Types of Communication: Types of Communication; Verbal Communication-Importance of verbal communication-Advantages of verbal communication- Advantages of written communication; Significance of Non-verbal Communication, Listening Skills: Listening Process; Classification of Listening; Purpose of Listening; Common Barriers to the Listening Process; Measures to Improve Listening; Listening as an Important Skill in Work Place, Language for Communication: Language and Communication; General Principles of Writing; Improving Writing Skills; Essentials of good style; Expressions and words to be avoided; Grammar and Usage, Communication in Organizations: Internal Communication; Stake Holders in Internal Communication; Channels of Internal Communication; External Communication; Stake Holders in External Communication; Channels of External Communication, Communication Network: Scope and Types of Communication Network; Formal and Informal Communication Network; Upward Communication; Downward Communication; Horizontal Communication; Diagonal Communication, Writing Business Letter: Importance of Business Letters; Difference between Personal and Business Letters; Structure and Format of Business Letters; Types of Business Letters.			

SE1109	Academic Integrity	T	-	-
Introduction to academic integrity, Academic integrity policies, Plagiarism, collusion and contract cheating, Putting academic integrity into practice, Research ethics, Citing and referencing, Reading and Note-making, Critical Thinking				

SE-EGP-1101	General English I	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester II				
SE2101	Algorithms, Data structures, and Complexity	T	P	-
Primitive data types: arrays, structures, pointers, memory allocation, iteration & recursion. Singly & doubly linked lists. Stack and Queue. Trees, binary search trees & basic operations. Hash tables. Graphs & basic algorithms on graphs: depth first & breadth first search, Dijkstra's algorithm. Sorting algorithms: quick sort, bubble sort, selection sort, merge sort, tree Sort. Complexity analysis of algorithms. Hands on experience on data structures & algorithms.				

SE2102	Database Management Systems	T	P	-
Introduction to Databases: Definition of the database, database system, data models, database applications. Database system architecture, characteristics of database approaches. Database development process. Data models. Relational model. ER model. Schema Mapping. Designing: Logical design: Relational database model, Logical view of data, keys, integrity rules, Normalization. Relational algebra: Introduction, Selection & projection, set operations, renaming, Joins, Division, syntax, semantics, Operators, Grouping & ungrouping, relational, Triggers. Database Management tools: Installation and Setting up the environment. Create Databases & Tables, Modifying Databases & Tables. Inserting Table Data, Modifying Table Data. Querying Data. Functions (String Functions, Date & time functions, Numeric Functions, Aggregate Functions). Joining Tables (Querying Multiple Tables, Joining Tables with SELECT, Table Name Aliases, Inner Joins, Outer Joins).				

SE2103	Operating Systems Basics	T	P	-
Operating Systems Overview (Historical development, Operating system objectives and functionalities, Major achievements). Process & Thread Management (Process concepts, Thread concepts, Descriptions, structures, and controls, Multiprocessors and Multi Thread programming). CPU Scheduling, Concurrency Control (Mutual exclusion, Synchronization, Deadlock, Starvation). Memory Management (Multiprogramming and partitions, Paging and segmentation, Virtual memory, Demand paging, Page replacement algorithms). I/O & File Management (I/O devices, Disk scheduling, File organization, Directory structures). Case Studies. Shell Programming: a) Unix Commands b) Editor Commands c) Unix Shell. programming commands a) Concatenation of two strings b) Comparison of two strings c) Maximum of three numbers d) Fibonacci series e) Arithmetic operation using case, System Calls a) Process Creation b) Executing a command c) Sleep command d) Sleep command using getpid e) Signal handling using kill f) Wait command, Introduction to MIPS Programming with Mars simulation tools- (Exception and interrupt handling).				

SE2104	Object Oriented Programming	T	P	-
Fundamentals of Object-Oriented Programming; Classes & Objects. Data Abstraction. Information Hiding & Encapsulation. Methods: Void methods, return methods, argument passing. Inheritance. Polymorphism: Method overloading and method overriding. Abstract Classes. Exception Handling. Files & Database				

connections. Installation & configuring an IDE for OOP language: setting up path, environmental variable. Implement Class, Objects, Variables, Identifiers, Keywords, Data types. Arithmetic/logical Operators, Demonstrate Control statement (If-else, Switch), Loops (while, do-while, for). Implementation of Arrays. Implementation of Methods, Passing parameters, Arguments, Constructors. Implementation of OOP Concepts: Abstraction, Encapsulation, Inheritance (Specialization and Generalization) and Polymorphism. Applications of OOP concepts to solve real life problems.

SE2105	Requirement Specification and Documentation	T	-	-

Requirements documentation basics (e.g., types, audience, structure, quality, attributes, and standards). Software requirements specification techniques (e.g., plan driven requirements documentation, decision tables, user stories, and behavioral specifications). Requirement Documentation tools and techniques.

SE2106	Software Process Implementation	T	-	-

Levels of process definition (e.g., organization, project, team, and individual). Life-cycle model characteristics (e.g., plan-based, incremental, iterative, and agile). Individual software process (model, definition, measurement, analysis, and improvement). Team process (model, definition, organization, measurement, analysis, and improvement). Software process implementation in the context of systems engineering. Process tailoring. Effect of external factors (e.g., contract and legal requirements, standards, and acquisition practices) on software process. Software process implementation techniques.

SE2107	Analysis Fundamentals	T	-	-

Regression Analysis: Simple linear regressions and multiple linear regressions, parameter estimation (OLS) and its properties, tests for regression coefficients, tests for significance of the fitted model (ANOVA), model adequacy checking and remedial measure, Models with qualitative independent variables (Dummy variables) and model selection procedures. Nonparametric statistical methods: Scale of Measurements, Single sample tests; Sign and Wilcoxon Signed Rank Test, Two Sample tests. Wilcoxon Matched Paired Signed Rank test, Wilcoxon Rank Sum Test, The Kruskal-Wallis One-Way Analysis of Variance by Ranks, and Friedman Two-Way Analysis of Variance by Ranks, Rank Correlations (Spearman's and Kendall Tau). Introduction to time series analysis and Forecasting; Components of Time Series data, Smoothing methods, Forecasting methods. Analysis of real world data using statistical software and interpretation of results.

SE2108	Advanced Mathematics	T	-	-

Functions & relations - relations: an association between two or more sets. Functions: a binary relation. Sequences - An enumerated collection of objects in which repetitions are allowed & order does matter. Series - The addition or multiplication of multiple quantities. Errors Numerical Solution of Nonlinear Equations. Interpolation Theory - The theory of estimating data points within a

known data set. Numerical solution of systems of Linear Equation. Numerical Differentiation & integration. Numerical methods for differential equations. Graph theory.

SE2109	Communication Skills II	T	-	-
Writing Memos Circulars and Notices: What is a Memo?- Principles of précis writing- Approaches to memo writing- Characteristics of a memo- Guidelines for writing memos- Language and writing style of a memo- Format of a Memo; Circulars- Guidelines for writing a circular- Languages and writing style of a circular- Format of a circular; Notices- Purpose- Format- Important points to remember while writing a notice, Report Writing: Features of Writing a Good Report; Purpose of Report Writing; Difference between Business Report and Engineering Report-Characteristics of writing a good report-Importance of communication in report writing; Guidelines for Report Writing; Steps in Report Writing; Structure of Report; Types of Reports and Different Formats, Writing E-mail: Principles of E-mail; E-mail Etiquette; Overcoming Problems in E-mail Communication, Oral Communication Skills: Oral Business Presentation- Purpose –Audience-Locale; Steps in Making a Presentation- Research and planning-Structure and style-Preparation –Presentation; Delivering a Presentation, Meetings: Types of Meetings; Importance of Business Meetings; Different Types of Business Meetings; Conducting Meetings-Selecting participants-Developing agendas-Opening meetings-Establishing ground rules for meetings-Time management-Evaluations of meeting process-Evaluating the overall meeting-Closing meetings; Common Mistakes Made at Meetings, Reading Skills: Reading Skill; Purpose of Reading; Types of Reading; Techniques for Effective Reading, Employment Communication – Resume: Contents of Good Resume; Guidelines for Writing Resume; Different Types of Resumes; Reason for a Cover Letter to Apply for a Job-Format of Cover Letter; Different Types of Cover Letters, Employment Communication – Job Interview: Importance and Factors Involving Job Interview; Characteristics of Job Interview; Job Interview Process; Job Interview Techniques-Manners and etiquettes to be maintained during an interview; Sample Questions Commonly asked During Interview			

SE-EGP-1201	General English II	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester III				
SE3101	Network Protocols	T	-	-
Data Transmission Concepts: Channel Model, Synchronization and Baseband encoding, multiplexing. Packet Network Architectures: Packet switching. Network topologies: Bus, Star, Ring, and Types of networks. Layered Architecture. Internet Protocol Suite: Introduction, Transport Layer protocols, IP support protocols, Application Layer Protocols, IPV4 and IPV6 and QoS. Local Area Networks: Conventional LAN Architectures, IEEE 802 MAC layer standards, Wireless LANs. Wireless interconnection devices: Hub, Router, and Bluetooth (802.15) wireless personal area network. Mobile Wide Area Networks: introduction to wireless				

network, 2Infrastructure based and ad hoc mode networking in wireless networks, CDMA, Mobility in Wide area networks. Network Design: cabling standards: CAT5, CAT5e etc. Virtual LANs provisioning on switched networks, Virtual Private Networks service provision by service providers, IP NAT and proxy provision. Last mile access solutions (e.g., xDSL, FTTH). Miscellaneous topics: Content Distribution Networks, Software defined networks (SDN), Internet of Things. Network Protocol practice.

SE3102	Formal Methods	T	-	-
Hoare Logic and Program Verification: classical logic, induction and recursion, Program semantics, rewriting, reactive systems, temporal logic, model checking, and abstraction. Temporal Logic and Model Checking: Build reliable software, hardware, and security protocols. Various tools, including theorem proving and model checking tools, and will work in groups to apply the tools to various domains.				

SE3103	Object Oriented Analysis and Design	T	P	-
Managing design complexity with OOAD. Evolution of the object-oriented paradigm. Classes & Objects: Associations, Aggregation, Inheritance; Polymorphism, Abstraction, Encapsulation. Unified process, Notation: Unified Modeling Language. Use Case Diagram. Class Diagrams. Sequence Diagrams. Activity and component diagrams. Behavioral State Machine Diagrams. OOAD in Agile. Hands on experience using CASE tools.				

SE3104	Requirements Validation	T	-	-
Reviews and inspections. Prototyping to validate requirements. Acceptance test design. Validating product quality attributes. Requirements interaction analysis (e.g., feature interaction). Formal requirements analysis.				

SE3105	Software Design Concepts	T	-	-
Definition of design. Fundamental design issues (e.g., persistent data, storage management, and exceptions). Context of design within multiple software development life cycles. Design principles (information hiding, cohesion, and coupling). Interactions between design and requirements. Design for quality attributes (e.g., reliability, usability, maintainability, performance, testability, security, and fault tolerance). Design trade-offs.				

SE3106	Web Systems and Technologies	T	P	-
Introduction to SOA. Communication Protocols: RESTFul services, SOAP services (WS-* protocols). Serialization Formats: XML (XML Schema, XPath & XSLT), JSON, Text Encoding Formats, Binary Formats (Protobuf). Web services with tools(Postman). Security: OAuth, JWT, SWT, Distributed Web applications development using a Java Web Framework. Implementation of web services.				

SE3107	Software Engineering Foundations	T	P	-
Introduction to engineering methodologies. Requirement engineering. System specification. System modeling. System architecture. System implementation. System testing. Software maintenance. Project management. Hands on experience in Software Engineering Foundations tools and techniques.				

SE-EAP-2101	Academic English I	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester IV				
SE4101	Security Fundamentals	T	-	-
Fundamental aspects of security: CIA, security mindset, design principles, system/security life cycle. Security Implementation Mechanisms (Guards, Gates, Cryptography, steganography). Information Assurance Analysis Models (Threats, Vulnerabilities, Attacks, Countermeasures). Disaster and Recovery. Security Mechanisms: Cryptography, Authentication, Redundancy, Intrusion Detection. Operational Issues: Trends, Auditing, Cost-Benefit analysis, Asset Management, Standards, Enforcements, Legal Issues. Policy: Creation & Maintenance of Policies, Prevention, Avoidance, Domain, Integration. Attacks: Social Engineering, Denial of Service, Protocol Attacks, Active & Passive Attacks, Buffer Overflow Attacks, Malware. Forensics: Legal Systems, Digital Forensics, Rules of Evidence, Search & Seizure, Digital Evidence, Media Analysis.				

SE4102	Software Verification and Validation	T	-	W
V&V terminology and foundations. V&V objectives and constraints. Planning the V&V effort. Documenting V&V strategy, including tests and other artifacts. Metrics and measurement (e.g., reliability, usability, and performance). V&V involvement at different points in the life cycle. Reviews and static analysis, Personal reviews (design, code, etc.), Peer reviews (inspections, walkthroughs, etc.). Static analysis (common defect detection, checking against formal specifications, etc.)				

SE4103	Software Configuration Management	T	-	-
Revision control. Release management, Configuration management tools, Build processes and tools, including automated testing and continuous integration, Software configuration management processes, Maintenance issues, Distribution and backup.				

SE4104	Software Project Management	T	-	-
Introduction to Software Project Management: Projects and Processes, The Process Framework, Project integration Management, Scope Management, Time Management, Project cost Management, Quality management, Human Resource Management, Communication Management, Risk Management, Project management tools Advanced life cycle models, Testing and maintenance and software project documentation, IT Management.				

SE4105	Human Computer Interaction Design	T	-	-
HCI Principles, Usability principles, Building a simple GUI, Human abilities, Human-centered software development, Cultural aspects, Human-centered software evaluation, GUI design, GUI programming, HCI aspects of multimedia systems, HCI aspects of collaboration & communication, Validation of usability & user experience, Handling errors & help.				

SE4106	Projects in Web Systems and Technologies	-	P	TH
This Project will provide students with the principles and practical programming skills of developing Internet and Web applications. Students have to develop a Web application using web development languages Such as HTML, CSS, JavaScript and PHP. This is an individual project.				

SE4107	Industrial Inspection	-	-	F
Students are provided with industry exposure through industrial visits.				

SE4108	Risk Management	T	-	-
Background of Risk Management, Management Processes: Risk Identification, developing a Risk Management Plan, Analyse & Prioritize Risks: Qualitative Risk Analysis, Quantitative Risk Analysis, Develop Risk Responses, Risk Monitoring & Control, Assessment Frameworks (OCTAVE, FAIR, NIST SP800-30, and ISO 27005), Application of Risk Assessment Frameworks, Authentication & Authorization, Intrusion Detection.				

SE4109	Communication Skills	T	P	-
Reading, understanding, and summarizing reading (e.g., source code, and documentation), Writing (assignments, reports, evaluations, justifications, etc.), Team and group communication (both oral and written, email, etc.), Presentation skills.				

SE4110	Management Information Systems	T	-	-
Management within the organization: Management activities, Roles and Levels; Management Planning, Controlling and Strategic planning, Decision making and using MIS: Measurement of MIS performance and capabilities, MIS applications and relationships: Introduction to different types of Computing and Information Systems, Databases and data warehouses and their relevance to MIS; Networks, Internet and MIS, Development of MIS: Managing MIS Project, Techniques and methodologies for supporting MIS development, Customer Relationship Management (CRM) and Supply Chain Management (SCM), Financial Systems and E-Commerce, Business Process Redesigning using new trends in MIS (ERP, Mobile and Cloud enabled MIS etc.).				

SE-EAP-2201	Academic English II	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester V				
SE5101	Computer and Network Security	T	P	-
Basic Security Concepts: Confidentiality, integrity, availability, Security policies, security mechanisms, assurance, Basic Cryptography: Historical background, Transposition/Substitution, Caesar Cipher, Introduction to Symmetric crypto primitives, Asymmetric crypto primitives, and Hash functions, Secret Key Cryptography, Data Encryption Standard (DES), Encrypting large messages (ECB, CBC, OFB, CFB, CTR), Multiple Encryption DES (EDE), Message Digests: Applications, Strong and weak collision resistance, The Birthday Paradox, MD5, SHA-1 T5, Public Key Cryptography, Number theory: Euclidean algorithm, Euler Theorem, Fermat Theorem, Totent functions, multiplicative and additive inverse, RSA, Selection of public and private keys, Authentication: Basic concepts of identification and authentication, Password authentication, Authentication protocols, Trusted Intermediaries: Public Key infrastructures, Certification authorities and key distribution centers, Kerberos, Real-time Communication Security: IPsec: AH and ESP, IPsec: IKE, Hans on experience in Computer and Network Securit.				

SE5102	Software Testing	T	P	-
Unit testing and test-driven development, Exception handling (testing edge cases and boundary conditions), Coverage analysis and structure-based testing, Black-box functional testing techniques, Integration testing, Developing test cases based on use cases and/or user stories, Testing based on operational profiles (e.g., most-used operations first), System and acceptance testing, Testing across quality attributes (e.g., usability, security, compatibility, and accessibility), Regression testing, Testing tools and automation, User interface testing, Usability testing and Performance testing, Use of Software Testing tools and techniques				

SE5103	Product Assurance	T	-	-
The nature of product assurance, Distinctions between assurance and V&V, Quality product models, Root cause analysis and defect prevention, Quality product metrics and measurement, Assessment of product quality attributes (e.g., usability, reliability and availability).				

SE5104	Mini Project	-	-	TH
Study the basic concepts of programming concepts & application to design & implement the mini project intended solution for project-based learning.				

SE5105	Evolution processes and activities	T	-	-
Introduction to process evolution, importance of evolution, program evolution dynamics, Working with legacy systems, Basics of refactoring, Traditional life cycle models, Software product life cycle models, Software production setting models, Evaluating life cycle models and methodologies, Customize life cycle process models				

SE5106	IT Auditing	T	-	-
IT Audit Overview: Roles of the IS auditor and IS audit functions, Auditing and Internal Control, Auditing IT Governance Controls, Auditing Operating Systems and Networks, Auditing Database Systems, Computer-Assisted Audit Tools and Techniques, Business Ethics, Fraud and Fraud Detection, IT auditing frameworks.				

SE5107	Human Resource Management	T	-	-
Uniqueness of Human Resource, Human Resource Management, Purpose of HRM, Importance & Responsibility for functions of HRM, Jobs, job designing & Job analysis. The necessity for Job re-designing, Job redesigning methods, Alternative work schedules. Value of Job Analysis, Job Description & Job Specification, HR Planning, HR Planning Process Recruitment & process of recruitment, Employer branding, New trends in recruitment – Active Sourcing/SNS recruitment. Significance of employee selections Selection methods & selection process, Errors in employee selection Process of hiring, Probationary period, Employee orientation. Definition of Employee Performance Evaluation (EPE), Significance of EPE, EPE methods, Developing PE system. Definition–Learning, Education, training, development, Learning Principles, Training needs analysis. Training programme designing, Effective implementation of training programs, Evaluation of training programmes. Reward & total reward, Basic Salary determination - Job evaluation, Pay survey, Performance based pay, Employee benefits, and Legal provisions for reward management in Sri Lanka. Grievance Handling (GH), Importance of GH, Methods of GH, Practical tips in HG. Discipline management, Hot Stove Model, Misconducts, Domestic Inquiry. The concepts of occupational health & safety, Hazards & factors affecting health & safety, Interventions for improving health & safety. Human Resource Information Systems. Green HRM, HR Analytics, HR Scorecards				

SE5108	Geographic Information Systems	T	P	-
Introduction to GIS - What is Geographic Information Systems, Different components of GIS, Different types of vector data, Raster data models & their types, TIN data model; Data Representations - Advantages & disadvantages associated with vector, raster & TIN, Non-spatial data (attributes) & their type, Raster data compression techniques, Different raster data file formats, Spatial database systems & their types; Map Projections - Pre-processing of spatial datasets, Different map projections, Spatial interpolation techniques, Different types of resolutions, Digital Elevation Model (DEM). Geographic Phenomena. Hands on experience with GIS, Hands on experience with different spatial related APIs (Geo Coding API, LocationIQ API, Google Maps API etc.).				

SE5109	Logistic System and Transportation Management	T	-	-
Evolution of Logistics, Integrated logistics, Evolution of Supply Chain Management, Supply Chain Overview, Global Supply Chains, Supply Chain Strategy, Supply Chain Planning, Supply Chain Performance Management, Supply Chain Financial Control, Demand and Order Management, Supply Chain Operations Reference model. Networking and Transportation, Shipment				

Management, Fleet/Container Management, Carrier Management, Freight Management, Reverse Logistics, Outsourcing - Third Party Logistics (3PL) Provider/Lead Logistics Provider (LLP), Import and Export Procedures, Freight forwarding agencies and shipment services. National and international law, Legislation, Regulations, Safety requirements, and Professional standards.

SE5110	Business Intelligence	T	-	-
Decision Support Systems and Business Intelligence: Business Environment Factors (markets, consumer demands, technology, and societal, etc.), Decision Support Frameworks (Degree of Structuredness vs. Types of Control), Automated Decision Making, Evolution of BI Capabilities, DSS & BI Architectures, Styles and Benefits of BI, Elements of a Work Systems, Major Tool Categories for Management Support Systems. Decision Making, Systems, Modeling, and Support: Introduction to Decision-Making Disciplines, Characteristics of Decision Making and Decision Styles, Types and Benefits of Decision-Making Models, Decision-Making Process, New Technologies to Support Decision Making, Key Data Issues and Key Ingredients of Data (Information) Quality Management, Decision Support Systems Concepts, Methodologies, and Technologies: DSS Characteristics and Capabilities, DSS Classifications, Major DSS Components and Web Impacts, Future/current DSS Developments Emerging Trends and Impacts: RFID and BI (RFID for BI in Supply Chain, RFID + Sensors for Better BI, etc.), Reality Mining and Virtual Worlds in BI applications, Web X.0 Revolutions, Virtual (Internet) Communities and Types, Online Social Networking and Social Network Analysis, Implications of Business and Enterprise Social Networks, Cloud Computing and BI, Issues of Legality, Privacy and Ethics. Collaborative Computer-Supported Technologies and Group Support Systems: Why (business) collaboration is difficult?, Time/Place Communication Framework, Groupware for (business) collaboration, Group Support Systems and Important Features, GSS Enabling Technologies, Collaborative Planning, Forecasting, and Replenishment (CPFR) and Collective Intelligence, Introduction to Taxonomy of Collective Intelligence.				

SE-EBP-3101	Business English	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Semester VI				
SE6101	Community Project	-	-	TH
Independent Topics related to Software development will be conducted.				

SE6102	Cloud Computing	T	P	-
Cloud Computing Concepts: Introduction to cloud computing, Properties, characteristics & disadvantages, Gossip, Membership & Grids, P2P Systems, Key-Value Stores, Time & Ordering Classical Distributed Algorithms. Cloud Systems & Infrastructure: Cloud computing stack, Service model, Deployment models, Containers, virtual machines, MAAS, PAAS, Web Services. Storage: Ceph, SWIFT, HDFS, NAAS, SAN, Zookeeper. Big Data & Applications in the Cloud: Spark, Hortonworks, HDFS, CAP, Streaming Systems, Graph Processing & Machine				

Learning, Cloud Resource management & Service management in cloud computing. Cloud Networking: Introduction to cloud networking SDN with cloud, Data center networking. Cloud security: Identity & Access management, Access control, Authentication in cloud computing, Developing application in cloud platform, Introduction to Cloud Computing with AWS, Azure google's cloud platform. Research trends in cloud: Edge & Fog computing, cloud & IoT. Hands on experience using a cloud based tool.

SE6103	Parallel and Distributed Systems	T	P	-

Introduction to Parallel & Distributed Programming (definitions, taxonomies, trends), Parallel Computing Architectures, Paradigms, Issues, & Technologies (architectures, topologies, organizations), Parallel Programming (performance, programming paradigms, applications), Parallel Programming Using Shared Memory I (basics of shared memory programming, memory coherence, race conditions & deadlock detection, synchronization), Parallel Programming Using Shared Memory II (multithreaded programming, OpenMP, pthreads, Java threads), Parallel Programming using Message Passing - I (basics of message passing techniques, synchronous/asynchronous messaging, partitioning & loadbalancing), Parallel Programming using Message Passing - II (MPI), Advanced,(accelerators, CUDA, OpenCL, PGAS), Introduction to Distributed Programming (architectures, programming models), Distributed Programming Issues/Algorithms (fundamental issues & concepts - synchronization, mutual exclusion, termination detection, clocks, event ordering, locking), Distributed Computing Tools & Technologies I (CORBA, JavaRMI), Distributed Computing Tools & Technologies II (Web Services, shared spaces), Distributed Computing Tools & Technologies III (Map-Reduce, Hadoop), Parallel & Distributed Computing – Trends & Visions (Cloud & Grid Computing, P2P Computing, Autonomic Computing), Cloud based tool will be used to conduct the practical.

SE6104	Advanced Database Management Systems	T	P	-

Database Design & Implementation - Relational Database Design, Database Implementation & Tools, Advanced SQL, Database System Catalog, DBMS Advance Features - Query Processing & Evaluation, Transaction Management & Recovery, Database Security & Authorization, Distributed Databases - Enhanced Database Models, Object Oriented Databases, Database & XML. Emerging Trends & Example of DBMS Architecture - Emerging Database Models, Technologies & Applications, Big data, Advanced SQL - Temporary table, Views, Stored procedures, Stored function &Triggers

SE6105	Software Architecture	T	-	-

Basic concepts & principles about software architecture, Introduction to Software Architectural pattern, ADL, 4+1 Architecture, Practical approaches & methods for Create & Analyse software architecture, Quality attributes of software architectures, Examples in architectural design applications & case studies in software architecture (N tier architecture, SOA, Cloud, etc.)

SE6106	Software Design Patterns	T	P	-
Introduction to Design Patterns: A Brief History, How Design Patterns Solve Design Problems, How to Select & Use a Design Pattern, The Catalog of GoF (Gang-of-Four) Design Patterns, Creational Patterns: Abstract Factory, Factory Method, Singleton, Structural Patterns: Adapter, Composite, Decorator, Behavioral Patterns: Observer, Strategy, Template Method Pattern, Model-View-Controller (MVC) Pattern, Design Principles for creating software that is flexible, reusable, and maintainable, Symptoms of bad design (anti-patterns), Hands on experience i n modelling using a UML professional design software and OOP programming.				

SE6107	Software Design Evaluation	T	-	-
Introduction to design evaluation, Importance of design evaluation, Software architecture design: evaluation and transformation, Design attributes (e.g., coupling, cohesion, information hiding and separation of concerns), Design metrics, Life-cycle architecture milestone, Complex system of systems (SoS) environment, Functionality-based architecture design, Formal design analysis, Assessing non-functional requirements design, Architecture patterns quality estimation, Selection of an optimal patterns suite.				

SE6108	Current Topics in Software Engineering	T	-	W
Current Topics in Software Engineering, Professional issues, Emerging trends, Current topics in Software Engineering research.				

SE6109	Enterprise Modeling Ontologies	T	P	-
Introduction to the Semantic Web, Introduction to Ontologies, Ontology Languages for the Semantic Web, Resource Description Framework (RDF), Lightweight ontologies: RDF Schema, Web Ontology Language (OWL), A query language for RDF: SPARQL, Ontology Engineering, Semantic web & Web 2.0, Applications of Semantic Web, Hands-on experience with Protégé tool.				

SE6110	Software Engineering Economics	T	-	-
Economic Aspect of Information & Information Systems, Problem of Asymmetric Information: Adverse Selection & Moral Hazard, Macroeconomic & Microeconomic Aspects of Information Systems, Basic Economic Principles on Firms, Markets, Industries & Organization; Demand & Supply Analysis, Economic Impacts of Telecommunication & Digital Media, Sustainable Development & Information Technology, Intellectual Property Rights & Knowledge Based Economy, The Impact of Information Systems on Employment /Unemployment, Pricing & Marketing of Information Goods.				

SE6111	Social Computing	T	-	W
Social networking, Enterprise 2.0, Internet activism/advocacy, Crowdsourcing, e-Government/ Government 2.0, Social/viral marketing, Social information processing, Social network analysis and the use of blogging, podcasts, wikis and other collaboration tools.				

SE6112	Semantic Web	T	P	-
Introduction to Knowledge Representation and the Semantic Web, Description logics and classifiers, Methods for developing and evaluating ontologies: Theoretical aspects: definition, scope, types of ontologies, ontology repositories, Common problems in ontology development, Architectures and languages used in creating semantic web services [RDF(S) and OWL], Hands on experience in semantic web development.				

SE6113	Robotics	T	P	-
Introduction to Robotics: The Engineering Design Process, Best practices in engineering design, Introduction to Computer Programming: Fundamentals of computer languages and machine logic, The "Hello World!" program, Variables, arithmetic operations and logical operations, Conditional statements, Loops and Iterations, Functions and calls, Libraries, Introduction to Electric Circuits: Electricity, voltage and current, Fundamentals of electric circuits, Ideal sources and resistors, Ohm's law and Kirchhof's law, Capacitors and RC circuits, Early Robotic Topics, Sensors, Actuators and Manipulators: Micro controllers, Sensors and actuators, Manipulators, Gears and other mechanical systems, Introduction to Robot Mechanics: Power and torque Acceleration and velocity, Design models for ground mobile robots, Design models for mechanic arms and lifting systems, Fundamentals of kinematics, Advanced Topics on Robotics: Sensing distance and direction, Line Following Algorithms, Feedback Systems, Other topics on advance robotic techniques, Hands on experience in robotic technologies.			

Semester VII				
SE7101	Industrial Training	-	-	TH
Students will be required to complete industrial training related to Information Systems at a relevant industry or research institution. The duration of the project period should be a minimum of 15 weeks. A project report (thesis if it is a research) should be submitted at the end of the semester & should be presented & defended by the respective student in front of an evaluation panel appointed by the department.				

Semester VIII				
SE8101	Research Project	-	-	TH
The course starts with a reflection and discussion about interdisciplinary research, where students define their research topics. Throughout the course, the students work in developing their research questions and choose the appropriate methodological approaches for their research and analyze the results. Students should be able to provide valid findings in selected research domains and report in a format of thesis and submit it to the department. They are encouraged to present their findings in local and international research forums.				

SE8102	Research Methods	T	-	-
Introduction to the notion of research, Literature review, Research designs, Identifying data requirements, sources, & instruments for data gathering,				

Undertaking 'experiments', Validation: Types of validation, Analysing research data, Writing Strategies, Ethical Consideration.

SE8103	Service Oriented Architecture	T	-	-
Introduction to XML: XML document structure; Well-formed and valid documents; Namespaces; DTD; XML Schema, Building XML-based Applications: Parsing XM; using DOM, SAX; XML Transformation and XSL; XSL Formatting, Modeling Databases in XML Service Oriented Architecture: Characteristics of SOA, Comparing SOA with Client-Server and Distributed architecture; Benefits of SOA; Principles of Service orientation; Service layers, Web Services: Service descriptions; WSDL; Messaging with SOAP; Service discovery; UDDI; Message Exchange Patterns; Orchestration; Choreography; WS Transactions, Building SOA-based Applications: Service Oriented Analysis and Design; Service Modeling; Design standards and guidelines; Composition; WS-BPEL; WS-Coordination; WS-Policy; WS-Security.			

SE8104	Problem Analysis and Reporting	T	-	-
Introduction to potential failures and defects, Analyzing the existing failure reports, Method to report failures and defects, Types of reports structuring failure reports, Scientific methods and techniques for debugging and fault isolation, Reading and understanding the code base, Defect analysis, Root cause analysis and problem tracking.				

SE8105	Machine Learning	T	P	-
Introduction to machine learning & neural networks: supervised learning, linear models for regression, basic neural network structure, Deep learning. Neural networks: Forward Propagation, Cost Functions, Error Backpropagation, training by gradient descent, bias/variance & under/ overfitting, regularization, Exercises on NNs, solving a problem with NNs on TensorFlow. Exercises on CNN, solving a problem with CNN on TensorFlow. Exercises on RNNs, solving a problem with RNNs on TensorFlow.				

SE8106	Mobile Computing	T	P	-
Native & Cross-platform Development, Mobile Application Development Languages & Frameworks, Development Tools & Version controlling, Mobile Application Architectures and Design Patterns, Graphics & User Interface Design, Data Persistence, APIs & Libraries, Files & Media, Camera & Motions sensors, GPS/ location sensing & Maps, Network programming, Future Trends (Augmented Reality, M-Commerce, Low Code Development), Security, & Marketplace deployment, Hands on experience in Mobile application development.				

SE8107	Refactoring	T	-	-
Introduction to principles in refactoring, bad smells in code, building tests, toward a catalog of refactoring, Composing methods, Moving features between objects, Organizing data, Simplifying conditional expressions, Making method calls				

simpler, Dealing with generalization, Big refactoring, reuse and reality, Refactoring tools.

SE8108	Game Designing and Development	T	P	W
A Brief History of Video Games, Games and Society, Game Design (with 3D Characters: Animation & control), Teams and Processes in Games, Programming Fundamentals for Game Development, Debugging Games, Game Architecture, Memory and I/O Systems in Game Development Environments, Mathematical Concepts for Games, Collision Detection and Resolution, Graphics for Games, Artificial Intelligence in Games, Networks and Multiplayer Mode for Game, UI Development, Connecting games to services Databases, Global illumination, code library, This module laboratory session is covered by using a suitable gaming library and develop simple gaming applications on given scenario.				

SE8109	Data Mining	T	P	-
Clustering Algorithms: K-mean, Agglomerative algorithm, Classification Algorithms: Decision Tree, Support Vector Machine, Association rule mining, Topic extraction, Implementation of datamining algorithms using python and Weka tools.				

SE8110	Big Data Analytics	T	P	-
Introduction to Big Data, Handling and Processing Big Data, Methodological Challenges and Problems, Deep Analytics and Visualization and Example Applications, Hand on experience in big data analysis tools and techniques.				

SE8111	Artificial Intelligence	T	P	-
Foundation of AI, Nature of Knowledge and Intelligent machine, Influential areas for AI, Turing Test and John Searle's argument, State of the art Search and Problem solving, Knowledge Representation and Major Areas of AI, Hand on experience in AI tools and techniques.				

Rules and regulations

1. Students should complete (obtain at least D+ grade) the non-credited compulsory courses General English I, General English II, Academic English I, Academic English II and Business English to obtain the degree.
2. Students should select Two (02) elective subjects to cover Four (04) credits during the semesters V and VI.
3. Students should select elective subjects to cover Four (04) credits during the semester VIII.
4. Community Project (SE 32343) is completely a software development project for any industrial, academic, educational, or institutional community inside Sri Lanka.
5. For Industrial Inspection (SE 22129), compulsory one credited and Three (03) industrial visits will be organized during the semester VI. A report should be submitted for each industrial visit.

Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

Department of Food Science and Technology

https://www.sab.ac.lk/app/food-science-and-technology

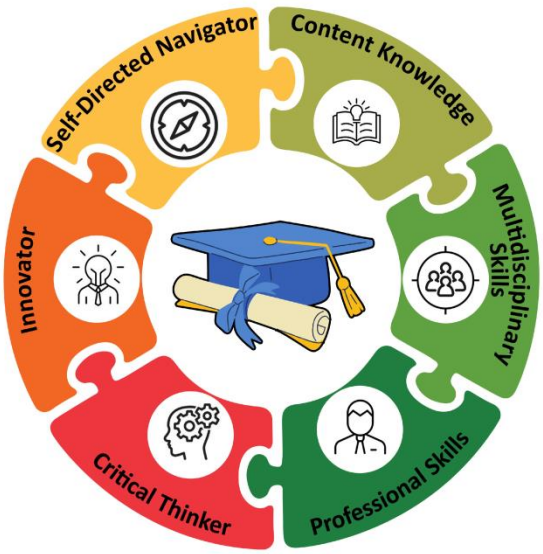
https://www.linkedin.com/company/faculty-of-applied-sciences-sabaragamuwa-university-of-sri-lanka/

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

Degree Program:

Bachelor of Science Honours in Food Science and Technology

Anticipated Graduate Profile

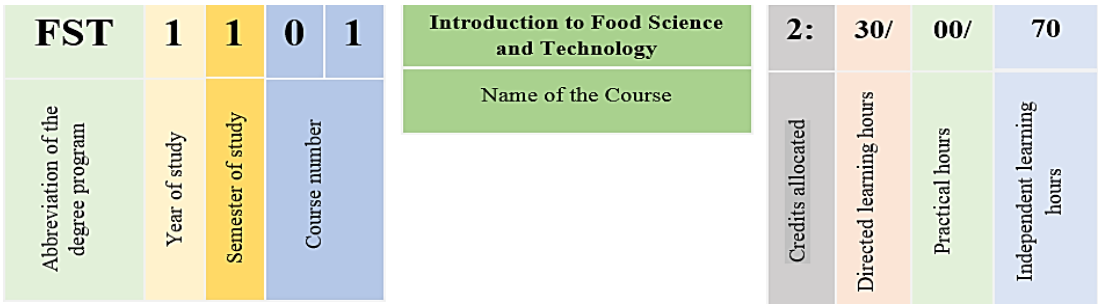


Content Knowledge	-	Discipline-specific theoretical and practical knowledge and skills in the core competency areas of Food Science and Technology.
Multidisciplinary Skills	-	Transferable skills and knowledge relevant to Food Science and Technology and resource management, digital literacy, teamwork and leadership and effective communication.
Professional Skills	-	Ability to apply broad-based knowledge to the relevant industry, academic and research institutions.
Critical Thinker	-	Critically analyze the needs of the relevant local and international industrial sectors to enable sound decision making.
Innovator	-	Follow the trends and dynamics of the relevant field. Think out of the box and execute ideas.

Self-Directed Navigator - Self-motivation and commitment for continuous professional development and life-long-learning.

Guidelines for course codes and credits

The course notation is described below.



Summary of courses

Course Code	Course Name	Credits and distribution of volume of learning	Compulsory/ Optional
Table 1: Courses offered in Semester I of the Year I			
FST 1101	Introduction to Food Science and Technology	2: 30/00/70	Compulsory
FST 1102	Food Biology and Practicum	2: 30/30/40	Compulsory
FST 1103	General Chemistry for Food Science	2: 30/00/70	Compulsory
FST 1104	Fundamentals of Organic Chemistry	2: 30/00/70	Compulsory
FST 1105	Laboratory in Elementary Inorganic Chemistry	1: 00/45/05	Compulsory
FST 1106	Introduction to Computer Fundamentals	2: 30/00/70	Compulsory
FST 1107	Application of Computer Fundamentals	1: 00/30/20	Compulsory
FST 1108	Principles of Mathematics	2: 30/00/70	Compulsory
FST 1109	Production of Agricultural Raw Materials for Better Food Quality	2: 30/00/70	Compulsory
FST-EGP-1101	General English I	0: 30/00/70	Compulsory
Total credits for the semester		16	
Table 2: Courses offered in Semester II of the Year I			
FST 1201	Fundamentals of Microbiology	2: 30/00/70	Compulsory
FST 1202	Fundamentals of Biochemistry	2: 30/00/70	Compulsory
FST 1203	Postharvest Technology	2: 30/00/70	Compulsory
FST 1204	Postharvest Pest and Disease Management	2: 30/00/70	Compulsory
FST 1205	Laboratory in Postharvest Handling of Food Sources	1: 00/30/20	Compulsory

FST 1206	Fundamentals of Analytical Chemistry	2: 30/00/70	Compulsory
FST 1207	Laboratory in Elementary Organic Chemistry	1: 00/45/05	Compulsory
FST 1208	Fundamentals of Statistics	2: 30/10/60	Compulsory
FST 1209	Technical /Scientific Writing	0: 30/00/20	Compulsory
FST-EGP-1201	General English II	0: 30/00/70	Compulsory
Total credits for the semester		14	
Total credits for the year I		30	
Table 3: Courses offered in Semester I of the Year II			
FST 2101	Advanced Biochemistry	2: 30/00/70	Compulsory
FST 2102	Food Chemistry	2: 30/00/70	Compulsory
FST 2103	Laboratory in Biochemistry and Food Chemistry	1: 00/30/20	Compulsory
FST 2104	Principles of Human Nutrition	2: 30/00/70	Compulsory
FST 2105	Food Microbiology	2: 30/00/70	Compulsory
FST 2106	Food Preservation and Practicum	2: 30/45/25	Compulsory
FST 2107	Management Process	2: 30/00/70	Compulsory
FST 2108	Statistics for Experimental Analysis	2: 30/30/40	Compulsory
FST-EAP-2101	Academic English I	0: 30/00/70	Compulsory
Total credits for the semester		15	
Table 4: Courses offered in Semester II of the Year II			
FST 2201	Biotechnology for Food Science	2: 30/00/70	Compulsory
FST 2202	Laboratory in Food Microbiology and Biotechnology	1: 00/45/05	Compulsory
FST 2203	Food Process Engineering I and Practicum	2: 30/40/40	Compulsory
FST 2204	Livestock Production, Aquaculture Practices and Practicum	2: 30/20/50	Compulsory
FST 2205	Applied Human Nutrition and Practicum	2: 30/30/40	Compulsory
FST 2206	Food Toxicology	1: 20/00/30	Compulsory
FST 2207	Food Quality Management	2: 30/00/70	Compulsory
FST 2208	Statistical Methodology	2: 30/30/40	Compulsory
FST 2209	Food Marketing	1: 15/00/35	Compulsory
FST-EAP-2201	Academic English II	0: 30/00/70	Compulsory
Total credits for the semester		15	
Total credits for the year II		30	
Table 5: Courses offered in Semester I of the Year III			
FST 3101	Food Analysis and Practicum	2: 30/30/40	Compulsory
FST 3102	Dairy Science	2: 40/00/60	Compulsory
FST 3103	Food Process Engineering II and Practicum	2: 30/30/40	Compulsory
FST 3104	Food Packaging	2: 30/00/70	Compulsory
FST 3105	Food Regulations	1: 15/00/35	Compulsory
FST 3106	Food Safety, Risk Analysis, Food Hygiene and Sanitation	2: 40/00/60	Compulsory
FST 3107	Food Product Development	1: 17/00/33	Compulsory
FST 3108	Environmental Sustainability in Food	2: 30/00/70	Compulsory

	Industries		
FST 3109	Human Resource Management	1: 25/00/25	Compulsory
FST 3110	Research Methodology and Scientific Communication	1: 20/00/30	Compulsory
FST-EBP- 3101	Business English	0: 30/00/70	Compulsory
Total credits for the semester		16	
Table 6: Courses offered in Semester II of the Year III			
FST 3201	Aquatic Food Processing Technology	2: 40/00/60	Compulsory
FST 3202	Dairy Processing Technology	2: 40/00/60	Compulsory
FST 3203	Laboratory in Dairy Science and Dairy Processing Technology	1: 00/45/05	Compulsory
FST 3204	Beverage Processing Technology	1: 30/00/20	Compulsory
FST 3205	Sensory Evaluation of Foods and Practicum	2: 20/40/40	Compulsory
FST 3206	Functional Foods and Nutraceuticals	1: 20/00/30	Compulsory
FST 3207	Process Control and Automation in Food Industry	1: 20/00/30	Compulsory
FST 3208	Seminars in Trends and Current Issues in Food Science and Technology	1: 05/00/45	Compulsory
FST 3209	Instrumental Techniques in Food Science	1: 15/00/35	Optional
FST 3210	Food Plant Layout and Operations	2: 30/00/70	Optional
FST 3211	Statistics for Research	1: 10/25/15	Optional
FST 3212	Nutritional Aspects of Chronic Diseases	1: 15/00/35	Optional
Total credits for the semester		14	
Total credits for the year III		30	
Table 7: Courses offered in Semester I of the Year IV			
FST 4101	Integrated Project in Food Science and Technology	2: 05/75/20	Compulsory
FST 4102	Chemistry and Technology of Cereals	2: 40/00/60	Compulsory
FST 4103	Chemistry and Technology of Fats and Oils	2: 40/00/60	Compulsory
FST 4104	Spice, Root and Tuber Processing Technology	1: 25/00/25	Compulsory
FST 4105	Pulse and Edible Nut Processing Technology	1: 15/00/35	Compulsory
FST 4106	Sugar and Confectionery Processing Technology	2: 30/00/70	Compulsory
FST 4107	Fruit and Vegetable Processing Technology	1: 20/00/30	Compulsory
FST 4108	Laboratory in Food Processing Technology (Cereals, Spices, Roots, Tubers, Pulses, Confectionery, Fruits, Vegetables)	1: 00/40/10	Compulsory
FST 4109	Meat and Egg Processing Technology	2: 40/00/60	Compulsory
FST 4110	Laboratory in Aquatic Food, Meat and Egg Processing Technology	1: 00/45/05	Compulsory
FST 4111	Advanced Food Quality Management	2: 30/00/70	Compulsory
FST 4112	Entrepreneurship in Food Technology	2: 40/00/60	Compulsory
FST 4113	Nanotechnology and its Applications in	2: 40/00/60	Optional

	Food		
FST 4114	Technology and Innovation Management	1: 20/00/30	Optional
FST 4115	Food, Culture and Traditional Foods	1: 20/00/30	Optional
FST 4116	Modern Food Supply and Distribution Systems and Sustainability	1: 20/00/30	Optional
FST 4117	Data Science and Informatics Applications in Food Science	1: 15/00/35	Optional
Total credits for the semester		22	
Table 8: Courses offered in Semester II of the Year IV			
FST 4201	Research Project in Food Science and Technology	8:30/375/395	Compulsory
Total credits for the semester		8	
Total credits for the year IV		30	
Grand Total		120	

Summary of credits offered

	Year I		Year II		Year III		Year IV	
	Semester I	Semester II	Semester I	Semester II	Semester I	Semester II	Semester I	Semester II
Credited and Compulsory courses	16	14	15	15	16	11	19	08
Credited and Optional courses	-	-	-	-	-	03	03	-
Non-credited and Compulsory courses	01	02	01	01	01	-	-	-
Total credits	30		30		30		30	
Total credits for the degree programme	120							

Detailed Syllabus

YEAR I SEMESTER I
FST1101 Introduction to Food Science and Technology (2: 30/00/70)
Scope and an overview of Food Science and Food Technology (definitions and terms); Food commodities and their composition; Biochemistry and Food chemistry; Human nutrition and food; Food microbiology and food biotechnology; Food preservation; An overview of food commodities and food processing; Unit operations in food processing and food engineering; Food analysis; Food packaging; Food quality and food safety; Food laws and regulations; Food choices and sensory evaluation of food; Food product development.

FST 1102 Food Biology and Practicum (2: 30/30/40)
Theory
Cell and its constituents; Structure and functions of cells and its organelles; Photosynthesis; Cellular respiration; Structure of plant food parts; General muscle types of animals; Typical meat composition; Muscle contraction and relaxation; Energy metabolism in post-mortem glycolysis; Morphological and physiological characteristics of fish, shrimp and crabs.
Practicum Identification of parts of microscope; Osmosis; Absorption spectrum of chlorophyll; Water potential of potato tubers; Structure of plant food parts; Morphological characteristics of fish, shrimp, prawn and crabs; Sensory quality parameters of meat; Meat processing equipment.

FST 1103 General Chemistry for Food Science (2: 30/00/70)
Atomic and molecular structure; Chemical bonding and molecular structures; Inter molecular forces and how it can affect to the physical properties of matter; Electrochemical half- reactions, cell potentials and Nernst equation; State of Matter, Kinetic molecular theory of gases, Redox reactions; Chemical equilibriums; Chemical thermodynamics and kinetics, Solutions; Surface chemistry.

FST 1104 Fundamentals of Organic Chemistry (2: 30/00/70)
Structure and Bonding of organic molecules **(**Review of atomic structure of carbon, atomic and molecular orbitals, sigma and pi-bonds, hybridization, review of Lewis bonding theory, ionic bonds, covalent bonds, Lewis structures of organic molecules, formal charge, Resonance and hyperconjugation), Functional groups in organic compounds (IUPAC nomenclature of organic compounds alkane, alkene, alkyne, alkyl halides, alcohols, carboxylic acids, amines), Inter molecular interactions (electronegativity, dipole moments, polarity of organic molecules, dipole-dipole interactions, Hydrogen bonding, Van der Waals interactions, inter molecular interactions and properties of organic compounds, solubility, melting points and boiling points of organic compounds), Acid base properties of organic compounds **(**Review of acid base theory, Lowry-Bronsted theory and Lewis theory, acid base trends in organic compounds, inductive effect, resonance effect), Isomerism (Structural and stereoisomerism, geometrical isomerism cis/trans vs E/Z

nomenclature, conformational isomers, conformational analysis of open chained compounds and cyclic compounds optical isomerism, chirality and stereocenters, enantiomers and diastereomers, R and S nomenclature, Fisher projections, racemic and meso compounds, Atropisomerism, separation of racemic compounds, biological importance of isomers).

FST 1105 Laboratory in Elementary Inorganic Chemistry (1: 00/45/05)
Qualitative analysis of anions and cations, Quantitative inorganic analysis: Volumetric titrations, Apparatus and measurements, Introduction to measurements and error analysis.

FST 1106 Introduction to Computer Fundamentals (2: 30/00/70)
Introduction to computers (History of computers, Components and functions of computers/systems, Types of computers and generations, Hardware & software, Input/output devices, Memory Hierarchy, Storage devices), Introduction to Operating Systems (Functions of an operating system, Types of operating systems, Introduction to Information systems, File handling and management, Difference between data and information, Introduction to database systems, Computer architecture), Computer number systems and data representation (Number systems, Compression of each number system, Logic & gate, Logic operations, Design circuits), Introduction to computer networking (Data Communications, Networking devices, Network types and security), Digital Media (Introduction to Internet applications and web resources), Computer Graphics (Hardware Requirements and Performance, Software Design, Light Effects), Computer etiquette & professionalism (Intellectual property, Information privacy, Computer abuse and computer crime).

FST 1107 Application of Computer Fundamentals (1: 00/30/20)
Identification of components of various computer/systems and input/output devices, Introduction to DOS (Basic commands, File directories), Introduction to computer application (Create documents, spreadsheets, databases, presentations), Introduction to Web design (Introduction to web designing software, Introduction to html, Creating blogs, Graphics and image editing), Introduction to Food Science and Management analysis software

FST 1108 Principles of Mathematics (2: 30/00/70)
Number system, Introduction to sets, Intervals, Inequalities, Coordinate system; Functions (properties, linear functions, quadratic function, polynomials, linear and quadratic equations, graph of functions, limit of functions), Trigonometric functions and identities; Differentiation, Partial differentiation, Applications of differentiation; Integration, Applications of integration; Matrix algebra (introduction, addition and subtraction, multiplication, inverse of a matrix, solution of system of linear equations); Complex Numbers (introduction, real and imaginary numbers, algebra of complex numbers, complex roots of quadratic equations, Argand diagram); Vectors (introduction to vectors and scalars, position vectors,

addition of vectors, cartesian components of vectors, scalar vector products, vector products).

FST 1109 Production of Agricultural Raw Materials for Better Food Quality (2:30/00/70)
Effect of agronomic practices on produce quality; Fruit quality and agro-ecological regions; Integrated pest and disease management on safe produce, Selective pesticide application and pre-harvest interval of pesticide application, Heavy metal contamination and pesticide residue minimization; Irrigation management for quality of fresh produce; Effect of soil nutrient management on quality, Use of organic manure for safe food production, Organic crop production and organic food certification; Protected agriculture and quality of produce; Good agricultural practices. (Field excursion)

FST- EGP- 1101 General English I (0: 30/00/70)
https://www.sab.ac.lk/app/eltu-curriculum

YEAR I SEMESTER II
FST 1201 Fundamentals of Microbiology (2: 30/00/70)
Introduction to microbial world; History of microbiology; Microbial habitats; Characteristics of different types of microbes including their nutrition; Respiration and reproduction

FST 1202 Fundamentals of Biochemistry (2: 30/00/70)
Introduction to biochemistry; Water (significance in biological systems, physical, solvent and ionizing properties); Carbohydrates (structure and functional roles of monosaccharides, disaccharides, polysaccharides); Lipids (structure and functional roles of fatty acids, glycerides, phospholipids, sphingolipids, steroids and eicosanoids); Proteins (amino acids and peptides, protein structure, protein synthesis and functional roles of proteins); Nucleic acids (structure and functional roles of DNA and RNA), DNA replication and genetic mutations; Vitamins and their biochemical roles.

FST 1203 Postharvest Technology (2: 30/00/70)
Introduction to postharvest technology; Postharvest physiology of fruits and vegetables; Ethylene in postharvest technology; Harvest and harvest handling; Pre-harvest and cultural practices; Packing house operations, Modified atmosphere and controlled atmosphere packaging; Minimal processing of fruits and vegetables; Postharvest handling perspectives; Postharvest losses and loss assessment; Cooling and storage methods (Field excursion)

FST 1204 Postharvest Pest and Disease Management (2: 30/00/70)
Introduction, Postharvest deterioration of food commodities and its significance; Common insect pests and vertebrate pests of harvested food commodities and their effects, Management of common pest problems of harvested food commodities; Concepts of disease and physiological disorders; Common postharvest diseases and

physiological disorders of major fruits and vegetables, Management of postharvest diseases and physiological disorders of major fruits and vegetables. (Field excursion)

FST 1205 Laboratory in Postharvest Handling of Food Sources (1: 00/30/20)
Maturity indices (subjective and objective types); Analysis of physicochemical properties; Exogenous methods of controlling fruit ripening; Packaging of agricultural produce; Common postharvest diseases of fruits and vegetables; Insect pests of food commodities; Evaluation of postharvest loss of food commodities.

FST 1206 Fundamentals of Analytical Chemistry (2: 30/00/70)
Introduction to chemical analyses, Sampling methods, Types of errors, Error analysis, Statistical treatment of analytical data, Introduction to classical methods; Titrimetric analysis (Acid–base, Complexometric, Gravimetricetc), Electromagnetic spectrum, Introduction to spectroscopic methods (UV-visible, AAS, Emission spectroscopy), Solvent extraction, Principles of separation techniques (solvent-solvent, solvent-solid, solid-solid, Calibration methods (External and internal standard methods and standard addition).

FST 1207 Laboratory in Elementary Organic Chemistry (1: 00/45/05)
Laboratory Safety, Physical nature of organic compounds, Acid base properties and solubility behaviour, Beilstein Test, Preparation of Lassaigne's fusion extract. Functional group analysis, Unsaturated organic compounds, Alkyl and aryl halides, Alcohols (primary, secondary tertiary), Aldehyde and ketones , Phenols, Carboxylic acid and their derivatives (amides, esters, ammonium salts) Amines, Carbohydrate analysis

FST 1208 Fundamentals of Statistics (2: 30/10/60)
Introduction to statistics; Types of data and presentations, Data collection methods, Population and sample, Sampling techniques, Descriptive statistics: Data presentation and Summary measures. Measure of central tendency, Measure of variability and dispersion, Elementary Probability: Elements of probability, Different approaches of probability, Elementary properties of Probability, Calculating the probabilities of simple and complex events, Conditional probability and Bayes' theorem, Random variables and Probability Distributions: Properties of Probability distributions. Special Probability Distributions: Discrete; Bernoulli, Binomial, and Poison. Continuous; Uniform, Normal, and Exponential Introduction to statistical software: Data management and familiarize with the common statistical functionalities; Entering, Summarizing, Presenting and Describing the data

FST 1209 Technical /Scientific Writing (0: 30/00/20)
Introduction (the nature of technical/scientific writing, writing in academic genres, principles of effective writing); The writing process (introduction, pre-writing stage, drafting stage, editing and proof reading stage); Grammar and words (selective grammar, active voice and passive voice, coherence, punctuation, spelling,

vocabulary, register and style, dictionaries, common problems and how to avoid them); An overview of sources and referencing (different kinds of sources, the functions of references, how to give references, using a reference style, referencing in the digital era); Academic integrity and writing (an overview of plagiarism).

FST-EGP- 1201 General English II (0: 30/00/70)
https://www.sab.ac.lk/app/eltu-curriculum

YEAR II SEMESTER I
FST 2101 Advanced Biochemistry (2: 30/00/70)
Introduction to metabolism; Carbohydrate metabolism (glycolysis, citric acid cycle, electron transport chain and oxidative phosphorylation, gluconeogenesis, pentose phosphate pathway, glycogen metabolism); Protein metabolism (essential and non-essential amino acids, biosynthesis of non-essential amino acids, amino acid catabolism, urea cycle); Lipid metabolism (lipid transport, biosynthesis of fatty acids, catabolism of odd chain and even chain fatty acids); Integration and regulation of basic metabolic pathways; Genetic diseases and disorders associated with carbohydrates, protein and fat metabolism; Enzyme biochemistry: kinetics and inhibition.

FST 2102 Food Chemistry (2: 30/00/70)
Introduction to Food Chemistry; Chemistry underlying the properties and reactions of major constituents in foods: Carbohydrates (decomposition of reducing and non-reducing sugars, granule structure and properties of native and modified starch, pectic substances and seed gums), Proteins (protein structure and functional properties, protein changes during processing), Lipids (fatty acids, triglycerides and phospholipids, lipid hydrolysis, lipid oxidation, hydrolytic and oxidative rancidity, hydrogenation, formation of trans fatty acids, polymorphism etc.), Water and its interaction with food components and food stability; Browning reactions in foods; Food additives: preservatives, antioxidants, emulsifiers, food colorants, food flavors; Food enzymes; Food fortification and enrichment; Food adulteration.

FST 2103 Laboratory in Biochemistry and Food Chemistry (1: 00/30/20)
Qualitative analysis of carbohydrates; Qualitative analysis of proteins and amino acids; Isolation and separation of proteins; Protein denaturation; Qualitative analysis of lipids, Fat characterization (acid value, peroxide value, iodine value, saponification value); Browning reactions in foods and effectiveness of control measures, Enzyme kinetics and inhibition.

FST 2104 Principles of Human Nutrition (2: 30/00/70)
Dietary sources, intake levels, physiological roles and requirements of major nutrients; Concepts of energy and nitrogen balance; Determinants of nutrient requirements and food intake; Rationale for the development of dietary guidelines and nutrition policies; Role of nutrition in growth and health through the life cycle.

FST 2105 Food Microbiology (2: 30/00/70)
Introduction to food microbiology; Factors affecting microbial growth and survival in foods; Methods used for the identification of microorganisms in foods; Characteristics of food borne microbial pathogens; Microbial food poisoning; Methods used to control food borne microbial pathogens; Uses of different microorganisms in food production.

FST 2106 Food Preservation and Practicum (2: 30/45/25)
Theory Causes of spoilage; Food additives and their functions; Principles of food preservation; Food preservation methods Thermal preservation; Chemical preservation; Non-thermal preservation; Fermentation; Hurdle technology; Novel food preservation techniques Practicum Food additives and functions; Drying and dehydration; Osmotic dehydration; Fermentation; Pickling; Caning and bottling; Cordial and nectar production.

FST 2107 Management Process (2: 30/00/70)
Organizations; Management environment, Introduction to management; Roles and competencies of a manager; Management decision making, Planning, Organizing, Leadership, Controlling, Communication, Motivation; Management ethics and social responsibility.

FST 2108 Statistics for Experimental Analysis (2: 30/30/40)
Estimation: Point and interval estimation for measures of centre (mean) and measures of dispersion (variance). Hypothesis testing: Concepts of hypothesis testing, single sample tests, two sample tests (dependent and independent). Introduction to design of experiments: simple and comparative experiments, factors and treatments, randomization, replication, blocking, balanced and unbalanced designs, fixed effects and random effects. Introduction to Analysis of Variance (ANOVA): Assumptions and basis of F –test. One-way ANOVA and two-way ANOVA. Multiple comparison analysis testing in ANOVA. Special experimental designs: Complete Randomized Design (CRD), Randomized Complete Block designs (RCBD), Latin Square and Graeco-Latin Square Design. Mean comparisons methods. Two factor factorial with CRD and RCBD, Analysis the real world data by using statistical software and interpret the results.

FST-EAP- 2101 Academic English I (0: 30/00/70)
https://www.sab.ac.lk/app/eltu-curriculum

YEAR II SEMESTER II
FST 2201 Biotechnology for Food Science (2: 30/00/70)
Introduction to Biotechnology; Historical background of Biotechnology; Applications of genetic engineering; DNA fingerprinting method and molecular markers in food industry; Detection of Genetically Modified Foods (GMF); Legal background and public perception related to GMF.

FST 2202 Laboratory in Food Microbiology and Biotechnology (1: 00/45/05)
Introduction to microbiology laboratory; Methods used to obtain microbial samples from foods; Enrichment of microbes at the laboratory; Preparation of dilution series; Media preparation and culturing of microorganisms; Microbial staining techniques; Different microbial colony characteristics; Enumeration of microorganisms by direct methods; Measurement of microbial growth by direct methods; Identification of microorganisms using biochemical tests; Study on the factors affect to the microbial growth and survival; Most Probable Number Method (MPN); DNA extraction, PCR technology, gel electroporesis, gel documentation and analysis.

FST 2203 Food Process Engineering I and Practicum (2: 30/40/30)
Food processes and Unit operations, Units and dimensions, Physical properties of food and agricultural produce, Material and energy balance, Flow of fluid in food processing, Rheological properties of food, Equilibrium moisture content and water activity, Thermodynamics, Psychrometry.

FST 2204 Livestock Production, Aquaculture Practices and Practicum (2: 30/20/50)
Theory Livestock and aquaculture industry in Sri Lanka; Livestock and aquaculture related organizations; Different livestock animal species and breeding techniques; Principles of livestock animal management systems; Application of good agricultural practices (GAP); Differentiation of different poultry eggs; Physicochemical and nutritional properties of table eggs; Water quality parameters for pond culture; Fish pond construction and management; Freshwater, marine water and brackish water aquaculture species; Cage culture; Bivalve culture; Shrimp culture and crab culture; seaweed culture; Application of good aquaculture practices; Innovation of livestock production and aquaculture. Practicum Livestock animal breed identification; Physicochemical characteristics of table egg; Water quality parameters; Feeding and algae management; Disease management, Pond sterilization, Pond fertilization, Pond harvesting; Postharvest management of aquaculture species; Food fish species and seaweed identification. (Field excursions)

FST 2205 Applied Human Nutrition and Practicum (2: 30/30/40)
Theory Health effects of nutrient deficiencies and excesses; Physiological changes and their effect on nutritional needs, Age-related diseases and associated nutritional requirements; Nutritional aspects of food processing and ingredients; Drug and nutrient interactions, Dietary/nutrient supplements. Practicum Introduction to assessment of nutritional status in individuals and populations; Nutritional screening tools, Nutritional risk screening, Malnutrition screening tool; Anthropometric assessment; Body composition analysis; Dietary assessment: 24 hour diet recall, Food frequency questionnaire, Diet recording, Food consumption behaviour.

FST 2206 Food Toxicology (1: 20/00/30)
Introduction to food toxicology and classification of food toxicants; Principles of toxicology (exposure, the dose-response curve); Absorption, distribution and storage of toxicants; Biotransformation and elimination of toxicants; Target organ toxicity; Carcinogenesis, mutagenesis and teratogenesis; Food allergies and food intolerances; Natural toxins in foods of plant origin and fungi; Food additives; Pesticides and antibiotic residues; Mycotoxins; Bacterial toxins; Marine toxins; Toxicants formed during food processing.

FST 2207 Food Quality Management (2: 30/00/70)
Concept of Quality and Quality management; Quality definitions; Dimensions of quality and Quality factors in food; Total Quality Management; Eight quality management principles; Quality control and Problem solving techniques (Seven tools of quality control) Quality costs; Sampling (Introduction to sampling, Sampling methods, Acceptance sampling, Variable sampling plans, Attribute sampling plans) Application of the 5S methodology in food industry; An overview of ISO 9001, ISO 14001 and ISO 22000.

FST 2208 Statistical Methodology (2: 30/30/40)
Simple linear regressions and multiple linear regressions, parameter estimation (OLS) and its properties, tests for regression coefficients; Tests for significance of the fitted model (ANOVA), model adequacy checking and remedial measure, Models with Qualitative Independent variables (Dummy variables), and model selection procedures. Nonparametric statistical methods: Scale of Measurements, Single sample tests: Sign and Wilcoxon Signed Rank Test, Two Sample tests: Wilcoxon Matched Paired Signed Rank test, Wilcoxon Rank Sum Test. The Kruskal–Wallis One-Way Analysis of Variance by Ranks, and Friedman Two-Way Analysis of Variance by Ranks. Rank Correlations (Spearman's and Kendall Tau). Analysis of Count Data: Chi-squared test of goodness of fit Introduction to time series analysis and Forecasting: Component of Time Series Data, Smoothing Methods, Forecasting methods. Analysis the real world data by using statistical software and interpret the results.

FST 2209 Food Marketing (1: 30/00/20)
Defining food marketing and basic concepts of food marketing, Marketing strategy, Planning and controlling; Consumer behavior, segmentation, targeting and positioning (STP) process; Product development, Pricing, Channel distribution, Marketing communication; Consumer decision making process; Food marketing trends.

FST-EAP- 2201 Academic English II (0: 30/00/70)
https://www.sab.ac.lk/app/eltu-curriculum

YEAR III SEMESTER I
FST 3101 Food Analysis and Practicum (2: 30/30/40)
Theory: Introduction to food analysis; Sampling and sample preparation; Compositional analysis of foods (moisture, ash, fat, protein and carbohydrates); Chemical properties and characteristics of foods (pH and titratable acidity, fat characterization, protein isolation and purification, analysis of food contaminants, residues and chemical constituents of concern); Spectroscopy (basic principles, ultraviolet, visible and fluorescence spectroscopy, atomic spectroscopy); Chromatography (basic principles and classification, gas chromatography and liquid chromatography). Practicum: Proximate analysis of foods: moisture and total solids, ash and its' characteristics, crude fat, crude protein, crude fiber; Determination of total sugar and reducing sugar by Lane-Eynon method; Determination of iodine content in salt; Determination of vitamin C content in foods by Indophenol Dye method; Analysis of phosphorus content in food samples by UV/Visible spectroscopy; Determination of pH and titratable acidity; Determination of total phenolic content and antioxidant activity of foods.
FST 3102 Dairy Science (2: 40/00/60)
Introduction (Milk production and milking animals, composition of milk, factors affecting the yield and composition of milk, basic physicochemical properties of milk, biosynthesis and secretion of milk); Nutritional significance of milk; Composition, chemistry and properties of milk fat; Milk proteins (introduction, caseins, whey proteins and enzymes); Lactose; Minerals and vitamins; Microbiology of milk (General aspects, pathogenic and spoilage microorganisms in milk, biochemical changes in milk during microbial growth, sources of contamination and hygienic measures to ensure clean milk production); General aspects of milk processing (quality assurance of raw milk, milk collection, storage and transport, changes in milk constituents during storage, heat treatment of fluid milk and its impact on milk constituents); Current and emerging trends in dairy science.
FST 3103 Food Process Engineering II and Practicum (2: 30/30/40)
Theory Heat transfer in food processing and principles of thermal processing, Food dehydration, Refrigeration, Chilling and Freezing, Evaporation in liquid food, Extrusion technology, Mechanical separation and mixing processes, Size reduction, Minimal processing technologies (Microwave processing Ohmic heating, Pulsed electric field, High pressure processing, Ultrasound, Irradiation). Practicum Using measuring instruments, Physical characteristics of food materials, Viscometry, Rheological properties, Equilibrium moisture content and isotherms, Moist air properties, Steam tables, Time temperature profiles in thermal processing, Food textural properties, Food process engineering tutorials, Industrial excursion to a pilot plant.

FST 3104 Food Packaging (2: 30/00/70)
Introduction to packaging and definitions, Levels and functions of food packaging, Evolution of food packaging industry, Food packaging materials (flexible materials, rigid plastic, metal, glass), Analysis of barrier properties, Modified and Controlled Atmospheric packaging systems, Retortable pouches and Aseptic packaging, Smart packaging systems, Advanced food packaging technologies, Edible packaging and Bio-packaging, Environmental considerations related to food packaging, Packaging laws and regulations. (Field excursion)

FST 3105 Food Regulations (1: 15/00/35)
Food ingredient labelling (including Halal and religious labelling); Nutrition labelling; Food law; Food Act; Organization and institutions concerning food standards: SLSI, ISO, Codex, WTO, STDF (Standards and Trade Development Facility), FAO, WHO, IPPC (International Plant Protection Convention), OIE (World Organization for Animal Health), IPR (International Property Right and International Trade); GAAT (General Agreement on Tariff and Trade); TBT (Agreement on Technical Barriers to Trade); SPS (Sanitary and Phytosanitary Agreement), Food safety regulatory mechanism of South Asian countries, EU, ASEAN; Export inspection and certification.

FST 3106 Food Safety, Risk Analysis, Food Hygiene and Sanitation (2: 40/00/60)
Food safety in the international and local context (common food safety issues in the agri-food chain, standards, guidelines and quality assurance systems to control food safety, international cooperation on food safety); Food safety and related hazards (chemical hazards, microbiological hazards, physical hazards, allergens); Risk analysis (introduction and principles of risk analysis); Chemical risk assessment (principles and applications); Microbiological risk assessment (principles and applications); Risk management; Risk communication; Food fraud, authenticity and food defense (types of food fraud, detection and prevention); Traceability in the food supply chain and crisis management (components of a traceability system, blockchain, IoT and artificial intelligence in traceability); Hygiene and sanitation in food industry (types of cleaning and sanitizing agents, fundamentals of sanitary design of food premises and equipment, personal hygiene, food safety and hygiene control in the hospitality/catering industry).

FST 3107 Food Product Development (1: 17/00/33)
Market Research; Identifying focus groups; Idea generation; Prototype development; Ingredient functionality interactions; Recipes to formulation process, Statistical designs for product development; Processing; Packaging; Scale-up of operations; Regulatory issues; Labeling; Physical, chemical, microbiological sensory evaluations; Quality control procedures, Shelf life evaluation rapid test methods; Trends and new techniques in processing and packaging; Special food production and commercialization; protection of intellectual properties.

FST 3108 Environmental Sustainability in Food Industries (2: 30/00/70)
Environmental problems associated with food industries, Food waste and their

utilization, Footprint concepts (ecological footprint, water footprint and carbon footprint), Waste treatment and management in food industries (solid waste and wastewater treatment methods), Concepts and tools for resource efficient and cleaner production, Environmental compliance, Energy management in food industry, Environmental Management Systems (EMS), Life Cycle Assessment (LCA) and Eco labeling. (Field excursion)

FST 3109 Human Resource Management (1: 25/00/25)
Human resource management (HRM) and its environment; Importance of effective HRM; Strategic Human Resource Management (SHRM) HRM goals; HRM functions; Job designing, Job analysis, HR planning, Recruitment, Selection, Hiring and contract of employment, Orientation, Training and development, Performance appraisal, Reward management, Grievance handling, Disciplinary management, Labour- management relations, Termination of employment.

FST 3110 Research Methodology in Food Sciences and Scientific Communication (1: 20/00/30)
Introduction (types of research, elements of the research process); Choosing a research problem; Literature review (sources, referencing and avoiding plagiarism); Formulation of research objectives; Research/project proposal preparation; Research design (experimental design and data collection); Data analysis and interpretation of results; Thesis/Report writing; Principles of effective Scientific communication (oral and poster presentations); Abstract writing; Research management; Preparation of Curriculum Vitaes, resumes and e-portfolios.

FST- EBP - 3101 Business English (0: 30/00/70)
https://www.sab.ac.lk/app/eltu-curriculum

YEAR III SEMESTER II
FST 3201 Aquatic Food Processing Technology (2: 40/00/60)
Fisheries industry in Sri Lanka and its marketing system; Fish processing plant establishment; Fish plant layout and its general operations; Postharvest handling of fish on the vessels and fish inspection at the landing place; Different food fish products; Traditional fish processing methods; Surimi products; Fish canning; High pressure freezing; By-products and waste utilization of fish plant; Prawn/shrimp and crab processing; Shellfish processing; Edible seaweeds processing; Impact of sea pollution on seafood processing; toxicological aspects of aquatic food; Innovation of aquatic food processing technology. (Field/industrial excursions)

FST 3202 Dairy Processing Technology (2: 40/00/60)
Introduction: general aspects of processing; Collection, transportation, reception and storage of milk; Dairy processing equipment; Fluid milk processing: pasteurized and sterilized milk; Cultured milk products; Butter and dairy spreads; Ghee and anhydrous milk fat; Cheese technology; Concentrated milk; Milk powder; Ice cream and frozen desserts; Caseinates and whey protein derivatives; Cleaning

and sanitation in the dairy industry; Current and emerging trends in dairy processing. (Field/Industrial excursions)

FST 3203 Laboratory in Dairy Science and Dairy Processing Technology (1: 00/45/05)
Organoleptic properties of raw milk/sensory evaluation; Qualitative examination of milk; Physico-chemical assessment of milk; Detection of unpermitted chemical compounds in milk; Microbiological examination of milk; Milking, milk collection and handling-observation of practices at the farm; Sensory evaluation of market samples of fluid milk; Evaluation of Physico-chemical, microbiological and textural properties of market samples of yoghurt; Production of cultured milk products; Evaluation of techno-functional properties of milk powder; Production of ice cream; Production of Semi-Hard Cheese and Mozzarella Cheese; Identification and sensory evaluation of cheese types.

FST 3204 Beverage Processing Technology (1: 30/00/20)
Overview of Beverage Industry; Different categories of beverages; Processing and technologies of alcoholic and non-alcoholic beverages; Physical, microbiological, and chemical properties of both raw materials and finished products; Quality attributes and quality assurance of alcoholic and non-alcoholic beverages; Trends and issues of beverage processing. (Industrial excursions)

FST 3205 Sensory Evaluation of Foods and Practicum (2: 20/40/40)
Theory Concept of sensory evaluation, Physiological and psychological perspective, Sensory attributes of foods and human senses, Reliability of assessment, Analytical tests and affective tests, Scales and techniques of measurement, Analysis and interpretation of sensory data, Sensory panel and testing environment, Applications in food industry and research. Practicum Planning of sensory tests, basic recognition tests and threshold levels, product-oriented test methods, consumer-oriented test methods, sensory panel and sensory data, data analysis and interpretation.

FST 3206 Functional Foods and Nutraceuticals (1: 20/00/30)
Definitions and evolution of the concept of functional foods and nutraceuticals, Functional foods and health concerns, Role of functional foods in the prevention/management of chronic diseases, Functional foods of plant and animal origin, Bioavailability, safety and efficacy of bioactive compounds, Health claims and regulatory issues, Development and marketing of functional food products, Current and emerging trends.

FST 3207 Process Control and Automation in Food Industry (1: 20/00/30)
Introduction to process control and automation; Conceptual framework of an automated system (feedback process model; key elements of a control loop, process dynamics, modes of process control); Process control loops; Robotics and

automation; Process control in modern food processing (Programmable Logic Controllers, SCADA systems and MES); Emerging and future trends in process control and automation. (Industrial excursions)

FST 3208 Seminars in Trends and Current Issues in Food Science and Technology (1: 05/00/45)
Students will be required to complete an individual literature survey based on a selected topic and assessed on a review paper, poster presentation and an abstract.

Optional Courses
FST 3209 Instrumental Techniques in Food Science (1: 15/00/35)
Introduction to instrumental analysis, basic analytical techniques, Potentiometry, Photometry, Electron spin resonance spectroscopy, Chromatography, Electron microscopy, Safety precautions in food analysis lab, Electronic circuitry for analytical instruments.

FST 3210 Food Plant Layout and Operations (2: 30/00/70)
Introduction to food plant designing (Objectives, Considerations and Advantages) Designing of a food plant; Procedure and Layout; Regulatory and environmental requirements; Location, Facilities, Internal Structures and Equipment; Plant sanitation and Personal health and Hygiene requirements; Waste management; Material handling and Storage requirements; Testing facilities; Other support services; Management, auditing and troubleshooting.

FST 3211 Statistics for Research (1: 10/25/15)
Statistical quality control; Introduction to modern quality management and improvement; Statistical process control: Control charts; Control charts for attributes (p-chart, c-chart, and u-chart), Control chart for variables (X-bar and R chart and X-bar and S chart), OC curve, and Process capability analysis using statistical software and interpretation of results. Special sampling methods related to Food Science studies: Acceptance sampling procedures: Single sampling plan for attributes, Double sampling plan for attributes, and sequential sampling by variables. Introduction to multivariate statistics; Principal Component Analysis (PCA), Factor analysis and MANOVA, Analysis of real world data using statistical software and interpretation of results.

FST 3212 Nutritional Aspects of Foods (1: 15/00/35)
Introduction to the module, Nutrition transition and non-communicable diseases, Metabolic syndrome; theories and hypothesis, Overweight and obesity, Diabetes mellitus, Cardiovascular diseases and associated illnesses; dyslipidemia and hypertension, Non-alcoholic fatty liver disease, Acute and chronic renal diseases, Cancers.

YEAR IV SEMESTER I
FST 4101 Integrated Project in Food Science and Technology (2: 05/75/20)
The course consists of supervised individual project work and group project work. The focus of the individual project should be on food product development/value addition. Students will be required to research or survey problem/problems related to the application of Food Technology for the group project. Students will also be required to submit a project proposal followed by an oral presentation, prior to the commencement of the project and a report upon the completion of the project, according to the guidelines given. The individual project should be defended in the form of viva voce by the respective student before the Examination Committee appointed by the department. The group project will be examined in the form of an oral presentation and a report. The assessment will be based on the project reports (individual and group project), viva voce examination (individual project only) and an oral presentation (group project only).
FST 4102 Chemistry and Technology of Cereals (2: 40/00/60)
Grain morphology; microscopic structure; chemical composition and properties of cereal grains; Characteristics of cereal starches; Processing of cereal grains; rice-based products; bakery technology; flour quality testing; Quality parameters and shelf-life of bakery products; production of snack food and breakfast cereals; composite flour; traditional cereal grains of Sri Lanka. (Field excursion)
FST 4103 Chemistry and Technology of Fats and Oils (2: 40/00/60)
Chemistry, functions, properties, and analytical tests of fats and oils; Overview of fats and oil manufacturing Industry; Production, refining, and modification of fat and oils; Science and technology of fat and oil types use in food applications; Lipid oxidation and biotechnological advances in lipid technology; Dietary fats in human nutrition; Quality, environmental and health safety and legislation for fats and oils manufacturing industry. (Industrial excursion)
FST 4104 Spice, Root and Tuber Processing Technology (1: 25/00/25)
Main spices grown in Sri Lanka; Ceylon spices in the international market; Processing of Ceylon cinnamon, clove, cardamom, pepper, nutmeg and mace into their primary forms; Quality and safety standards for the main Ceylon spices; Spice essential oils, oleoresins and their applications; Current research and research potentials on spices; Introduction to root and tuber crops; Postharvest handling of root and tuber crops; Toxic compounds and anti-nutritional factors present in root and tuber crops; General introduction and processing technologies of cassava, sweet potato, potato, yams, edible aroids; Current researches and research potential on root and tuber crops. (Field excursions)
FST 4105 Pulse and Edible Nut Processing Technology (1: 15/00/35)
Structure and composition of pulses; Toxic constituents in pulses; Milling and processing of pulses; Fermented and traditional products from pulses; Preparation of protein isolates from pulses; Evaluation of cooking quality of pulses; Current trends in kernel products; Composition of coconut, cashew nut, peanut and other

nut kernels; Processing of copra and palm kernels; Processing of coconut cream and desiccated coconuts; Processing of cashew nuts, peanuts and other nuts used in food industry; Value added products from waste in coconut kernel industry; Aflatoxin in nuts, their health hazard and control; Nutritional and nutraceutical factors in pulses and nuts; Quality standard of pulses and nut products. (Field excursion)

FST 4106 Sugar and Confectionery Processing Technology (2: 30/00/70)
Sugar manufacturing process (sugar cane harvesting and quality inspection, juice extraction, purification, evaporation, crystallization, centrifugation, drying and packaging); Nutritive and non-nutritive sweeteners used in confectionery products; Technical aspects of industrial sugar confectionery manufacture; Types of confectionery products, processing technology and characteristics (hard boiled sweets, caramel, toffee, fudge, gums and jellies, aerated confectionery, extruded confectionery); Sugar confectionery in the diet, packaging and quality control; Chocolate confectionery. (Industrial excursion)

FST 4107 Fruit and Vegetable Processing Technology (1: 20/00/30)
Selecting fruits and vegetables for processing; Processing technology of jam, jelly and marmalade; Fruit juice processing; Fermented fruits and vegetable products; Canning of fruits and vegetables; Minimal processing of fruit and vegetables; Freezing technology of fruit and vegetables; Drying and dehydration of fruits and vegetables; Novel technology in fruit and vegetables processing; Novel foods; Quality control and quality assurance; Utilization of by-products in fruits and vegetables processing industry. (Field/Industrial excursion)

FST 4108 Laboratory in Food Processing Technology (Cereals, Pulses, Spices, Roots, Tubers, Confectionery, Fruits, Vegetables) (1: 00/40/10)
Product development from soy; Value-added products from fruit and vegetable processing waste; Confectionery technology: sugar crystallization; Identification and sensory analysis of sugar confectionery products; Production and quality evaluation of confectionary: hard boiled candy, marshmallows, gelatin and gummy candy, traditional Sri Lankan sweets; Processing of cassava and other roots; Processing of bakery products; Processing of Ceylon Cinnamon; Extraction of spice essential oils; Spice value addition

FST 4109 Meat and Egg Processing Technology (2: 40/00/60)
Meat marketing system and meat industry in Sri Lanka; Processing of high-quality fresh meat and ensuring animal welfare at farm level and during the transportation; Slaughterhouse and meat processing plant establishment; Ante-mortem and post-mortem inspection; Different stunning techniques; Halal and Kosher slaughtering; Different butchering technique; By-product utilization of farm animals; Slaughterhouse waste management; Processing technique of cured meat products; Table egg processing techniques; Nutritional and health benefits of table eggs; Application of different food quality standards for meat and egg products; Innovation of meat and egg processing. (Field/Industrial excursions)

FST4110 Laboratory in Aquatic Food, Meat and Egg Processing Technology (1: 00/45/35)
Personal sanitation and hand washing technique; Fresh fish cuts; Traditional fish products (ambulthiyal, Maldives fish, jaadi, smoked fish, and dry fish); Surimi product; Fish meal, Slow and blast freezing; Application of good manufacturing practices and maintenance of different processing equipment; Identification of different processed meat and fish products and their organoleptic properties; Processing of broiler chicken; Barbecue meat, sausage, ham and form products; Slaughterhouse by-product utilization; Residual chemical determination of cured meat/ fish product; cold storage and pasteurization of table eggs. (Field/Industrial excursions)

FST 4111 Advanced Food Quality Management (2: 30/00/70)
HACCP (Introduction, Prerequisite programs, Basic principles, Steps in the application of HACCP to food processing); Food Safety Management System (ISO 22000) and its elements; Uses of some other safety standards beyond ISO (eg. FSSC, BRC, IFS, SQF).

FST 4112 Entrepreneurship in Food Technology (2: 40/00/60)
Introduction to the entrepreneurial process; Opportunity recognition and evaluation of business potential (the NABC approach); Industry and market analysis (marketing, market research and planning); Market exploitation and resource acquisition (business models and strategic alliances); Presentation of a business idea (elevator pitch and writing a viable business plan); Managing Intellectual Property rights (patenting/licensing/trademarks, regulatory aspects); Financing the new venture; Launching, growing and ending the new venture. Compulsory assignments: the students shall deliver a business idea pitch based on a food/nutrition innovation. A group project shall be conducted to write a business plan based on a real research output or product development result.

Optional Courses
FST 4113 Nanotechnology and its Applications in Food (2: 40/00/60)
Basic concepts and fundamental issues of nanotechnology; Nanomaterials and their characterization (nanomaterial synthesis and characterization tools); Introduction to food nanotechnology and nanotechnology applications in food (nanotubes and nanoparticles, nanoencapsulation, nanoemulsions, nanocomposites, food packaging applications, detection of food-borne pathogens and intervention, nanosensors and nanoprobes, food supplements, nanocoatings on food contact surfaces, water decontamination); Risk assessment of nanomaterials. (Field excursion)

FST 4114 Technology and Innovation Management (1: 20/00/30)
An introduction to the management of technological innovations; Organizing for innovation; Technological innovation; Innovation strategy; Elements of the innovation process; The management of research and development; Managing product innovation (the value engineering approach to new product innovation);

Innovation and entrepreneurship; Challenges and future perspectives.

FST 4115 Food, Culture and Traditional Foods (1: 20/00/30)
Introduction and impact of culture on food; Traditional foods of major cultures and/or ethnic groups in Sri Lanka; Food commodities and traditional food preparation methods in Sri Lanka (agro-climatic conditions for local food commodities, postharvest management practices, potential uses as traditional food, functional properties, ethnomedicinal uses); New product development and value addition; Food safety aspects concerning traditional foods (common hazards and interventions).

FST 4116 Modern Food Supply and Distribution Systems and Sustainability (1: 20/00/30)
Introduction to Food Supply and Distribution Systems (FDS); Consumer and food industry trends shaping FDS; Major stakeholders and their roles in FDS; Drivers and operations of local and global supply chains; Government and industry regulatory policies and programmes affecting FDS; Sustainable FDS (current perspectives and future prospects).

FST 4117 Data Science and Informatics Applications in Food Science (1: 15/00/35)
Industry 4.0 – Introduction: Industrial Revolutions and Future, he digital transformation of industry and the fourth industrial revolution, Industry 4.0 Key Principles, challenges and risks, IOT (Internet Of Things Industry 4.0): Key IoT technologies, Sensors, applications in food supply change, Storage And Compute – Cloud Computing: IaaS, PaaS, SaaS, AWS Architecture, Data Driven Decision Making: Data Mining, Supervised and Unsupervised learning, Principles of Deep Learning, Forecasting – Principles and methods, Disruptions in big data, analytic and business-intelligence capabilities, Blockchain: Food safety and traceability.

YEAR IV SEMESTER II
FST 4201 Research Project in Food Science and Technology (8: 30/375/395)
The research topic will be selected with the agreement of the student, internal supervisor in the university and the external supervisor/s of the respective industry/institute. The Project will have duration of 15 weeks. Students should follow the guidelines provided in the Handbook for Final Year Research Projects for preparing the required components (project report, oral presentation and poster presentation) for assessment.

Rules and Regulations:

1. Students should earn a total of 120 credits to be eligible for the award of the Bachelor of Science Honours degree in Food Science and Technology. It includes 114 credits from compulsory courses and 6 credits from optional courses (3 credits from year III and 3 credits from year IV).
2. To obtain a minimum grade of D+ for each English language component (i.e. General

English I, General English II, Academic English I, Academic English II and Business English) offered in the first five semesters is also a compulsory requirement to be eligible for graduation.

3. Students are also required to actively contribute in the following programs/activities organized by the Department.
    - Pro Foods Pro Pack annual exhibition - the Department will operate an exhibition stall in the above-mentioned exhibition held annually during July-August
    - World Food Day celebration - the Department will organize events to mark the World Food Day on 16th October each year.

Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

Department of Natural Resources

https://www.sab.ac.lk/app/natural-resources

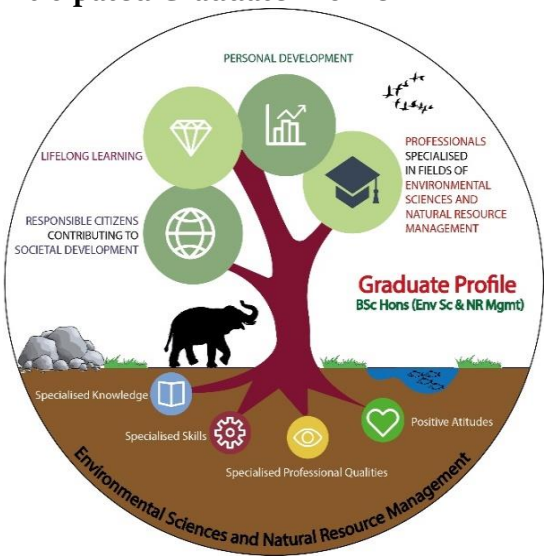
https://www.linkedin.com/company/faculty-of-applied-sciences-sabaragamuwa-university-of-sri-lanka/

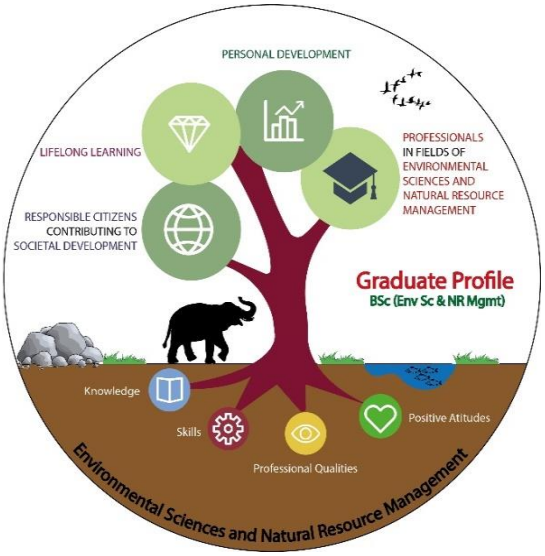
DEPARTMENT OF NATURAL RESOURCES

Degree Programs:

- Bachelor of Science Honours in Environmental Sciences and Natural Resource Management - BScHons (Env Sc & NR Mgmt)
- Bachelor of Science in Environmental Sciences and Natural Resource Management - BSc (Env Sc & NR Mgmt)

Anticipated Graduate Profile





Guidelines for course codes and credits

- A course code contains an abbreviation to the name of the degree program, year of study, semester of study, number of credits assigned for the subject and the course number, respectively.

Example: The course code of ESNRM 12201 denotes the following;

Degree Program	Year	Semester	No. of Credits	Course Number
Environmental **S**ciences and **N**atural **R**esource **M**anagement	**1**	**2**	**2**	**01**

Summary of the courses

The degree programs are designed to cater to the current needs in the following fields,

01. Environmental Management,
02. Earth Resource Management,
03. Biodiversity Conservation and Management.

Table 1: Courses offered in Semester I of the Year I			
Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 11301	Introduction to the Environment and Natural Resources	3	Compulsory
ESNRM 11202	Biology I: Cellular and Organismic Biology	2	Compulsory
ESNRM 11203	Biology II: Evolution and the Diversity of Life	2	Compulsory
ESNRM 11104	Biology - Practical	1	Compulsory
ESNRM 11205	General Chemistry	2	Compulsory
ESNRM 11106	Inorganic Chemistry for Natural Resource Studies - Practical	1	Compulsory
ESNRM 11207	Computer Literacy for Natural Resource Studies (Theory and Practical)	2	Compulsory
ESNRM 11208	Mathematics for Natural Resource Studies	2	Compulsory
NRM-EGP-1101	General English I	-	Compulsory
	Total Number of Credits	**15**	

Table 2: Courses offered in Semester II of the Year I			
Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 12201	Earth Materials and Processes	2	Compulsory
ESNRM 12202	Fundamentals of Hydrology	2	Compulsory
ESNRM 12203	Concepts of Ecology	2	Compulsory
ESNRM 12204	Physical Chemistry for Natural Resource Studies	2	Compulsory
ESNRM 12205	Fundamentals of Analytical Chemistry	2	Compulsory
ESNRM 12206	Organic Chemistry for Natural Resource Studies (Theory and Practical)	2	Compulsory
ESNRM 12107	Computer Literacy for Natural Resource Studies - Practical	1	Compulsory
ESNRM 12208	Fundamentals of Statistics (Theory and Practical)	2	Compulsory
NRM-EGP-1201	General English II	-	Compulsory
	Total Number of Credits	**15**	

Table 3: Courses offered in Semester I of the Year II			
Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 21201	Limnology (Theory and Practical)	2	Compulsory
ESNRM 21202	Microbiology for Natural Resource Studies (Theory and Practical)	2	Compulsory
ESNRM 21203	Genetics, Biotechnology and Biosafety (Theory and Practical)	2	Compulsory
ESNRM 21204	Mineralogy and Petrology	2	Compulsory
ESNRM 21205	Biodiversity (Theory and Practical)	2	Compulsory
ESNRM 21206	Physics for Natural Resource Studies	2	Compulsory
ESNRM 21207	Statistics for Experimental Analysis (Theory and Practical)	2	Compulsory
ESNRM 21208	Natural Product Chemistry (Theory and Practical)	2	Compulsory
NRM-EAP-2101	Academic English I	-	Compulsory
	Total Number of Credits	**16**	

Table 4: Courses offered in Semester II of the Year II			
Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 22201	Fundamentals of Soil Science	2	Compulsory
ESNRM 22202	Introduction to Economics	2	Compulsory
ESNRM 22103	Geomorphology and Geology of Sri Lanka	1	Compulsory
ESNRM 22104	Erath Science - Practical	1	Compulsory
ESNRM 22205	Statistical Methodology (Theory and Practical)	2	Compulsory
ESNRM 22206	Analytical Techniques for Environmental Sciences and Natural Resources (Theory and Practical)	2	Compulsory
ESNRM 22207	Field Techniques in Ecology and Biodiversity (Theory and Practical)	2	Compulsory
ESNRM 22208	Forestry	2	Compulsory
ESNRM 22109	Forestry - Practical	1	Compulsory
NRM-EAP-2201	Academic English II	-	Compulsory
	Total Number of Credits	**15**	

Table 5: Courses offered in Semester I of the Year III			
Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 31201	Remote Sensing and Geographic Information Systems	2	Compulsory
ESNRM 31102	Remote Sensing and Geographic Information Systems - Practical	1	Compulsory

ESNRM 31203	Environmental and Natural Resource Economics	2	Compulsory
ESNRM 31204	Environmental Toxicology	2	Compulsory
ESNRM 31205	Industrial Chemistry and Technology	2	Compulsory
ESNRM 31206	Industrial Minerals	2	Compulsory
ESNRM 31107	Hydrology and Soil Science - Practical	1	Compulsory
ESNRM 31208	Biogeography	2	Compulsory
ESNRM 31209	Waste Management	2	Compulsory
NRM-EBP-3101	Business English	-	Compulsory
	Total Number of Credits for BScHons (Env Sc & NR Mgmt) Degree	**16**	
Students, those who wish to exit at the end of the 3rd year (after completing a three year general degree programme), should complete the compulsory/optional course units of ESNRM 41201(in this semester as ESNRM 31208), ESNRM 41202 (in this semester as ESNRM 31211; optional), ESNRM 41204 (in this semester as ESNRM 31209), ESNRM 41205 (in this semester as ESNRM 31212; optional) and ESNRM 41208 (in this semester as ESNRM 31210) within the semester I.			
ESNRM 31208	Research Methodology and Scientific Communication	2	Compulsory
ESNRM 31209	Literature Review and Research Proposal Development for BSc Dissertation	2	Compulsory
ESNRM 31210	Managing People in Organizations	2	Compulsory
ESNRM 31211	Environmental Legislation and Regualation	2	Optional
ESNRM 31212	Statistical Application in Natural Resource Studies (Theory and Practical)	2	Optional
	Total Number of Credits for BSc (Env Sc & NR Mgmt) Degree	**22**	

Table 6: Courses offered in Semester II of the Year III only for BSc (Env Sc & NR Mgmt) Degree

Students should select optional course units covering 06 credits from the 07-course units available (from ESNRM 32201 – ESNRM 32207)

Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 32201	Resource Efficient and Cleaner Production	2	Optional
ESNRM 32202	Aquatic Resource Management (Theory and Practical)	2	Optional
ESNRM 32203	Coastal and Marine Resource Management (Theory and Practical)	2	Optional
ESNRM 32204	Tools for Environmental Management	2	Optional
ESNRM 32205	Study and Management of Natural Hazards	2	Optional

ESNRM 32206	Biodiversity Conservation and Management (Theory and Practical)	2	Optional
ESNRM 32207	Soil Degradation and Management	2	Optional
ESNRM 32409	B.Sc. Dissertation in Environmental Sciences and Natural Resource Management	4	Compulsory
	Total Number of Credits	**10**	

Table 7: Courses offered in Semester II of the Year III only for BScHons (Env Sc & NR Mgmt) Degree

Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 32201	Resource Efficient and Cleaner Production	2	Compulsory
ESNRM 32202	Aquatic Resource Management (Theory and Practical)	2	Compulsory
ESNRM 32203	Coastal and Marine Resource Management (Theory and Practical)	2	Compulsory
ESNRM 32204	Tools for Environmental Management	2	Compulsory
ESNRM 32205	Study and Management of Natural Hazards	2	Compulsory
ESNRM 32206	Biodiversity Conservation and Management (Theory and Practical)	2	Compulsory
ESNRM 32207	Soil Degradation and Management	2	Compulsory
ESNRM 32108	Community Outreach Program (Mini Project)	**1**	Compulsory

Students are given an option to select course units equivalent to at least two credit points from the following optional course units.
Students are encouraged to select subjects from one of the following subject combinations <u>if you are interested in persuing a career or higher education in any of the following focal areas.</u>

Subject Combination		Main Subjects
SC1	Environmental Management	Climatology, Environment and Society, Protected Area Management, Ecotourism, Applied Hydrology, Machine Learning for Natural Resource Studies
SC2	Earth Resource Management	Mineral Exploration and Management, Oil Exploration, Gemmology, Groundwater Exploration and Management, Climatology, Applied Hydrology, Basic Methods of Surveying Sciences, Machine Learning for Natural Resource Studies
SC3	Biodiversity Conservation and Management	Lichenology, Biogeography and Conservation Planning, Protected Area Management, Ecotourism, Forestry and Rural Development, Basic Methods of Surveying Sciences,

		Bioinformatics, Machine Learning for Natural Resource Studies	
ESNRM 32210	Lichenology (Theory and Practical)	2	Optional
ESNRM 32211	Biogeography and Conservation Planning (Theory and Practical)	2	Optional
ESNRM 32212	Environment and Society	2	Optional
ESNRM 32213	Mineral Exploration and Management	2	Optional
ESNRM 32214	Bioinformatics	2	Optional
	Total Number of Credits	**17**	

Table 8: Courses offered in Semester I of the Year IV			
Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 41201	Research Methodology and Scientific Communication	2	Compulsory
ESNRM 41202	Environmental Legislation and Regualation	2	Compulsory
ESNRM 41203	Energy Resource Management (Theory and Practical)	2	Compulsory
ESNRM 41204	Literature Review and Research Proposal Development for BSc Dissertation	2	Compulsory
ESNRM 41205	Statistical Application in Natural Resource Studies (Theory and Practical)	2	Compulsory
ESNRM 41206	Environmental Geochemistry	2	Compulsory
ESNRM 41207	Field Techniques in Earth Science (Theory and Practical)	2	Compulsory
ESNRM 41208	Managing People in Organizations (Theory and Practical)	2	Compulsory
ESNRM 41209	Environmental Governance	2	Compulsory
Students are given an option to select at least two-course units equivalent to 4 credit points from the following optional course units.			
ESNRM 41210	Applied Hydrology (Theory and Practical)	2	Optional
ESNRM 41211	Gemmology (Theory and Practical)	2	Optional
ESNRM 41212	Groundwater Exploration and Management (Theory and Practical)	2	Optional
ESNRM 41213	Protected Area Management (Theory and Practical)	2	Optional
ESNRM 41214	Ecotourism (Theory and Practical)	2	Optional
ESNRM 41215	Oil Exploration	2	Optional
ESNRM 41216	Forestry for Rural Development (Theory and Practical)	2	Optional
ESNRM 41217	Basic Methods of Surveying Sciences (Theory and Practical)	2	Optional
ESNRM 41218	Climatology	2	Optional

ESNRM 41219	Machine Learning for Natural Resource Studies (Theory and Practical)	2	Optional
	Total Number of Credits	**22**	

Table 9: Courses offered in Semester II of the Year IV			
Course code	**Course title**	**No of Credits**	**Compulsory or Optional**
ESNRM 42801	BSc Dissertation in Environmental Sciences and Natural Resource Management	8	Compulsory

Summary of credits offered:

For BSc (Env Sc & NR Mgmt) Degree Programme			
	Semester I	Semester II	Total Number of Credits
Year I	15	15	30
Year II	16	15	31
Year III	22	10	32
	Total Number of Credits		**93**

For BSc Hons (Env Sc & NR Mgmt) Degree Programme			
	Semester I	Semester II	Total Number of Credits
Year I	15	15	30
Year II	16	15	31
Year III	16	17	33
Year IV	22	8	30
	Total Number of Credits		**124**

Detailed syllabus

Year I Semester I	
ESNRM 11301	Introduction to the Environment and Natural Resources
The Earth system and its spheres, Definitions of environmental sciences and natural resources; Characteristics and classification of natural resources; Introduction to major natural resources (Lithospheric resources – land, soil, and mineral resources; Hydrospheric resources – water, inland aquatic, and coastal and marine resources; Atmospheric resources; Biospheric resources - wild and cultivated biological resources, forest resources); Energy resources, History of environmentalism, Environment, development, technology and society (human wellbeing, environmental health, environmental remediation and the concept of Sustainable Development).	

ESNRM 11202	Biology I: Cellular and Organismic Biology
Introduction to Biology, Chemicals of life (simple and macromolecules and their	

significance), Organization of life (the cells, tissues, and organs of plants and animals), Metabolism, Protein synthesis, Enzymes, Respiration, Nerve transmission, Homeostasis, Excretion and Osmoregulation, Reproduction, Photosynthesis, Plant growth and development.

ESNRM 11203	Biology II: Evolution and the Diversity of Life
Introduction to the origin and evolution of life, The scenario of evolution within the geological time scale, Biosystematics (taxonomy, classification and nomenclature), The diversity of life (lower organisms, fungi, plants and animals).	

ESNRM 11204	Biology - Practical
Development of observation, Illustration and microscopy skills in Biology, Understanding the cell, Understanding animal and plant Tissues, The diversity in lower Kingdoms of Life, The Diversity of Fungi, The Diversity of Plants, The Diversity of Animals.	

ESNRM 11205	General Chemistry
Review of classical atomic theory (Atoms and molecules, Orbital, Electron configurations of elements, Aufbau principle, Hund's rule, Pauli exclusion principle), De Broglie relationship, Heisenberg's uncertainty principle, Wave-particle duality, Schrödinger equation, Atomic spectra, Sub-atomic particles, Chemical bonds (Covalent bonds, Ionic bond and ionic lattices, Partial covalent character of ionic bonds, Fajan's rule, Intra and intermolecular forces), Lewis theory, Valence bond theory, Molecular orbital theory, Shapes of molecules from VSEPR theory, Hybridization. Size and energy factors in Chemistry, Born-Haber cycle, Oxidation-reduction reactions, Balancing chemical equations and Half-reactions, Concepts of acid-base, Nernst equation and applications of electrode potential data.	

ESNRM 11106	Inorganic Chemistry for Natural Resource Studies - Practical
Qualitative analysis of anions and cations, Quantitative inorganic analysis; Volumetric titrations, Apparatus and measurements, Introduction to measurements and error analysis.	

ESNRM 11207	Computer Literacy for Natural Resource Studies (Theory and Practical)
Overview of computer Hardware: Motherboard, CPU, Computer Memory, I/O devices; Software: System software and Application Software; Introduction to Data management: Fundamental concepts of database systems, Database management tools; Best practices used for computer security: Computer viruses and anti-virus SW, Information security, Cybersecurity, Introduction to programming.	

ESNRM 11208	Mathematics for Natural Resource Studies
Number system, Introduction to sets, Intervals, Inequalities, Coordinate system, Functions (Properties, Linear Functions, Quadratic function, Polynomials, Graph of functions), Linear and quadratic equations and their solutions, Introduction to	

the trigonometric functions and identities, Differentiation, Integration, Matrix algebra (Introduction, Addition and subtraction, Multiplication, Inverse of a matrix), Complex numbers (Introduction, Real and imaginary numbers, Algebra of complex numbers), Vectors (Introduction to vectors and scalars, Position vectors, Algebra of vectors), Mathematical applications in Natural Resource Studies.

NRM-EGP-1101	General English I
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Year I Semester II	
ESNRM 12201	Earth Materials and Processes
The Universe, The solar system, Origin, Structure and composition of the earth, Endogenetic, exogenetic, and extra-terrestrial processes, Theory of plate tectonics, Earth's internal processes (volcanism, earthquakes and tsunamis, deformation and metamorphism), Introduction to minerals and rocks, Physical properties of minerals, Rock cycle, Introduction to Historical Geology, Geological time scale, Determining absolute and relative age/time of geological materials/events.	

ESNRM 12202	Fundamentals of Hydrology
Hydrological cycle, Introduction to basic principles of hydrology including mathematical, physical and chemical concepts, Commonly used analytical techniques in understanding the different components of the hydrological cycle, Hydrological parameters (precipitation, evapotranspiration, run-off, infiltration, permeability etc.), Sources of streamflow, Uniform and steady-state flow, Hydrographs and hydrologic routing, Basin study and water balance, Social hydrology, Concepts of rainwater harvesting.	

ESNRM 12203	Concepts of Ecology
Introduction to Ecology, Concept, structure and functions of ecosystems, Autotrophy, heterotrophy and energy dynamics, Autecology, Population ecology, Community ecology, Introduction to behavioural ecology, Ecological applications, Human ecology, Conservation ecology and habitat restoration, Introduction to global change ecology.	

ESNRM 12204	Physical Chemistry for Natural Resource Studies
Properties of gases: The perfect gas, Gas laws, Kinetic model of gases, Real gases and their behaviour, Van der Waals equation of state; Thermodynamics: First law, Expansion work, The internal energy, Enthalpy, Thermochemistry, Adiabatic changes, Entropy, Second and Third laws of thermodynamics, Statistical entropy, Gibbs free energy, Chemical potential and mass action law, Thermodynamics of electrochemical cells; Chemical kinetics: Rate laws, Rate constant, Order of a reaction, Integrated rate laws of zeroth, first and second-order reactions, Arrhenius equation, Steady state approximation.	

ESNRM 12205	Fundamentals of Analytical Chemistry
Introduction to chemical analyses, Sampling methods, Types of errors, Error analysis, Statistical treatment of analytical data, Introduction to classical methods; Titrimetric analysis (Acid-base, Complexometric, Gravimetric etc.), Electromagnetic spectrum, Introduction to spectroscopic methods (UV-visible, AAS, Emission spectroscopy), Solvent extraction, Principles of separation techniques (solvent-solvent, solvent-solid, solid-solid, Calibration methods (External and internal standard methods, and standard addition).	

ESNRM 12106	Organic Chemistry for Natural Resource Studies (Theory and Practical)
Structure and Bonding of organic molecules: Review of atomic structure of Carbon, Atomic and molecular orbitals, Sigma and pi-bonds, Hybridization, Review of Lewis bonding theory, Ionic bonds, Covalent bonds, Lewis structures of organic molecules, Formal charge, Resonance and hyperconjugation; Functional groups in organic compounds: IUPAC nomenclature of organic compounds-alkane, Alkene alkyne, Alkylhalides, Alcohols, Carboxylic acids, Amines; Intermolecular interactions: Electronegativity, Dipole moments, Polarity of organic molecules, Dipole-dipole interactions, Hydrogen bonding, Van der Waals interactions, Intermolecular interactions and properties of organic compounds, Solubility, Melting points and boiling points of organic compounds; Acid-base properties of organic compounds: Review of acid-base theory, Lowry-Bronsted theory and Lewis theory, Acid-base trends in organic compounds, Inductive effect, Resonance effect; Isomerism: Structural and stereoisomerism, Geometrical isomerism cis/trans vs E/Z nomenclature, Conformational isomers, Conformational analysis of open chained compounds and cyclic compounds, Optical isomerism, Chirality and stereocenters, Enantiomers and diastereomers, R and S nomenclature, Fisher projections, Racemic and meso comp, Atropisomerism, Separation of racemic compounds, Biological importance of isomers. Practical component Laboratory Safety, Physical nature of organic compounds, Acid-base properties and solubility behaviour, Beilstein Test, Preparation of Lassaigne's fusion extract, Functional group analysis, Unsaturated organic compounds, Alkyl and aryl halides, Alcohols (primary, secondary tertiary), Aldehyde and ketones, Phenols, Carboxylic acid and their derivatives, (amides, esters, ammonium salts) Amines, Carbohydrate analysis.	

ESNRM 12107	Computer Literacy for Natural Resource Studies - Practical
Managing a database: Excel, Access/ MySQL, Graphics for Science Communication, Preparation of Web-Based portfolio; Introduction to programming: Python, C.	

ESNRM 12208	Fundamentals of Statistics (Theory and Practical)
Introduction to statistics: Types of data and presentations, Data collection methods, Population and sample, Sampling techniques; Descriptive statistics: Data presentation and Summary measures, Measure of central tendency, Measure of	

variability and dispersion; Elementary Probability: Elements of probability, Different approaches of probability, Elementary properties of Probability, Calculating the probabilities of simple and complex events, Conditional probability and Bayes' theorem; Random variables and Probability Distributions: Properties of Probability distributions; Special Probability Distributions: Discrete; Bernoulli, Binomial, and Poison; Continuous, Uniform, Normal, and Exponential. Introduction to statistical software: Data management and familiarize with the common statistical functionalities; Entering, Summarizing, Presenting and Describing the data.

NRM-EGP-1201	General English II
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Year II Semester I	
ESNRM 21201	Limnology (Theory and Practical)
Introduction to limnology, Structure of aquatic ecosystems, Physical, chemical and biological characteristics of water and aquatic environment, Classification of lentic ecosystems using thermal properties, Trophic relationships in lotic and lentic systems, Nutrient dynamics, Oligotrophy, Eutropy and dystrophy in inland ecosystems, Ecological concepts in stream ecology, Animal adaptations to aquatic environment and bioindicators, Human influence on aquatic systems and their consequences, Eutrophication management and pollution control, Limnology field and laboratory.	

ESNRM 21202	Microbiology for Natural Resource Studies (Theory and Practical)
Introduction to microbiology, Microbial habitats: virus, bacteria and fungi (classification characteristics, identification, nutrition and metabolism); Microbial techniques, Structure of microbial communities, Microbial interaction with plants, animals, and humans; Role of micro-organisms in ecosystems and industry, Epidemiology of human and zoonotic diseases, Microbial toxins in the environment, Advances in Microbiology, Microbiology laboratory.	

ESNRM 21203	Genetics, Biotechnology and Biosafety (Theory and Practical)
Introduction to genetics, DNA and RNA, Gene technology, Introduction to plant tissue culture and genetic engineering, Principles and applications of plant tissue culture and genetic engineering, Biofuels, Bio-safety, Biopiracy and Bioprospecting, Advance techniques in Biotechnology, Biotechnology laboratory.	

ESNRM 21204	Mineralogy and Petrology
Symmetry, Bravais lattices, Crystal forms, Habits and twinning, Point group symmetry, Classification into crystal systems and classes, Introduction to common rock-forming minerals, Physical and optical properties of minerals, Classification, Composition and physicochemical properties of economic minerals, Optical properties of minerals, Basic petrology (Igneous, sedimentary and metamorphic rocks).	

ESNRM 21205	Biodiversity (Theory and Practical)
Introduction to biodiversity, Levels of biodiversity, Alpha, Beta and Gamma diversity, Values of biodiversity, Measuring biodiversity, Introduction to biodiversity assessment, Ecosystem processes and services, Biodiversity of Sri Lanka, Introduction to biodiversity conservation, Field excursion to explore the biodiversity of a unique protected area.	

ESNRM 21206	Physics for Natural Resource Studies
Newton's laws of motion, Fluid dynamics, Streamlines, Pascal's Principle, Bernoulli's equation, Concept of temperature and heat, Thermal expansion, Specific heat and latent heat, Vapour pressure, Relative humidity, Elementary geometrical optics (Reflection, Refraction, Mirrors, Lenses etc.), Introduction to physical optics (Interference, Diffraction and Polarization of light), Static electricity, Electric charge, Introduction to Gauss's law, Electric potential, Electric field, Current and resistance, Capacitance, Magnetism, Basics of EM theory (Electromagnetic induction, Radiation and ionisation), Noise and wave phenomena (Longitudinal and transverse waves, Propagation of waves).	

ESNRM 21207	Statistics for Experimental Analysis (Theory and Practical)
Estimation: Point and interval estimation for measures of centre (mean) and measures of dispersion (variance); Hypothesis testing: Concepts of hypothesis testing, single sample tests, two-sample tests (dependent and independent); Introduction to the design of experiments: simple and comparative experiments, factors and treatments, randomization, replication, blocking, balanced and unbalanced designs, fixed effects and random effects; Introduction to analysis of variance (ANOVA): Assumptions and basis of F –test, One-way ANOVA and two-way ANOVA, Multiple comparison analysis testing in ANOVA; Special experimental designs: Complete randomized design (CRD), Randomized complete block designs (RCBD), Latin square and Graeco-Latin square design. Mean comparisons methods, Two factor factorial with CRD and RCBD, Analysis the real-world data by using statistical software and interpret the results.	

ESNRM 21208	Natural Product Chemistry (Theory and Practical)
Primary and secondary metabolism, Enzymes and coenzymes, Construction mechanisms in biological systems such as alkylation, Wagner-Meerwein rearrangement, Aldol and Claisen condensations, Schiff base formation, Mannich reaction, Transamination, reductions and oxidations in biosynthesis; Fatty acids and polyketides from acetate pathway: Saturated/Unsaturated fatty acids, Prostaglandins, Aromatic polyketides (Cyclization to give simple phenols and Anthraquinones), alkylation and coupling reactions of polyketides, Macrolides and polyether, Cyclization through Diels-Alder reaction to give statins; Aromatic amino acids and phenylpropanoids from shikimate pathway: Aromatic amino acids and simple benzoic acids, Lignans and lignin, Phenylpropanes, Benzoic acids from C6C3 compounds, Coumarins; Terpenoids and steroids from mevalonate pathway: Monoterpenes, Sesquiterpenoids, Diterpenoids, Sesterterpenoids, Triterpenoids, Carotenoids, Steroids, Steroid skeleton, numbering, conformations,	

main types of steroids and their biological functions, steroids; Biosynthesis of Alkaloids from amino acids: Chemical structure, Biosynthesis of alkaloids derived from ornithine, lysine, nicotinic acid, tyrosine, tryptophan, anthranilic acid, and histidine; Mixed biogenesis: Flavonoids and stilbenes, Meroterpenoid; Carbohydrates: Conformations of carbohydrates and conformational effects; An Introduction to Natural Products Extraction, Identification, and Structure elucidation process.

NRM-EAP-2101	Academic English I
https://www.sab.ac.lk/app/eltu-curriculum	

Year II Semester II	
ESNRM 22201	Fundamentals of Soil Science
Soil formation and development, Soil composition, Description of soil profile, Soil classification, Soils of Sri Lanka, Soil properties (physical properties and functions: colour, texture, structure, consistency, porosity, bulk density, soil water movement, soil moisture and soil moisture characteristic curves, soil temperature and soil compaction; Chemical properties and functions: composition, colloidal nature, ion exchange, base saturation, organic matter, soil reaction, redox potential; Biological properties and functions), Soil fertility.	

ESNRM 22202	Introduction to Economics
Introduction to economics (resource scarcity, choices, opportunity cost, factors of production), Microeconomics; Theory of consumer behaviour, Theory of production and cost, Market structures (perfect competition, monopoly and imperfect competition), Macroeconomics; Circular flow of income and aggregate demand, National income accounting, Consumption, Investment and inflation, Unemployment, Introduction to cost-benefit analysis.	

ESNRM 22103	Geomorphology and Geology of Sri Lanka
Earth landforms, Landform evolution, Processes forming landscape, Geomorphology of Sri Lanka, Geological and tectonic evolution of Sri Lanka. Field excursion to selected sites in order to identify geological processes acting on the earth surface, field occurrence of minerals and rocks, and to discuss geomorphology and geology of Sri Lanka.	

ESNRM 22104	Erath Science - Practical
Topographic maps and cross-sections, Identification of common crystal forms and habits, Determining point group symmetry, Classification into crystal classes and systems, Physical identification of common rock forming minerals, Identification of economic minerals on the basis of physicochemical properties, Study of mineralogy and texture of common igneous, sedimentary and metamorphic rocks, Identification of structures in hand specimens, Optical identification of minerals under the microscope.	

ESNRM 22205	Statistical Methodology (Theory and Practical)
Simple linear regressions and multiple linear regressions, parameter estimation (OLS) and its properties, tests for regression coefficients, tests for significance of the fitted model (ANOVA), model adequacy checking and remedial measure, Models with qualitative independent variables (Dummy variables), and model selection procedures; Nonparametric statistical methods: Scale of measurements; Single sample tests: Sign and Wilcoxon signed rank test; Two sample tests: Wilcoxon matched paired signed rank test, Wilcoxon rank sum test; The Kruskal–Wallis one-way analysis of variance by ranks, and Friedman two-way analysis of variance by ranks; Rank correlations (Spearman's and Kendall Tau); Analysis of count data: Chi-squared test of goodness of fit. Introduction to time series analysis and Forecasting: Component of Time Series Data, Smoothing Methods, Forecasting methods; Analysis of the real-world data by using statistical software and interpret the results.	

ESNRM 22206	Analytical Techniques for Environmental Sciences and Natural Resource (Theory and Practical)
Instrumental methods in advanced environmental analysis (Atomic Absorption Spectrophotometer-AAS, microwave digester, Gas-Ghromotograph-Mass Spectrophotometer-GC-MS, High-Performance Liquid Chromatography-HPLC, Fourier Transform Infrared-FTIR gas analyser); Global environmental problems; air pollution; water and soil pollution; sampling of air, water and soil for chemical analysis; Measurement of air, water and soil parameters; preservation, monitoring techniques; Trace metal toxicity on soil and water; Extraction of toxic heavy metals from water and soil; Practical lessons-water, soil analysis.	
ESNRM 22207	Field Techniques in Ecology and Biodiversity (Theory and Practical)
Introduction to biodiversity related field techniques and evidence-based conservation, Biodiversity assessment and monitoring, Systematic recording of field data, Plant Identification and Preparation of Herbarium Specimens, Sampling techniques for flora, Species identification characters for fauna, Inventorying of fauna (Total species listing, Time-restricted searches, Encounter rates, Species discovery curves, MacKinnon lists), Species-area curves, Monitoring of animal populations, Relative and absolute abundance, Population census techniques (Total counts, Territory mapping), Population estimation techniques (Sampling and survey designs, Plot sampling, Indices of abundance, Transect and point counts, Distance sampling, Mark and recapture technique, Removal technique, Indirect sampling methods); Animal behaviour study techniques; Advanced field techniques and software in biodiversity studies; Field excursion to gain hands-on practical experience of biodiversity related field techniques.	

ESNRM 22208	Forestry
Forest types in Sri Lanka and their characteristics, Introduction to forestry, Principles and practices of silviculture, Plant reproduction and regeneration,	

Nursery establishment and management, Plantation establishment and management, Forest degradation, Forest Plantation Management, Biomass and carbon sequestration, Principles in wood science and timber technology, Forest mensuration, Field excursion, Forestry Field and Laboratory.

ESNRM 22109	Forestry - Practical
This practical includes measurements of bark thickness, diameter, height and volume of trees, stand basal area, slope and altitude; Determination of stand volume using single tree volume tables.	

NRM-EAP-2201	Academic English II
https://www.sab.ac.lk/app/eltu-curriculum	

Year III Semester I	
ESNRM 31201	Remote Sensing and Geographic Information Systems
Overview and concepts of remote sensing technology, Fundamental characteristics of electromagnetic radiation and their interaction, Remote sensing platforms, Satellite system and sensors, Overview of RS applications, Introduction to GIS, Definition, History and concepts of GIS, Functional elements of GIS, Required hardware and software for GIS, Scope, Application areas and benefits of GIS, Data structures (raster and vector data), Data quality and spatial data modelling, Input of geospatial data, Sources of data and input devices, Introduction to GPS, and principles of GPS measurements.	

ESNRM 31102	Remote Sensing and Geographic Information Systems - Practical
Manipulation and analysis of satellite images, Image interpretation, pre-processing, processing, and classification, Image data handling in computer systems, Data input, linking non-spatial and spatial databases, Data manipulation and pre-processing in GIS, Spatial analysis for Natural Resources Studies, and Map generation.	

ESNRM 31203	Environmental and Natural Resource Economics
Rationale of natural resource economics and environmental economics, Sustainable development, Markets and social welfare, Market failure; Property rights, Externalities, Public good and missing preferences, Resource utility value, Economic principles of managing renewable and non-renewable resources, Potential market economic solutions to mitigate environmental degradation, Project cycle and criteria for project analysis, Introduction to environmental valuation techniques, Role of economics in Environmental Impact Assessment (EIA), Introduction to ecological economics, Introduction to ecosystem market place, Economics of ecosystems and biodiversity.	

ESNRM 31204	Environmental Toxicology
Historical roots of toxicology, Toxicology branches, Classification of toxic substances, Sources and pathways of contaminants, Environmental partitioning of toxic substances (octanol-water partitioning (K_{ow}), solid-water distribution	

coefficient (K_{id})), Sorption-adsorption isotherm, Environmental processes of toxicants (human and plant uptake, persistence, fate), Toxicokinetics and toxicodynamics, Effects of toxic agents on living organisms. Toxicological features and effects of toxic substances, Factors affecting the toxicity (routes, sites, duration and frequency of exposure, Determination of toxicity, Dose-response relationship, Toxicity measurement (LD_{50}, LC_{50}), Quantification of toxic substance loading to the environment (Quantitative health risk assessment (QHRA), Environmental risk assessment (ERA), Strategies to avoid contaminant exposure to living organisms – exposure management.

ESNRM 31205	Industrial Chemistry and Technology

Introduction to the importance of chemical processes used in industry and to the aspects of research and development in the industry, Concepts of cleaner production, Industrial organic chemistry, Plantation crop industries, Coconut, Tea, Rubber, Sugar Cane, and Soap industry, Edible margarine industry, Detergents, Oils as fats, Petroleum products, Organic dye stuffs, Chemistry of essential oils.

ESNRM 31206	Industrial Minerals

Classification of economic minerals, Economic minerals of Sri Lanka, Mineral based industries: Glass, Graphite (Graphene), Silica, Clay, Ceramics, Mineral sands (ilmenite, rutile, zircon, monazite, garnet), Cement, Fertilizers (Apatite, Dolomite); Metallurgy, Steel and cast iron, Gems and Gem industry.
Field excursion to selected industrial mineral sites and economic mineral deposits in order to identify field occurrence of mineral resources and their exploitation, utilization and environmental impact and management.

ESNRM 31207	Hydrology and Soil Science - Practical

Laboratory based practical in hydrology and soil science (physical, chemical and biological), Quantification of soil degradation (field and model-based). Field excursion to obtain hands on experiences on hydrology and soil science related applications in the field.

ESNRM 31208	Biogeography

Introduction to biogeography, Key concepts and processes in biogeography (Evolution, Vicariance, Speciation, Radiation, Dispersal, Colonisation, Endemism, Cosmopolitanism, Extinction, Refugia, Range/Distribution, Areas and centres of endemism, Provincialism, Regionalisation), History of biogeography, Main approaches in biogeography (historical and ecological biogeography, vicariance and dispersal biogeography), Global patterns of species diversity, Global patterns of ecosystem diversity, Biomes of the World, Biogeographic regionalisation (Intuitive to numerical methods; global to local scales), Global biogeography, Biogeography of Sri Lanka, Biogeography and Conservation.

ESNRM 31209	Waste Management

Introduction to waste: classification, quantification and characterization, biochemical transformations, Hierarchy of waste management and respective

techniques for solid, liquid, air, hazardous waste; Solid waste management: Construction of disposal yards, Treatment of solid waste (primary treatment, solid-composting, pyrolysis, incineration, anaerobic digestion, bioreactors, Sludge handling and disposal, management techniques for e-waste and hazardous waste); Introduction to wastewater: constituents and characteristics, Wastewater treatment (physical, chemical and biological treatment methods, constructed wetlands); Emission control and management of gaseous waste; Field visit to a central waste treatment plants at industrial zones to explore different wastewater treatment systems.

Students, those who wish to exit at the end of the 3rd year (after completing a three year general degree programme), should complete the compulsory/optional course units of ESNRM 41201(in this semester as ESNRM 31208), ESNRM 41202 (in this semester as ESNRM 31211; optional), ESNRM 41204 (in this semester as ESNRM 31209), ESNRM 41205 (in this semester as ESNRM 31212; optional) and ESNRM 41208 (in this semester as ESNRM 31210) within the semester I.

NRM-EBP-3101	Business English
https://www.sab.ac.lk/app/eltu-curriculum	

Year III Semester II

Students, those who wish to exit at the end of the 3rd year (after completing a three year general degree programme), should select optional course units covering six credits from the seven course units available (from ESNRM 32201 – ESNRM 32207), and compulsory course unit of ESNRM 32409.

Students, those who wish to exit at the end of the 4th year (after completing a four year honours degree programme), should select optional course units covering two credits from the five course units available from ESNRM 32210 – ESNRM 32214, and compulsory course units of ESNRM 32201 – ESNRM 32108.

** A given course unit will be offered only if a minimum of five students have applied for it (Alternative provisions allowed upon the approval of the subject coordinator).

ESNRM 32201	Resource Efficient and Cleaner Production

Metrics of resource consumption (ecological footprint, water footprint (ISO 14046) and carbon footprint(ISO 14064)), Principles of Cleaner Production (CP), Introduction to CP auditing, Introduction to ergonomics, Introduction to Green Productivity (GP) Management system elements according to ISO 14001, Occupational health and safety management, ISO 45001, Quality management, ISO 9000 standards, Environment performance measurements, Green reporting, Resource efficiency indicators, Benchmarking, circular economy, Life cycle thinking, Biomimetics, Eco design, Environmental auditing and compliance, Environmental accounting, Chemical management, Field visit to industrial sites to gain hands-on experience on tools of environmental management and their applicability.

ESNRM 32202	Aquatic Resource Management (Theory and Practical)
Part I: Fisheries and Aquaculture; Resource availability and production statistics related to Sri Lanka, Fish biology; Age and growth of fish, Food and feeding, Reproduction, Fish yield prediction; Inland fisheries and introduction to Aquaculture, Shrimp culture, Ornamental fish culture; Environmental problems related to aquaculture; Laboratory practical on Fish Biology. *Part II: Water Resource Management;* Water resource, scarcity and global distribution, issues, Water footprint, Approaches to reduce water footprint and water conservation, Water pollution; Agricultural impacts on water, Irrigation water quality; Effects of urbanization and industrialization on water quality; Water pollutants; Groundwater and groundwater aquifers in Sri Lanka, Groundwater pollution and management; Water resource management; Field excursion to explore Aquaculture practices.	

ESNRM 32203	Coastal and Marine Resource Management (Theory and Practical)
History of ocean exploration; Introduction to Oceanography: Ocean floor characteristics, Ocean water chemistry, Waves, Tides, Currents and Ocean circulation; Resources from the ocean: Living and nonliving resources, Zones of the ocean, Marine and coastal communities and their adaptations, Marine primary production and fish production; Marine fishery: Problems related to marine fishery management, Ecological impacts of fishing and fishery management options; Human impacts on the marine environment: pollution, climate change, species introduction, overexploitation of marine resources, Management of Marine and coastal environment; Field excursion to explore marine and coastal environment, coastal environmental issues and their management.	

ESNRM 32204	Tools for Environmental Management
Environmental Impact Assessment (EIA); EIA in project cycle, Legislative and administrative documents in the EIA process, Project screening, Scoping, Impact assessment methods, EIA/IEE Reports, Development of a TOR, Review processes, Preparation of an EIA report, Reviewing and evaluation), Cumulative environmental management, Strategic Environmental Assessments (SEA), Contemporary economic tools in environmental management (Carbon crediting), Risk management, Case studies; Field excursion to sites of large scale development projects to observe project compatibility with sustainable environmental management practices.	

ESNRM 32205	Study and Management of Natural Hazards
Introduction to risk, hazard, Vulnerability and disaster, Types of natural hazards (Geological, Hydrological, Meteorological and Biological), Environmental health and disaster management, Diseases and occupational health hazards, Conducting hazard assessments, Applications of GIS and RS in management of natural hazards, Management of natural disasters, Case studies; Optional field excursion.	

ESNRM 32206	Biodiversity Conservation and Management (Theory and Practical)
Introduction to biodiversity conservation, Historical development of forest and wildlife conservation in Sri Lanka, Causes for and mechanisms of loss of biodiversity, *In-situ* and *Ex-situ* conservation, Global, regional and national biodiversity conservation initiatives and regulatory mechanisms, Principles and approaches of Conservation Biology. Field excursion to study biodiversity conservation in practice.	

ESNRM 32207	Soil Degradation and Management
Types and nature of soil degradation, Soil and water conservation measures, Management of soils in relation to potentials and limitations for agricultural, engineering and other uses, Economics of land degradation, Quantification of soil degradation (field and model based), Socio-economic determinants of soil degradation, Concepts of watershed management, Case studies, Field excursion to soil degraded lands, in order to identify major causes and migratory measures for them.	

ESNRM 32108	Community Outreach Program (Mini Project)
Capacity development on using information, tools and skills to plan a community outreach activity, and conducting a mini project that will produce a quantifiable output. The mini project could be a community based project or a placement at a recognized governmental or non-governmental organization.	

ESNRM 32409	BSc Dissertation in Environmental Sciences and Natural Resource Management
Student research projects should commence in the first semester of the final year. Students are expected to plan their project, review relevant literature, develop methodologies and establish links with relevant organizations during the first semester. Field/ industrial/ laboratory studies on a research problem relevant to natural resources should be conducted during the second semester leading to a research dissertation. The Dissertation should compulsorily consist of the following components; 1. Introduction, justification, and objectives 2. Literature review 3. Materials and methods 4. Results/Observations 5. Discussion 6. Conclusion and recommendations 7. Bibliography Both theoretical and practical components of the dissertation should be completed within a given schedule. The topic of the project will be selected through the consensus of the internal and external supervisors and the respective student.	

The research project will be evaluated, based on the efficiency of student's field/ industrial/ laboratory work, written dissertation and presentations (oral and poster).
Students are given a total of four credits for the dissertation based on the research project carried out throughout the third year (ESNRM 32410).

It is compulsory for those students who complete the three year BSc (Env Sc & NR Mgmt) Degree Programme to obtain a total of 93 credits.
Obtaining the pass mark of 40% (D+) for the English Programme is a requirement for the award of the BSc Degree in Environmental Sciences and Natural Resource Management.
Students should select optional course units covering four credits from the 10 course units available from ESNRM 41210 – ESNRM 41219.

ESNRM 32210	Lichenology (Theory and Practical)

Classification and identification of lichens, Lichen symbiosis, Sexual and vegetative reproduction of lichens, Lichen photobionts, Ecology and evolution of lichens, Lichen-animal interactions, Field and herbarium techniques in lichenology, Lichen chemistry, Lichens as an air pollution indicator, Ecological and economic benefits of lichens, Lichenology laboratory.

ESNRM 32211	Biogeography and Conservation Planning (Theory and Practical)

Island biogeography, Conservation biogeography, Landscape Ecology, Climate changes and biogeography, Diversity vs. endemism (species and phylogenetic) in conservation planning, Introduction to systematic conservation planning, Global, regional and Sri Lankan practices in setting spatial conservation priorities, Introduction to conservation planning software, A field visit to study biogeographic gradients and spatial conservation planning in practice.

ESNRM 32212	Environment and Society

Structure of the society, Social stratification, Rural communities, Indigenous knowledge (IK); IK vs. Scientific knowledge, IK in agriculture and water resources management, Land tenure, Gender and environment, Data collection methods for research on rural society (Rapid rural appraisals, participatory rural appraisals), Community development, Social responsibility and ethics towards environmental sustainability; A field excursion to obtain indigenous knowledge practices and apply data collection method for research on rural society.

ESNRM 32213	Mineral Exploration and Management

Ores and ore deposits, Tectonics and mineralization, Geological, geophysical and geochemical methods in mineral exploration, Reserve evaluation, Drilling, Borehole logging, Mining, Mineral mining and environmental problems in Sri Lanka, Mineral resource management.

ESNRM 32214	Bioinformatics

Introduction to bioinformatics, Bioinformatics algorithms Basic concepts in

Molecular Biology, Nucleic acids and Proteins, Bioinformatics Databases, Sequence alignment, Similarity searching, DNA sequence analysis and protein sequence analysis, protein structure prediction, Genome bioinformatics, Applications of bioinformatics. Computational approaches to biological science concepts of bioinformatics the computational skills for problems solving in biology, Establish, and maintain research information in biology, Solutions to bioinformatics, software packages, usages, and development.

Year IV Semester I	
ESNRM 41201	Research Methodology and Scientific Communication

What is Science and what is research? Why do we do research? Characteristics of Research, Methods of inquiry, The scientific method and research methodology, Research the process, Qualitative and quantitative research.
Choosing a research problem, Literature search and review, Objective formulation and research proposal preparation, Data analysis and interpretation, Writing and presentation of research results, References, Dissemination of knowledge and scientific communication, Research management,
Personality and career development, Social and interpersonal skills.

ESNRM 41202	Environmental Legislation and Regulation

Introduction to the legal system of Sri Lanka, Constitution of Sri Lanka, Introduction to environmental law (National environmental act, laws pertaining to the conservation of fauna, flora, forest and wetlands, coastal zone management, protected area management, wildlife trade, pollution control and other related acts), Public nuisance and environmental protection, Relevant case studies.

ESNRM 41203	Energy Resource Management (Theory and Practical)

Forms of energy, Energy transformation, Energy sources, Categories of energy, Historical and latest trends in global and Sri Lankan energy production and demand, Global fuel stocks, Energy crisis, Energy Management, Energy units, prices and tariffs, Electricity price in Sri Lanka, Energy charge (kWh) and demand charge (kVA), Energy efficiency vs effectiveness, Energy efficiencies in the energy supply chain, Electricity demand management, Energy efficiency in domestic and industrial sectors, Energy benchmarking, Energy auditing and standards, Energy Exploration and production (Biofuels, Biogas, Hydroelectricity, Wind energy, Solar, Coal, Natural gas), Energy storage, Energy within Environmental Constraints, Emissions from fuel combustion and their effects on the environment, Options for reducing emissions and energy-related environmental pollution, Green rating tools and techniques in energy management (Green building concepts).

ESNRM 41204	Literature Review and Research Proposal Development for BSc Dissertation

Student research projects should commence in the first semester of the final year. Through this course, students are expected to discuss with their supervisors, plan their projects, review relevant literature, develop methodologies and establish

links with relevant organizations, Project proposals will be evaluated at the end of this course.

ESNRM 41205	Statistical Application in Natural Resource Studies (Theory and Practical)
Special sampling methods related to natural resources studies, Introduction to Multivariate Statistics; Multi-normal distribution, Principal Component Analysis (PCA), Factor Analysis and MANOVA, Introduction to Logistic Regression, Repeated measure data analysis, Analysis of real world data using statistical software and interpretation of results.	

ESNRM 41206	Environmental Geochemistry
Fundamentals of Geochemistry, Element mobility and their distribution in the Earth systems, Aqueous solutions in Geology, Geochemical cycle, Water chemistry, Water quality standards, Causes and concepts of pollution of water, Groundwater and base flow contamination, Inorganic chemicals and organic compounds in water, Application of geochemical principles to study of natural systems, Application of isotopes, Traceelements related health problems, Laboratory sessions: Laboratory analysis, data handling, data analysis, reporting, and information utilization.	

ESNRM 41207	Field Techniques in Earth Science (Theory and Practical)
Study and interpretation of maps and cross-sections, Use of geological instruments in the field, Identification of geological structures in the field, Methods of field geology, Mapping of rock sequences, Preparation of geological maps and reports.	

ESNRM 41208	Managing People in Organizations (Theory and Practical)
Organizations and management, Understanding human behaviour at work, Developing communication skills, Conflict management and resolution, Stress management techniques, Leadership, Managing teams, Managing change, discipline, and adaptability.	

ESNRM 41209	Environmental Governance
Defining "Governance", Components and principles of governance, Issues leading to governance mechanisms; local, global and transboundary, Organizations and institutions in global environmental governance, Evolution of Multi-Lateral Environmental Agreements (MEA's; CBD, RAMSAR, CITES, CMS, UNFCC, UNCLOS), Local institutional setup and policy framework, National and local level environmental governance (with case studies); Field visit to observe and experience a selected MEA being put into practice at the local context.	

Students should select optional course units covering four credits from the 10 course units available from ESNRM 41210 – ESNRM 41219. ** A given course unit will be offered only if a minimum of five students have applied for it (Alternative provisions allowed upon the approval of the subject coordinator).

ESNRM 41210	Applied Hydrology (Theory and Practical)
Use of Meteorological data, Evaporation and transpiration, Infiltration and percolation, groundwater, Surface runoff, Urban hydrology, Rainwater harvesting techniques, Catchment characteristics and catchment management, Water quality and groundwater contamination, Hydrological forecasting and modelling, Applications of hydrology.	

ESNRM 41211	Gemmology (Theory and Practical)
Classification of gemstones, Formation and geological setting of gemstones, Major gem occurrences of the world, Crystallography and mineralogy of gemstones, Physical and optical properties of gemstones, Synthetic gemstones, Fashioning of gemstones, Value addition of gemstones, Gemmological instruments, Geology of gem deposits of Sri Lanka, Environmental management of gem mining.	

ESNRM 41212	Groundwater Exploration and Management (Theory and Practical)
Groundwater occurrences and aquifers, Geological and geophysical methods in groundwater exploration, Drilling, Borehole logging, Pumping tests, Chemical quality of groundwater measurements and remedies, Groundwater pollution, Artificial recharge of groundwater, Groundwater safety, Groundwater modelling.	

ESNRM 41213	Protected Area Management
Introduction to Protected Area (PA) management, PA categories (Global and National), Threats to PAs, PA management approaches (Habitat management, Species management), Research needs for evidence-based PA management, Planning and management of PAs (Ecosystem approach, Participatory approach, Incident management, Adaptive management, Tourism and visitor management, Community-based management), Indigenous people and PAs, Integrated Community Development Plans (ICDP). Field excursion to study PA management in practice.	

ESNRM 41214	Ecotourism (Theory and Practical)
Concept and evolution of Ecotourism (guidelines, planning, policies), Structure and market of Ecotourism industry, Interpretation techniques, Assessment of visitor impacts and carrying capacity, Visitor services and management approaches, Ecotourism marketing, Ecotourism for sustainable development, Assessment of Ecotourism potential, Case Studies and field excursion.	

ESNRM 41215	Oil Exploration
Nature of oil and gas, Overview of petroleum industry and petroleum engineering, Formation of oil and gas, Petroleum systems, Structure and stratigraphy, Exploration methods, Heat flow analysis, Basic volumetric calculation, Basic concepts related to formations evaluation, Completion and production, Surface facilities, Petroleum law and economics, Health, safety and environmental policy.	

ESNRM 41216	Forestry for Rural Development (Theory and Practical)
Introduction and defining agroforestry systems, State-managed to community-based forestry practices, Forestry for sustainable development of rural livelihood, Preparation of forest inventories and management plans; Field excursion.	

ESNRM 41217	Basic Methods of Surveying Sciences (Theory and Practical)
Definitions, principles, divisions of surveying; Applications of Surveying; Introduction to Modes of spatial data collection; Units of Measurements: distance, area and volume; Distance and Direction (angle); Introduction to Coordinate Systems; Working with maps: scale, legend, symbols and measurements on maps; Introduction to Conventional surveying techniques: chain, plane table and compass surveying; Introduction to Theodolite, Leveling and Heights/contours, EDMs and GNSS (GPS); Surveying Applications in Natural Resources Studies. Practical Component Familiarization with conventional surveying techniques; Chain, Plane Table, and Compass Surveying; Familiarization with Theodolite; Familiarization with Levelling and Height measurements; Familiarization with Total station/EDM; Familiarization with GNSS(GPS) Mapping Task with Handheld GPS; Fieldwork Documents: Project report on the mapping task and group presentation on the mapping task and an individual oral viva session covering all field practical aspects.	

ESNRM 42218	Climatology
The Earth and Its Atmosphere; Warming the Earth and the Atmosphere; Water in Atmosphere; Condensation, Stability and Precipitation; Air Pressure and Winds: Small Scale, Local Scale, and Global Scale; Thunderstorms, Tornadoes and Cyclones; Climate Changes: Past and Future; Air Pollution; Weather Charts, Forecasting, and Analysis; Meteorological Instruments and observations.	

ESNRM 41219	Machine Learning for Natural Resource Studies (Theory and Practical)
Supervised Algorithms: K-mean, Agglomerative algorithm; Unsupervised Algorithms: Decision Tree, Support Vector Machine, Neural Network, Introduction to Deep Neural Network. Practical component Implementation of machine learning algorithms using python and tools such as "Weka tool".	

Year IV Semester II	
ESNRM 42801	B.Sc. Dissertation in Environmental Sciences and Natural Resource Management
Student research projects should commence at the first semester of the final year. Students are expected to plan their project, review relevant literature, develop methodologies and establish links with relevant organizations during the first semester of the fourth year.	

Field/ industrial/ laboratory studies on a research problem relevant to natural resources should be conducted during the second semester leading to a research dissertation. The Dissertation should compulsorily consist of the following componants;

1. Introduction, justification, and objectives
2. Literature review
3. Materials and methods
4. Results/Observations
5. Discussion
6. Conclusion and recommendations
7. List of references

Both theoretical and practical componants of the dissertation should be completed within a given schedule. The topic of the project will be selected through the consensus of the internal and external supervisors and the respective student.
The research project will be evaluated, based on the efficiency of student's field/ industrial/ laboratory work, written dissertation and presentations (oral and poster).

It is compulsory for those students who complete the four year BScHons (Env Sc & NR Mgmt) Degree Programme to obtain a total of 124 credits.
Obtaining the pass mark of 40% (D+) for the English Program is a compulsory requirement for the award of the BSc Degree in Environmental Sciences and Natural Resource Management.

Rules and Regulations:

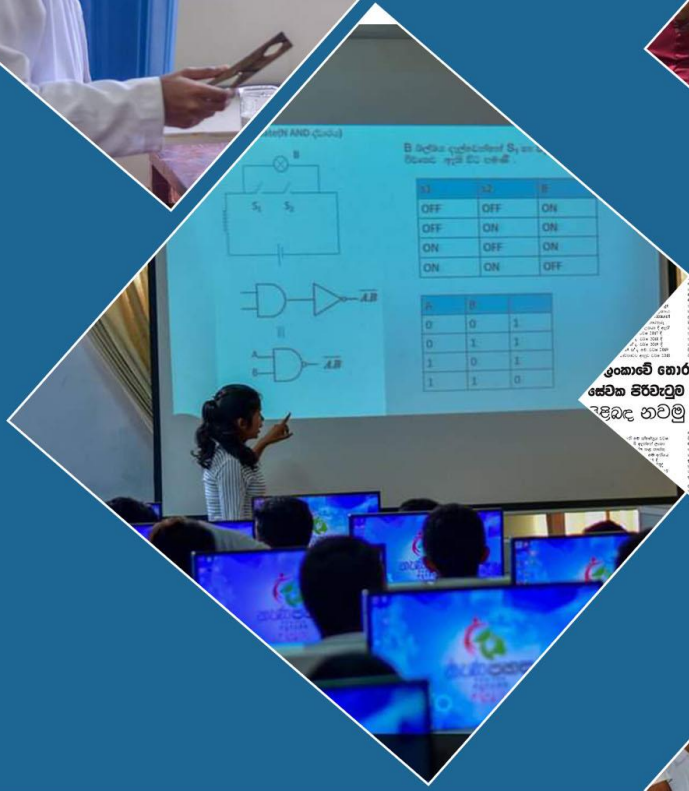
1. Students should earn a total of 93 and 124 credits to be eligible for the award of the Bachelor of Science degree in Environmental Sciences and Natural Resource Management and the Bachelor of Science Honours degree in Environmental Sciences and Natural Resource Management, respectively.

2. To obtain a minimum grade of D+ for each English language component (i.e. General English I, General English II, Academic English I, Academic English II and Business English) offered in the first five semesters is also a compulsory requirement to be eligible for graduation.

3. Students are also required to actively contribute in the educational, community outreach, aesthetic and cultural programs/activities/ field excursions organized by the Faculty, Department, and Student Society of Natural Resource Studies (SNRS).

Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

Department of Physical Sciences and Technology



https://www.sab.ac.lk/app/physical-sciences-and-technologies

https://www.linkedin.com/company/faculty-of-applied-sciences-sabaragamuwa-university-of-sri-lanka/

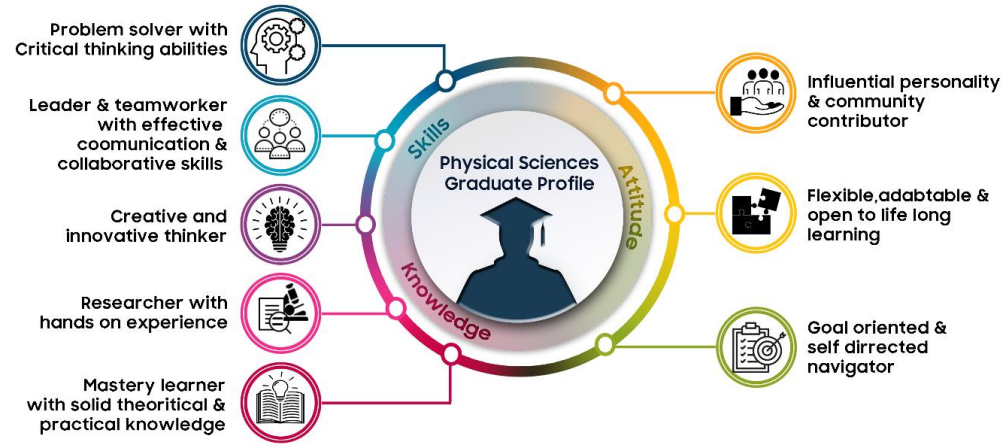
DEPARTMENT OF PHYSICAL SCIENCES & TECHNOLOGY

Degree Programs:

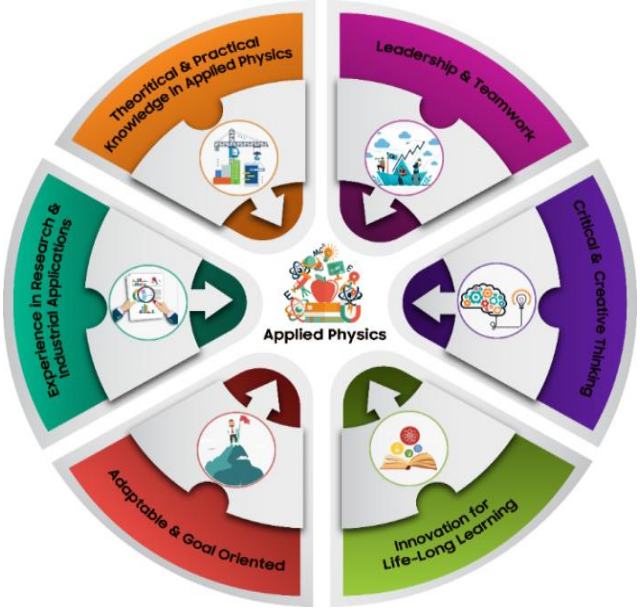
- Bachelor of Science in Physical Sciences
- Bachelor of Science Honours in Applied Physics
- Bachelor of Science Honours in Chemical Technology
- Bachelor of Science Honours in Computer Science and Technology

Anticipated Graduate Profile

Bachelor of Science in Physical Sciences

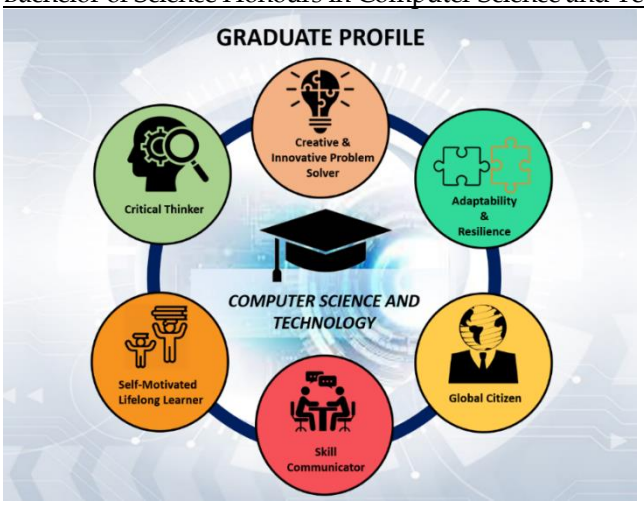


Bachelor of Science Honours in Applied Physics



Bachelor of Science Honours in Chemical Technology

Bachelor of Science Honours in Computer Science and Technology



Guideline for Course Codes and Credits

A course code contains, abbreviation to the name of degree program, year of study, semester of study, number of credits assigned for the subject and the subject code respectively.

Example: The course code of PST 12201 denotes the following.

Degree Program	Year	Semester	No. of Credits	Subject Code
Physical **S**ciences &**T**echnology	**1**	**2**	**2**	**01**

Summary of courses

Table 1: Courses offered in the Semester I of the First Year (*A student must earn a minimum of 16 credits)*				
Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 11201	Mechanics and Properties of Matter	2	Compulsory	
PST 11202	Introduction to Electricity and Magnetism	2	Compulsory	
PST 11103	Physics Laboratory 1-I	1	Compulsory	
PST 11204	General Chemistry	2	Compulsory	
PST 11205	Fundamentals of Organic Chemistry	2	Compulsory	
PST 11106	Inorganic Chemistry Laboratory I	1	Compulsory	
PST 11107	Structured Programming	1	Compulsory	
PST 11208	Computer Hardware and Software	2	Compulsory	
PST 11109	Computer Laboratory 1-I	1	Compulsory	
PST 11210	Calculus and Differential Equations	2	Compulsory	
PST-EGP-1101	General English I	0	Compulsory	
	Total	**16**		
Table 2: Courses offered in the Semester II of the First Year (*A student must earn a minimum of 16 credits)*				
Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 12201	Physics of Heat and Waves	2	Compulsory	
PST 12102	Semi-Conductor Physics	1	Compulsory	
PST 12103	AC Theory & Circuits	1	Compulsory	
PST 12104	Physics Laboratory 1-II	1	Compulsory	
PST 12205	Fundamentals of Physical Chemistry	2	Compulsory	
PST 12206	Fundamentals of Analytical Chemistry	2	Compulsory	PST11204
PST 12107	Organic Chemistry Laboratory I	1	Compulsory	PST11106
PST 12108	Object Oriented Programming	1	Compulsory	PST11107
PST 12209	Fundamentals of Statistics	2	Compulsory	
PST 12110	Computer Laboratory 1-II	1	Compulsory	PST11109
PST 12211	Database Management Systems	2	Compulsory	
PST-EGP-1201	General English II	0	Compulsory	
	Total	**16**		

Table 3: Courses offered in the Semester I of the Second Year (*A student must earn a minimum of 17 credits) Note: Those who are willing to do Chemical Technology must earn a minimum of 18 credits)*				
Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 21201	Electronics	2	Compulsory	
PST 21202	Geometrical and Physical Optics	2	Compulsory	
PST 21103	Physics Laboratory 2-I	1	Compulsory	
PST 21204	Organic Chemistry	2	Compulsory	PST 11205
PST 21205	Industrial Chemistry and Technology I (Organic)	2	Compulsory	PST 11205
PST 21106	Organic Chemistry Laboratory II	1	Compulsory	PST 12107
PST 21207	Data Structures & Algorithms	2	Compulsory	PST 11107, PST 11109
PST 21208	Computer Architecture and Assembly Language	2	Compulsory	PST 11208
PST 21209	Statistics for Experimental Analysis	2	Compulsory	PST12209
PST 21110	Computer Laboratory 2-I	1	Compulsory	
PST 21111	Physical Chemistry Laboratory I	1	Elective (Compulsory for BSc Hons (Chem Tech))	PST 11106, PST 12205, PST 12206
PST-EAP-2101	Academic English I	0	Compulsory	
	Total	**18**		
Table 4: Courses offered in the Semester II of the Second Year (*A student must earn a minimum of 20 credits)*				
Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 22201	Physics of Electromagnetic Radiation and Introduction to Laser	2	Compulsory	
PST 22202	Quantum Physics, Atomic & Nuclear Physics	2	Compulsory	
PST 22103	Physics Laboratory 2-II	1	Compulsory	
PST 22204	Chemistry of Elements	2	Compulsory	PST 11204
PST 22205	Physical Chemistry	2	Compulsory	PST 12205
PST 22106	Inorganic Chemistry Laboratory II	1	Compulsory	PST 11106
PST 22107	Analytical Chemistry Laboratory I	1	Elective (Compulsory for BSc Hons (Chem Tech))	PST 12206, PST 11106
PST 22208	Software Engineering	2	Compulsory	PST 21207
PST 22209	Statistical Methodology	2	Compulsory	PST12209 PST21209

PST 22110	Computer Laboratory 2-II	1	Compulsory	PST 11109
PST 22211	Operating Systems	2	Compulsory	PST 11211
PST 22112	Leadership and Communication	1	Elective	
PST 22213	Biology for Physical Sciences	2	Elective	
PST 22114	Soft Skill Development	1	Elective	
PST 22215	Mathematical Methods	2	Elective (Compulsory for BSc Hons (App Phy))	
PST 22116	Introduction to Astronomy	1	Elective (Compulsory for BSc Hons (App Phy))	
PST 22217	Industrial Metrology	2	Elective	
PST 22218	Management Information Systems	2	Elective (Compulsory for BSc Hons (Com Sc & Tech))	PST 12211
PST 22219	Molecular Spectroscopy	2	Elective (Compulsory for BSc Hons (Chem Tech))	PST11204, PST11205
PST-EAP-2201	Academic English II	0	Compulsory	
	Total	**31**		

GENERAL DEGREE COURSE B Sc DEGREE IN PHYSICAL SCIENCES

Table 5: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 16 credits)*

For BSc Degree in Physical Sciences (Majoring in Physics)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31201	Solid State Physics	2	Compulsory	PST 12102
PST 31202	Nuclear Physics & Applications	2	Compulsory	PST 22202
PST 31203	Quantum Mechanics	2	Compulsory	PST 22202
PST 31104	Material Physics	1	Compulsory	PST 12102
PST 31205	Special Relativity	2	Compulsory	PST 11201
PST 31206	Optical Fiber & Telecommunication	2	Compulsory	PST 21202
PST 31107	Introduction to Nanotechnology	1	Compulsory	
PST 31108	Physics Laboratory 3-I	1	Compulsory	PST 11103, PST 12103, PST 21103
PST 31209	The Origin and Evolution of the Universe	2	Elective	
PST 31210	Multimedia and Hypermedia	2	Elective	

	Systems Development			
PST 31211	Mathematical Programming	2	Compulsory	
PST 31212	Numerical Methods	2	Elective	
PST 31213	Economics	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	PST 11103 PST 12103, PST21103
PST-EBP-3101	Business English	0	Compulsory	
	Total	**23**		

Table 6: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 16 credits)*

For BSc Degree in Physical Sciences (Majoring Chemical Technology)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31107	Introduction to Nanotechnology	1	Elective	PST 11204, PST 12205, PST 22205
PST 31211	Mathematical Programming	2	Elective	
PST 31212	Numerical Methods	2	Elective	
PST 31213	Economics	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	
PST 31216	Biochemistry – I	2	Compulsory	PST 11205
PST 31217	Electroanalytical Techniques	2	Compulsory	PST 11204, PST 12205
PST 31218	Industrial Chemistry and Technology - II (Inorganic)	2	Compulsory	PST 11204, PST 12206
PST 31219	Environmental Chemistry	2	Compulsory	PST 11204, PST 11205, PST 12206
PST 31220	Coordination Chemistry	1	Compulsory	PST 11204, PST 22204
PST 31121	Laboratory Quality Control and Assurance	1	Compulsory	PST 11106, PST 12206
PST 31122	Physical Chemistry Laboratory II	1	Compulsory	PST 11205, PST 21111
PST 31123	Analytical Chemistry Laboratory II	1	Compulsory	PST 12206, PST 22106, PST 22107
PST-EBP-3101	Business English	0	Compulsory	
	Total	**19**		

Table 7: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 16 credits)*

For BSc Degree in Physical Sciences (Majoring Computer Science and Technology)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite

PST 31210	Multimedia and Hypermedia Systems Development	2	Compulsory	
PST 31211	Mathematical Programming	2	Elective	
PST 31212	Numerical Methods	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	
PST 31215	Agile Software Development	2	Elective	PST 22208
PST 31224	Artificial Intelligence & Expert Systems	2	Compulsory	PST 21207
PST 31225	Software Project Management	2	Compulsory	PST 22208
PST 31226	Software Quality Assurances	2	Compulsory	PST 22208
PST 31227	Object Oriented Analysis and Design	2	Compulsory	PST 12108, PST 21207
PST 31128	Computer Laboratory 3-I	1	Compulsory	PST 11109
PST 31229	Advanced Database Management Systems	2	Compulsory	PST 22218
PST 31230	Social and Professional Issues in Computing	2	Elective	
PST-EBP-3101	Business English	0	Compulsory	
	Total	**21**		

Table 8: Courses offered in the Semester II of the Third Year (*A student must earn a minimum of 08 credits)*

For BSc Degree in Physical Sciences (Majoring in Physics)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 32801	Project Work (Industrial Exposure): BSc Thesis in Physical Sciences (Major in Applied Physics)	8	Compulsory	
	Total	**8**		

Table 9: Courses offered in the Semester II of the Third Year (*A student must earn a minimum of 08 credits)*

For BSc Degree in Physical Sciences (Majoring Chemical Technology)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 32802	Project Work (Industrial Exposure): BSc Thesis in Physical Sciences (Major in Chemical Technology)	8	Compulsory	
	Total	**8**		

Table 10: Courses offered in the Semester II of the Third Year (*A student must earn a minimum of 08 credits)*

For BSc Degree in Physical Sciences (Majoring Computer Science and Technology)

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 32803	Project Work (Industrial	8	Compulsory	

	Exposure): BSc Thesis in Physical Sciences (Major in Computer Science & Technology)			
	Total	**8**		

HONOURS DEGREE COURSE

BSC HONOURS DEGREE IN APPLIED PHYSICS/ CHEMICAL TECHNOLOGY/ COMPUTER SCIENCE & TECHNOLOGY

Table 11: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 17 credits)*

BSc Honours Degree in Applied Physics

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31201	Solid State Physics	2	Compulsory	PST 12102
PST 31202	Nuclear Physics & Applications	2	Compulsory	PST 22202
PST 31203	Quantum Mechanics	2	Compulsory	PST 22202
PST 31104	Material Physics	1	Compulsory	PST 12102
PST 31205	Special Relativity	2	Compulsory	PST 11201
PST 31206	Optical Fiber & Telecommunication	2	Compulsory	PST 21202
PST 31107	Introduction to Nanotechnology	1	Compulsory	
PST 31108	Physics Laboratory 3-I	1	Compulsory	PST 11103, PST 12103, PST 21103
PST 31209	The Origin and Evolution of the Universe	2	Compulsory	PST 22116
PST 31210	Multimedia and Hypermedia Systems Development	2	Elective	
PST 31211	Mathematical Programming	2	Compulsory	
PST 31212	Numerical Methods	2	Elective	
PST 31213	Economics	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	PST 11103, PST 12103, PST21103
PST-EBP-3101	Business English	0	Compulsory	
	Total	**23**		

Table 12: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 14 credits)*

BSc Honours Degree in Chemical Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 31107	Introduction to Nanotechnology	1	Elective	PST 11204, PST 12205, PST 22205
PST 31211	Mathematical Programming	2	Elective	
PST 31212	Numerical Methods	2	Elective	

PST 31213	Economics	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	
PST 31216	Biochemistry – I	2	Compulsory	PST 11205
PST 31217	Electroanalytical Techniques	2	Compulsory	PST 11204, PST 12205
PST 31218	Industrial Chemistry and Technology - II (Inorganic)	2	Compulsory	PST 11204, PST 12206
PST 31219	Environmental Chemistry	2	Compulsory	PST 11204, PST 11205, PST 12206
PST 31220	Coordination Chemistry	1	Compulsory	PST 11204, PST 22204
PST 31121	Laboratory Quality Control and Assurance	1	Compulsory	PST 11106, PST 12206
PST 31122	Physical Chemistry Laboratory II	1	Compulsory	PST 11205, PST 21111
PST 31123	Analytical Chemistry Laboratory II	1	Compulsory	PST 12206, PST 22106, PST 22107
PST-EBP-3101	Business English	0	Compulsory	
	Total	**19**		

Table 13: Courses offered in the Semester I of the Third Year (*A student must earn a minimum of 15 credits)*

BSc Honours Degree in Computer Science & Technology

Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 31210	Multimedia and Hypermedia Systems Development	2	Compulsory	
PST 31211	Mathematical Programming	2	Elective	
PST 31212	Numerical Methods	2	Elective	
PST 31014	Industrial Visit	0	Compulsory	
PST 31215	Agile Software Development	2	Elective	PST 22208
PST 31224	Artificial Intelligence & Expert Systems	2	Compulsory	PST 21207
PST 31225	Software Project Management	2	Compulsory	PST 22208
PST 31226	Software Quality Assurances	2	Compulsory	PST 22208
PST 31227	Object Oriented Analysis and Design	2	Compulsory	PST 12108
PST 31128	Computer Laboratory 3-I	1	Compulsory	PST 11109
PST 31229	Advanced Database Management Systems	2	Compulsory	PST 22218
PST 31230	Social and Professional Issues in Computing	2	Elective	
PST-EBP-3101	Business English	0	Compulsory	
	Total	**21**		

Table 14: Courses offered in the Semester II of the Third Year ***(A student must earn a minimum of 16 credits)***				
BSc Honours Degree in Applied Physics				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 32201	Statistical Physics	2	Compulsory	PST 12201
PST 32102	Interaction of Radiation with Matter	1	Compulsory	PST 11202, PST 22201
PST 32203	Atmospheric Physics	2	Compulsory	
PST 32104	Advanced Electronics	1	Compulsory	PST 21201
PST 32205	Solid State Devices	2	Compulsory	PST 21201
PST 32206	Astrophysics	2	Compulsory	PST 22116, PST 31209
PST 32207	Atomic and Molecular Spectroscopy	2	Elective	
PST 32108	Current Topics in Physics	1	Compulsory	PST 12102
PST 32109	Human Resource Management	1	Elective	
PST 32210	Statistics in Quality Control	2	Elective	PST21209, PST 22209
PST 32111	Physics Laboratory 3-II	1	Compulsory	PST 11103, PST 12103, PST 21103, PST 22103, PST 31108
PST 32212	Graph Theory	2	Elective	
PST 32213	Resource Efficient and Cleaner Production	2	Elective	
	Total	**21**		

Table15: Courses offered in the Semester II of the Third Year *(A student must earn a minimum of 16 credits)*				
BSc Honours Degree in Chemical Technology				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 32109	Human Resource Management	1	Elective	
PST 32210	Statistics in Quality Control	2	Elective	PST21209, PST 22209
PST32213	Resource efficient & Cleaner Production	2	Elective	
PST 32214	Chemistry of Drug Design and Drug Action	2	Compulsory	PST 11205, PST 21204, PST 11205
PST 32215	Polymer Chemistry & Technology	2	Compulsory	PST 12205, PST 21204
PST 32216	Surface and Colloid Chemistry	2	Compulsory	PST12205
PST 32217	Biochemistry II	2	Compulsory	PST 31216

PST 32118	Advanced Organic Chemistry	1	Compulsory	PST 11205, PST 21204
PST 32219	Introduction to Organic electronics	2	Elective	PST 12205, PST 22205, PST 31217
PST 32220	Structures and Properties of Solids	2	Compulsory	PST 11204
PST 32121	Advanced Inorganic Chemistry Laboratory	1	Compulsory	PST 11106, PST 12106
PST 32122	Biochemistry Laboratory	1	Compulsory	PST 31216
PST 32223	Organometallic Chemistry	2	Elective	PST 11204, PST 11205, PST 21204, PST 22204
	Total	**22**		

Table16: Courses offered in the Semester II of the Third Year *(A student must earn a minimum of 15 credits)*

BSc Honours Degree in Computer Science & Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 32109	Human Resource Management	1	Elective	
PST 32210	Statistics in Quality Control	2	Elective	PST21209, PST 22209
PST 32212	Graph Theory	2	Elective	
PST 32224	Artificial Neural Networks	2	Compulsory	PST 31224
PST 32225	Digital Image Processing	2	Compulsory	
PST 32226	Data Mining and Applications	2	Compulsory	
PST 32227	Data Communication and Computer Networks	2	Compulsory	
PST 32228	Computer Graphics and Visualization	2	Compulsory	
PST 32229	Project in Computer Science and Technology (Mini Project)	2	Compulsory	PST 12108, PST 22208, PST 31227
PST 32130	Computer Laboratory 3-II	1	Compulsory	PST 31128
PST 32231	Human Computer Interactions	2	Elective	
PST 32232	Bioinformatics	2	Elective	
PST 32133	Current Topics in Computer Technology	1	Elective	
	Total	**23**		

Table 17: Courses offered in the Semester I of the Fourth Year (*A student must earn a minimum of 19 credits)*				
BSc Honours Degree in Applied Physics				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST 41201	Research Methodology and Scientific Communication	2	Compulsory	
PST 41202	Computational Physics	2	Compulsory	
PST 41203	Robotics	2	Elective	
PST 41204	Remote Sensing & GIS	2	Compulsory	PST 32203
PST 41205	Geophysics	2	Compulsory	
PST 41206	Medical and BioPhysics	2	Compulsory	
PST 41207	Advanced Nanotechnology	2	Elective	
PST 41208	Data Acquisition and Signal Processing Methods	2	Compulsory	PST 21201
PST 41209	Advanced Laser Physics	2	Elective	
PST 41210	Automation	2	Elective	
PST 41211	Astronomical Instruments and Data Reduction & Analysis Techniques	2	Compulsory	PST 32206
PST 41212	Electrochemical Power Conversion	2	Elective	
PST 41013	Literature Search Seminar in Applied Physics	0	Non credited Compulsory	
PST 41014	Independent Research / Project in Applied Physics	0	Non credited Compulsory	
PST 41215	Industrial Management	2	Elective	
PST 41216	Classical Mechanics	2	Compulsory	PST 11201, PST 11210, PST 22215
PST 41235	Critical Thinking	2	Elective	
	Total	**30**		
Table 18: Courses offered in the Semester I of the Fourth Year (*A student must earn a minimum of 22 credits)*				
BSc Honours Degree in Chemical Technology				
Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST41201	Research Methodology and Scientific Communication	2	Compulsory	
PST41207	Advanced Nanotechnology	2	Elective	PST 41107
PST41212	Electrochemical Power Conversion	2	Elective	PST 11204, PST 12205, PST 21111,

				PST 31122, PST 31217
PST41215	Industrial Management	2	Elective	
PST41217	Natural Products Chemistry	2	Compulsory	PST 11205, PST 21204
PST41218	Biotechnology	2	Compulsory	PST31216, PST32122
PST41219	Advanced Solid-State Chemistry	2	Compulsory	PST 11106, PST 32220
PST41120	Bioinorganic Chemistry	1	Compulsory	PST 11204, PST 31216
PST41221	Instrumental Analysis	2	Compulsory	
PST41222	Applied Molecular Modelling	2	Elective	PST 11204, PST 11205, PST 21204, PST 22205
PST41223	States of Matter	2	Elective	PST11204, PST 21204, PST 22205
PST41124	Literature Search in Chemistry	1	Compulsory	
PST41225	Independent Research / Project in Chemical Technology	2	Compulsory	
PST41226	Computer Applications in Instrumentation	2	Elective	
PST41235	Critical Thinking	1	Elective	
	Total	**27**		

Table 19: Courses offered in the Semester I of the Fourth Year (*A student must earn a minimum of 16 credits)*

BSc Honours Degree in Computer Science & Technology

Course Code	**Course Title**	**No of Credits**	**Compulsory or Elective**	**Prerequisite**
PST41201	Research Methodology and Scientific Communication	2	Compulsory	
PST 41203	Robotics	2	Elective	
PST 41215	Industrial Management	2	Elective	
PST 41227	Web services	2	Compulsory	PST 21110
PST 41228	Computer System Security	2	Compulsory	
PST 41229	Advanced Computer Networks	2	Compulsory	PST 32227
PST 41230	Internet of Things (IoT)	2	Elective	
PST 41231	Natural Language Processing	2	Elective	
PST 41232	Cloud Computing	2	Compulsory	PST 31229
PST 41233	Business Process Management Systems	2	Elective	
PST 41234	Mobile Computing	2	Elective	

PST 41235	Critical Thinking	2	Elective	
	Total	**24**		

Table 20: Courses offered in the Semester II of the Fourth Year (*A student must earn a minimum of 11 credits)*

BSc Honours Degree in Applied Physics

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 42801	Project Work (Industrial Exposure) : BSc Thesis in Applied Physics	8	Compulsory	PST 11103, PST 12103, PST 12103, PST 21103, PST 22103, PST 31108, PST 32111
PST 42102	Literature Search Seminar in Applied Physics	1	Compulsory	PST 11103, PST 12103, PST 12103, PST 21103, PST 22103, PST 31108, PST 32111
PST 42203	Independent Research / Project in Applied Physics	2	Compulsory	PST 11103, PST 12103, PST 12103, PST 21103, PST 22103, PST 31108, PST 32111
	Total	**11**		

Table 21: Courses offered in the Semester II of the Fourth Year (*A student must earn a minimum of 08 credits)*

BSc Honours Degree in Chemical Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 42804	Project Work (Industrial Exposure): BSc Thesis in Chemical Technology	8	Compulsory	
	Total	**8**		

Table 22: Courses offered in the Semester II of the Fourth Year (*A student must earn a minimum of 14 credits)*

BSc Honours Degree in Computer Science and Technology

Course Code	Course Title	No of Credits	Compulsory or Elective	Prerequisite
PST 41805	Project Work: BSc Thesis in Computer Science & Technology *	8	Compulsory	

PST 42606	Industrial Training	6	Compulsory	
	Total	**14**		

** The Independent Research Project will be offered as an annual course unit in both semesters I and II, with a total value of 8 credits. Students will be evaluated through regular progress presentations from Semester I to the end of the Semester II.*

Summary of credits offered:

The minimum number of credits required for a BSc degree in Physical Sciences in each year.

	Semester I	Semester II	Total
Year 1	16	16	32
Year II	17(18)	20	37(38)
Year III	16	08	24
Total			**93(94)**

The minimum number of credits required for BSc Hons degree in Applied Physics in each year.

	Semester I	Semester II	Total
Year 1	16	16	32
Year II	17	20	37
Year III	17	16	33
Year IV	19	11	30
Total			**132**

The minimum number of credits required for BSc Hons degree in Chemical Technology in each year.

	Semester I	Semester II	Total
Year 1	16	16	32
Year II	18	20	38
Year III	14	16	30
Year IV	22	08	30
Total			**130**

The minimum numbers of credits required for BSc Honours in Computer Science and Technology in each year.

	Semester I	Semester II	Total
Year 1	16	16	32
Year II	17	20	37
Year III	15	15	30
Year IV	16	14	30
Total			**129**

Detailed Syllabus

N.B.

T - Theory
P - Practical
F - Field visit relevant to the particular subject area.
TH - Thesis

Year I Semester I				
PST 11201	Mechanics and Properties of Matter	T		
Displacement, velocity and acceleration, vectors and vector operation, projectile motion and relative velocity, Newton's laws, circular motion: centripetal force, friction and work, energy: kinetic, potential and conservation, power, liner momentum and collisions, center of mass and moment of inertia, circular motion: equations of motion, circular motion: torque, angular momentum, energy, law of gravitation, elasticity and viscosity, surface tension				

PST 11202	Introduction to Electricity and Magnetism	T		
Electricity Introduction to Electricity, First Law of Static Electricity, Coulomb Law, Electric Intensity, Concept of Electric Field & Line of Forces, Various Type of Electric Fields (one & two point charges), Electric Field of Continuous Charge Distributions, Gauss' Law, Application of Gauss' Law (sphere of charge, spherical shell of charge, infinite line charge and a uniform sheet of charge), Electric Potential due to (point charge and continuous charge distribution), Capacitors & Dielectrics, Energy Stored in Electric Field, Electric Dipole Moment, Method of Images, Current & Current Density, Drift Velocity, Resistance, Resistivity & Conductivity **Magnetism** Magnetic Field, Lorentz Force, Hall Effect, Torque on a Current Loop, Motors, Magnetic Dipole, Biot–Savart Law & its Application, Ampere's Law, Solenoids & Toroids, Faraday's Law of Induction, Lenz's Law, Motional emf, Dynamos, Induced Electric Fields, Betatron, Gauss' Law for Magnetism and Atomic & Nuclear Magnetism				

PST 11103	Physics Laboratory 1-I		P	
Mechanics, Thermal Physics, Geometrical Optics, Waves, Electricity and Magnetism				

PST 11204	General Chemistry	T		
Review of classical atomic theory, (Atoms and molecules, Orbital, Pauli exclusion principle, De Broglie relationship, Heisenberg's uncertainty principle, Schrödinger equation), Atomic spectra, Sub-atomic particles, Chemical bonds (Covalent bonds, Intra- and inter-molecular forces), Lewis theory, Valence bond theory, Molecular orbital theory, Shapes of molecules from VSEPR theory, Hybridisation. Size and energy factors in Chemistry, Born - Haber cycle, Oxidation-reduction reactions, Concepts of acid-base, Redox reactions, Nernst equation and applications of electrode potential data. Balancing chemical equations and Half-reactions				

PST 11205	Fundamentals of Organic Chemistry	T		
Inter- and intra-molecular interactions of organic molecules, Principles of resonance, Hybridization, Conjugation, Polar effects, Steric effects, IUPAC Nomenclature of organic compounds, Aliphatic and aromatic compounds, Acidity and basicity of organic compounds, Stereochemistry (Stereoisomerism; Optical & geometrical isomerism, Absolute and relative configurations, Substitution and elimination reactions, Reactions of free radicals, carbocations and carbanions)				

PST 11106	Inorganic Chemistry Laboratory I		P	
Qualitative analysis: Analysis of inorganic anions, Cations and their mixtures. Quantitative inorganic analysis by volumetric titrations, Apparatus and measurements, Error analysis, Introduction to analytical methods.				

PST 11107	Structured Programming	T		
Introduction to Structured Programming: Introduction to compilers and interpreters, Pseudo code, Data types, Variables, Expressions and Assignment Statements, Console Input/output, Libraries. Flow Control: Branching Mechanisms, Loops. Function Basics: Predefined Functions, User-Defined Functions, Scope Rules. Parameters: Parameters, Default Arguments. Arrays: Introduction to Arrays, Array manipulation, Multidimensional Arrays. Structures: Structures. Pointers: Pointers. Recursion: Recursive functions. Exception Handling: Testing and Debugging, File Handling.				

PST 11208	Computer Hardware and Software	T	P	
History of Computers: The First Generation: Vacuum Tubes, The Second Generation: Transistors, The Third Generation: Integrated Circuits, Later Generations; Classification of Computers: Classification based on Size, Functionality, and Data Handling; Motherboard: Motherboard Types and Features, Motherboard Form Factors, Processor Sockets, Chipset, Buses and Expansion Slots, On-board Ports and Connectors; Processor: Types and Characteristics of Processors, How a Processor Works, Intel Processors, AMD Processors; Memory: Computer Memory System Overview, Cache Memory Principles, Internal Memory, External Memory; Hard Drive: Hard Drive Technologies and Interface Standards, Technologies Used Inside a Hard Drive, Interface Standards used by a Hard Drive; Input/ Output Devices: Ports and Wireless Connections Used by Peripheral Devices, I/O Peripheral Devices, Adapter cards, Video Subsystem; Storage Devices: File Systems Used by Storage Devices, Standards Used by Optical Drives and Discs, Solid State Storage; Software: Systems Software, Application Software, Software Issues and Trends; Networking Types, Devices, and Cabling: Network Types and Topologies, Hardware used by Local Networks.				

PST 11109	Computer Laboratory 1-I		P	
Introduction to Programming and C Language with IDE, Libraries and Namespaces, Data types and Variables, Constants and Literals, Operators and Expressions, Input/Output Operators, Control Statements and Decision Making, Arrays:				

Introduction to Arrays, Array manipulation and Multidimensional Arrays, Strings, Pointers: Basics of Pointers, Pointers and One-dimensional Arrays, Null pointers, Pointers and Strings, Structures and Unions: Basics of Structures, Arrays of Structures, Pointers to Structures, and union, Functions: Predefined Functions, User-Defined Functions. Scope Rules, Recursion, Dynamic Memory Allocation: Dynamic Memory Allocation, Allocating Memory with malloc, Allocating Memory with calloc, Freeing Memory and Reallocating Memory Blocks, File Management: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Random Access to Files, Command Line Arguments.

PST 11210	Calculus and Differential Equations	T		

Calculus: Sets, Relations, Functions, limits (right hand limit and left hand limit), continuity and differentiability, Coordinate systems (2D and 3D),Partial derivatives and chain rule, Differential Equations: Basic concepts – Introduction, Ordinary and partial differential equations, Classification of ordinary differential equations, Applications, Simple Harmonic Motion, Simple Pendulum, General form and solution of a differential equation, Formation of a differential equation, Linear and non-linear differential equations, Initial value problem, Boundary value problem, Differential equations of the first order and first degree, Separation of variables, Homogeneous equations, Method of solving homogeneous equations, Linear differential equations, Bernoulli's equation, Exact differential equations, Equations reducible to the exact form.

PST-EGP-1101	General English I	T		

https://www.sab.ac.lk/app/eltu-curriculum

Year I Semester II				
PST 12201	Physics of Heat and Waves	T		

Waves and Vibrations

Simple Harmonic Motion (SHM): Properties, Mathematical Representation, Energy of a SH Oscillator, examples of SHM, Damped Harmonic Motion, Forced Oscillations, Application of SHM in Mechanical and electrical systems, Propagation of Waves in Strings, Linear Wave Equation, Principle of Superposition, Standing Waves in Stings and in Air Columns, Interference of Waves, Beats, Sound waves in Media, Doppler Effect, Shock Waves

Thermal Physics

Concept of Temperature, Zeroth Law of Thermodynamics, Temperature Scales, Thermal Expansion, Internal Energy and Heat, Specific Heat, Latent Heat, Calorimetry, Work Done by a Gas, First Law of Thermodynamic, Application of the First Law of Thermodynamics, Energy Transfer Mechanisms, Kinetic Theory of Gases, Phase Diagrams and Critical Points, Drift & Diffusion Velocities, Specific Heat of Gases, Distribution of Molecular Speeds, Heat Engines and Second Law of Thermodynamic, Carnot Engine, Entropy

PST 12102	Semi-Conductor Physics	T		
Free electron theory, Density of states, Fermi energy, Electrical conduction in metals, Band theory, Conductors Insulators & Semiconductors, Intrinsic & extrinsic semiconductors, Diffusion & drift current, mobility & conductivity of charge carriers, Abrupt & Smooth p-n junction (Depletion region, built in electric field, contact potential, density of majority & minority charge carriers, depletion capacitance), biasing of p−n junction, The rectifying diodes, The breakdown in p−n junction (Avalanche & Zenner), Homo junction Schottky Junction & Hetero junction, pnp & npn bipolar transistor, Photo diodes, Light emitting diodes (LED) and Introduction to Solar cells				

PST 12103	AC Theory & Circuits	T		
Alternating currents; Sinusoidal waveform; Resistors, capacitors & their colour coding; Thevenin's theorem & its application to complicated circuits; Delta & Star transformations of resistor networks; Resistors capacitors & inductors in a.c. signal; A.C. transients in CR & RL; Energy in inductor; LC oscillations, Damped oscillations, Analysis of LCR a.c. circuits using Trigonometric analysis, Phasor diagram & Complex representation; Impedance & Resonance in LCR circuits; Power and Power factor; Transformer; and Filter circuits & band width				

PST 12104	Physics Laboratory 1-II		P	
AC Circuits, Semiconductor Physics, Geometrical Optics, Electricity & Magnetism, Basic Electronics and Introduction to Computer Sensors				

PST 12205	Fundamentals of Physical Chemistry	T		
Properties of gases: The perfect gas, Gas laws, Kinetic model of gases, Real gases and their behaviour, Van der Waals equation of state. Thermodynamics: First law, Expansion work, The internal energy, Enthalpy, Thermochemistry, Adiabatic changes, Entropy, Second & Third laws of thermodynamics, Statistical entropy, Gibbs free energy, Chemical potential and mass action law, Thermodynamics of Electrochemical Cells. Chemical kinetics: Rate laws, Rate constant, Order of a reaction, Integrated rate laws of zeroth, first and second order reactions, Arrhenius equation, Steady State Approximation.				

PST 12206	Fundamentals of Analytical Chemistry	T		
Introduction to chemical analyses, Sampling methods, Types of errors, Error analysis, Statistical treatment of analytical data, Introduction to classical methods; Titrimetric analysis (Acid–base, Complexometric, Gravimetric etc.), Electromagnetic spectrum, Introduction to spectroscopic methods (UV-visible, AAS, Emission spectroscopy), Solvent extraction, Principles of separation techniques (solvent-solvent, solvent-solid, solid-solid, Calibration methods (External & internal standard methods and standard addition).				

PST 12107	Organic Chemistry Laboratory I		P	
Laboratory Safety, Physical nature of organic compounds, acid base properties and solubility competitive, Beilstein Test, Preparation of Lassaigne's fusion extract.				

Functional group analysis, unsaturated organic compounds, alkyl and aryl halides, alcohols (primary, secondary tertiary), aldehyde and ketones, , phenols, carboxylic acid and their derivatives, (amides, esters, ammonium salts) amines, carbohydrate analysis

PST 12108	Object Oriented Programming	T		
Introduction to OO Concepts: Abstraction, Encapsulation, Inheritance and Polymorphism. Introduction to OOP: class, object, interfaces, packages, methods, constructors, objects creation, and method invocation. Encapsulation; class member visibility (private, public, protected, default), static members, abstract classes and abstract methods. Inheritance and Polymorphism: subclasses, inheritance and class hierarchies, dynamic binding. Applications of OO concepts to solve real life problems				

PST 12209	Fundamentals of Statistics	T		
Introduction to statistics; Types of data and presentations, Data collection methods, Population and sample, Sampling techniques, Descriptive statistics: Data presentation and Summary measures. Measure of central tendency, measure of variability and dispersion, Elementary Probability: Elements of probability, Different approaches of probability, Elementary properties of Probability, Calculating the probabilities of simple and complex events, Conditional probability and Bayes' theorem, Random variables and Probability Distributions: Properties of Probability distributions. Special Probability Distributions: Discrete; Bernoulli, Binomial, and Poison. Continuous; Uniform, Normal, and Exponential Introduction to statistical software: Data management and familiarize with the common statistical functionalities; Entering, Summarizing, Presenting and Describing the data				

PST 12110	Computer Laboratory 1-II		P	
Introduction to Java: History of Java, Features of Java, Java Development Kit (JDK), Java Basics: Keywords; Working of Java; Data Types, Variables, Using Classes and object in Java, Declaring Methods in Java, Operators and Control Statements, Compiling and Executing Java Program. Introduction to OOP and its basic features, Access Control, Exceptions Handing, Arrays and Strings, OOP Concepts: Encapsulation, polymorphism, Inheritance, Aggregation and Abstraction, Constructors and Destructors, Memory Management, Using API libraries in Object Oriented Programming				

PST 12211	Database Management Systems	T	P	
Introduction to Databases: Definition of the database, database system, data models, database applications, database system architecture, characteristics of database approaches, Designing: Conceptual design: ER- diagram: Relational Model, Constraints, ERD Issues, weak entity sets. Logical design: Relational database model, Logical view of data, keys, integrity rules, Normalization. Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics, Operators, Grouping and ungrouping, relational, Triggers. Database programming: SQL, DDL, DML. Database tuning and indexing				

PST-EGP-1201	General English II	T		
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Year II Semester I				
PST 21201	Electronics	T		

Diodes (biasing, DC & AC resistance, equivalent circuit, load line analysis, half & full wave rectification, clippers, clampers, voltage multiplier circuit & diode testing), Bipoler transistors (Operation, configuration, characteristics, testing, biasing methods, load line analysis, switching net work, r_e model & the hybrid equivalent model), BJT Frequency Response, Feedback, Oscillators, Operational amplifiers (inverting, non-inverting), Basic OP-Amp circuits, Applications of OP-Amp, Binary decimal octal & hex number systems, Logic gates, Logic expressions & its simplifications using Boolean algebra and k-Maps, De Morgan's theorem, Combinational logic circuits (Full adder), Sequential logic circuits, Introduction to Flip-Flops (S-R, J-K, D, and Master-Slave), Shift Registers, Asynchronous & Synchronous Counters, Decoders (BCD to Decimal, BCD to Seven Segment), Encoders, BCD Code & ASCII Code, Multiplexer, Analysis of Sequential Logic Circuits, Transition Tables, Sequential Circuit Design, Excitation Tables

PST 21202	Geometrical & Physical Optics	T		

Geometrical Optics

Graphical ray-trace method, Key rays used in ray tracing, Reflection, Reflection law, Mirror formulas for image location, Sign convention, Magnification of a mirror image, Refraction, Snell's law, Refractive index, Prisms and their properties, Refraction at curved surface, Function of a lens, Types of lenses, Image location by ray tracing, Lens formulas for thin lenses, Power of a lens, Optical Instruments (Telescope, Microscope)

Physical Optics

Huygens Theory, Laws of Reflection and Refraction by Huygen's theory, Electrical and Magnetic Constants and Speed of Light, Solution to the Wave Equation, Interference, Principle of Superposition, Young's Double Slit Experiment, Michelson's Interferometer, Newton's rings, Resolving Power of an Interferometer, Diffraction, Fresnel Diffraction, Fraunhoffer Diffraction, Dispersion, Polarization, Scattering, Absorption

PST 21103	Physics Laboratory 2-I		P	

AC Circuits, Semiconductor Physics, Geometrical Optics, Physical Optics, Electronics and Computer Sensors

PST 21204	Organic Chemistry	T		

Alkyl halides, **and Alcohols** Nucleophilic substitution reaction, S_N1, S_N2 and S_Ni mechanisms. Elimination reactions E1 and E2 mechanisms in detail E1/ S_N1 and E2/ S_N2 reactions

Aromatic compounds, molecular orbital description of benzene Aromaticity, Frost Diagrams, Hückel's rules, aromatic, antiaromatic and non-aromatic compounds, reactions of benzene, electrophilic aromatic substitution, halogenation, nitration, sulfonation, alkylation, acylation, reactions of substituted benzene, orientation in

electrophilic substitution, Phenols and aryl halides, nucleophilic aromatic substitution reactions

Carbonyl compounds Structure and reactivity (nucleophilic addition reactions, keto-enol isomerism, alpha-substitution reactions, aldol condensation reactions) of aldehydes and ketones, Conjugated enones, 1,2- vs 1,4-additions, Carboxylic acids and their derivatives, Nucleophilic acyl substitution reactions, **Chemistry of aliphatic amines and aryl amines**

PST 21205	Industrial Chemistry and Technology I (Organic)	T		

Introductions to the importance of chemical processes used in industry and to the aspects of R&D in the industry. Industrial organic chemistry, Plantation crop industries, Coconut, Tea, Sugar cane, Chemistry of essential oils, Oils and fats, Edible margarine industry, Detergents, Petroleum products and biofuels, Organic dyes, Pesticides, Tannery industry

PST 21106	Organic Chemistry Laboratory II		P	

Organic chemistry (recrystallization, Separation of Binary mixtures, (Acid / base/neutral), solvent extraction, Synthesis of organic compounds (acetanilide, benzanilide, dibenzalacetone, acetyl salicylic acid, benzoin, acetaminophen etc), extraction of natural products (caffeine from tea, trimyristine from nutmeg, piperine from black pepper etc) Synthesis of industrially important products (soap, nylon etc , Chromatography)

PST 21207	Data Structures & Algorithms	T		

Data Types (Simple and Compound data types, The realization in the Standard Language chosen for Study),Data Structure(Strings, Arrays and Tables, Stacks and Queues, Linked Lists, Binary Trees and Balanced Binary Trees, Splay Trees), File Organization and Access (Sequential organization, Random Organization, Linked Organization, Inverted les and Databases, Sort and Search Algorithms (Searching – Sequential Search, Binary Search, Sort: Bubble Sort, Insertion, Selection, Quicksort, 2-Way Merge Sort), Consideration of the efficiency of Algorithms in terms of Time and Space.

PST 21208	Computer Architecture and Assembly Language	T		

Basic Structure & Components of a Computer System, Difference in Computer Organization & Computer Architecture, Computer Evolution, Study of Different Microprocessors, Interconnection Structures, Memory Organization, Data Representation, Instruction Set, Processor Structure &Function, Instructions and instruction codes, Instruction cycle, Interrupts, Performance, Processor Registers, Address Segmentation, I/O Schemes, System Support Devices, Programming in 80x86 Assembly Language

PST 21209	Statistics for Experimental Analysis	T	P	

Estimation: Point and Interval Estimation for measures of centre (mean) and measures of dispersion (variance). Hypothesis Testing: Concepts of Hypothesis testing, single

sample tests, two sample tests (dependent and independent). Introduction to design of experiments: simple and comparative experiments, factors and treatments, randomization, replication, blocking, balanced and unbalanced designs, fixed effects and random effects. Introduction to Analysis of Variance (ANOVA): Assumptions and Basis of F – test. One-way ANOVA and two-way ANOVA. Multiple comparison analysis testing in ANOVA. Special Experimental Designs: Complete Randomized Design (CRD), Randomized Complete Block designs (RCBD), Latin Square and Graeco-Latin Square Design.
Mean comparisons methods, Two factor factorial with CRD and RCBD, Introduce statistical software, Analysis of the real world data by using statistical software and result interpretation.

PST 21110	Computer Laboratory 2-I		P	

Introduction to the Web: Internet, Browsers, Clients, Introduction to HTML: HTML tag syntax, Basic HTML tags (text, fonts, colors, images, lists, tables, frames, forms), Introduction to CSS: Basic CSS for text formatting, Working with Layout ,Working with Images in CSS, Introduction to JavaScript: Basic Syntax Used in Java Script ,Variables, Operators, Functions ,Flow Control Structures ,Events, Arrays, JavaScript inside a browser, DMO, jQuery, Introduction to PHP: PHP Basics, Data Types, Flow Control ,String Manipulation, Use of Array, Functions: Introductions to Functions, HTML Form Processing: HTML Form Basics, GET Method, POST Method, Client Side form Validation (Using JavaScript), File Manipulation: Directory Manipulation, File Uploading, Session & Cookies: Server Variables, Use of Sessions & Cookies, Application development using sessions and cookies, Introduction to MySQL RDBMS, MySQL with PHP: Connecting PHP to MySQL, Working with MySQL, Advanced PHP form processing with PHP/MySQL

PST 21111	Physical Chemistry Laboratory I		P	

Treatment of experimental data: Presentation of data and error analysis. Experiments in physical chemistry: Gas laws, Thermochemistry, Chemical kinetics, Colligative properties, Phase diagrams, Surface Phenomena, UV-Visible spectroscopy, Vibrational spectroscopy,
Conductometric and pH titrations, Electrochemistry.

PST-EAP-2101	Academic English I	T		

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Year II Semester II				
PST 22201	Physics of Electromagnetic Radiation and the Introduction to the Laser	T		

Physics of Electromagnetic Radiation:
Cathode Ray Oscillograph, Aston's Mass Spectrograph, Betatron, Magnetization, Electron Spin, Introduction to Magnetic Material (Paramagnetism, Diamagnetism & Ferromagnetism), Magnetism of Planets, Diamagnetism & Langevin's Classical Theory, Paramagnetism & Langevin's Classical Theory, Quantum Theory & Paramagnetism,

Weiss Theory of Ferromagnetism, Concept of Domains and Hysteresis, Maxwell Equations, and Electromagnetic Waves

Introduction to the Laser

Historical Development, Principle of Coherence Spatial, Temporal & Partial, Coherence, Methods of Measuring Temporal & Spatial Coherence, The Density of Modes, Mode in a Reflecting Volume, Longitudinal Modes in a Laser Resonator, Transverse Modes in a Plane-parallel Resonator, Interaction of Light with Matter Processes of Spontaneous Emission, Absorption and Stimulated Emission, Radiative Energy Exchange, Einstein Coefficients, Transmit of Light Beams through a Material Medium, Process of Excitation & Attenuation, Gain Saturation, Oscillation Threshold, and Population Inversion Basic Laser Systems 2-level, 3-level and 4-level Systems Brief Discussion of the Diversity of Laser Applications

PST22202	Quantum Physics, Atomic and Nuclear Physics	T		
Bohr Theory of the Hydrogen Atom, Atomic Spectra, Orbital Angular Momentum, Magnetic Dipole Moment, Spin, Pauli Exclusion Principle, Space-time, Mass Energy and Momentum in Relativity, Planck's Hypothesis, Photo Electric Effect, Compton Effect, De Brogile Waves, Heisenberg's Uncertainty principle, Schrodinger's wave equation, Atomic Nucleus Binding Energy, Models of the Nucleus, Liquid Drop, Shell Model, Decay of Unstable Nuclei (α,β,γ-decay),), Fission and Fusion, Nuclear Reactions, Elementary Particles				

PST 22103	Physics Laboratory 2-II		P	
AC Circuits, Semiconductor Physics, Geometrical & Physical Optics, Advanced Electronics, Computer Sensors and Arduino				

PST 22204	Chemistry of Elements	T		
Main group chemistry (General and systematic chemistry of the groups of elements), s-block elements (physical and chemical properties of the alkali metals and alkaline earth elements), p- block elements (Physical and chemical properties of group 13 – 18 elements), An introduction to d-block & f-block elements and their applications.				

PST 22205	Physical Chemistry	T		
Quantum Mechanics: Revision of evidence for quantization, Dynamics of microscopic systems, Schrödinger equation, Quantum mechanical principles: Operators and observables, Superposition and expectation values, the uncertainty principle, Solution of the Schrödinger equation for particle in a one-dimensional box, 2-dimensional box, 3-dimensional box. **Phase Equilibria:** One component system, Miscible, partially miscible & immiscible liquid mixtures, Condensed phases, Eutectic systems and compounds formation, Partially miscible systems, Solid solutions, Simple three component systems, Distillation of liquid mixtures (Congruent and non-congruent).				

PST 22106	Inorganic Chemistry Laboratory		P	
Gravimetric analysis, Determination of anions and cations by gravimety,				

Complexometric titration including EDTA, Synthesis of inorganic complexes and their analysis, Qualitative analysis of simple mixtures, Analysis of rare elements, Insoluble mixtures, Synthesis of special inorganic compounds.

PST 22107	Analytical Chemistry Laboratory I		P	
Synthesis & analysis of coordination compounds., Colorimetric analysis, Chromatography Determination of water quality parameters , Soil, and Air quality etc				

PST 22208	Software Engineering	T		
Introduction to Software Engineering, Introduction to problems, Software Processes, Requirements and Specification, Software design, COTS and Reuse, CASE Tools, Metrics and Reliability Assessment, Software Testing and Quality Assurance (Testing, Analysis, QA, Reviews), Implementation Models, Team Organization and People Management, Software and System Safety, Putting It All Together				

PST 22209	Statistical Methodology	T		
Simple linear regressions and multiple linear regressions, parameter estimation (OLS) and its properties, tests for regression coefficients, tests for significance of the fitted model (ANOVA), model adequacy checking and remedial measure, Models with qualitative independent variables (Dummy variables) and model selection procedures Nonparametric statistical methods; Scale of Measurements, Single sample tests; Sign and Wilcoxon Signed Rank Test, Two Sample tests; Wilcoxon Matched Paired Signed Rank test, Wilcoxon Rank Sum Test, The Kruskal-Wallis One-Way Analysis of Variance by Ranks, and Friedman Two-Way Analysis of Variance by Ranks, Rank Correlations (Spearman's and Kendall Tau) Analysis of Count Data: Chi-squared test of goodness of fit, Introduction to time series analysis and Forecasting; Components of Time Series data, Smoothing methods, Forecasting methods, Analysis of real world data using statistical software and interpretation of results.				

PST 22110	Computer Laboratory 2-II		P	
Introduction To **C#;** Introducing C#, Understanding .NET, overview of C#, Base Class Library, Namespaces, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, Constant, Arrays, String. Object Oriented Aspects of C#, Application Development on .Net; Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, Windows application configuration. Deploying windows Applications, Web Based Application Development on.Net; ASP.NET introduction, Creating Virtual Directory and Web Application, Introduction to Configuration files, Session management techniques, Data Validation with Regular Expressions, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.				

PST 22211	Operating Systems	T		
Overview, Operating system principles, Multi-Programming: Processes and threads, system calls, context switching, Managing processor time. Types of scheduling, Scheduling algorithm, concurrency, Memory management, Device management, File systems, Inter-process Communication: pipes, sockets, signals, shared memory, security and protection, real time and embedded systems, fault tolerance, system performance and evaluation. Case study: Linux.				

PST 22112	Leadership and Communication	T	P	
Definition of leadership, power and leadership, importance of leadership, leadership qualities, leadership behaviours and approaches, different types of leaders, leadership in practice; definition of team and team work, building an effective team, stages of team building, different team roles, obstacles to team effectiveness; definition of communication, the communication process; effective listening skills, elements of an effective presentation, non-verbal communication, email etiquettes & phone etiquettes.				

PST 22213	Biology for Physical Sciences	T		
Cell and its constituents, Cellular water relations, Protein Synthesis, Introduction to enzymes, Principles of genetics, Composition of living matter, Structure and characteristics of animal tissues				

PST 22114	Soft Skill Development	T	P	
Listening to a talk and basic interpersonal skills, basics of giving a talk, preparing slides for a presentation, writing an article, conveying information, reading skills, debating, acting, how to have a conversation, how to face an interview, presenting an argument, "Political correctness"				

PST 22215	Mathematical Methods	T		
Complex Numbers: Introduction, Real and Imaginary Numbers, The Algebra of Complex numbers, Complex Number Operation, Polar form of the complex number. Matrices and determinants: Matrices and system of linear Equations, Operations with Matrices, Determinant of a Square Matrix, Inverse of a Square Matrix, Applications of Matrices and Determinants. Vectors: Vectors and Scalars, Vector Algebra, lineally independence and linearly independence, Vector Fields, Dot and Cross product, Reciprocal sets of Vectors, Vector differentiation, Gradient, Divergence, Vector integration. Fourier Series: Periodic functions, Function having arbitrary period, Even and odd functions, Half-range expression, Convergence of Fourier series, Operation on Fourier Series Fourier Transforms: Fourier's integral theorem, Fourier cosine and sine transforms, Fourier transforms of derivatives, Calculation of the Fourier transforms of some simple functions, Fourier transforms of some rational functions Laplace Transforms: Inverse functions, Linearity, Laplace transforms of derivatives and integrals, Shifting on the s-axis ,Shifting on the t-axis, Unit step functions, Differentiation and Integration of the transforms.				

PST 22116	Introduction to Astronomy	T		
Introduction about the difference in astronomy, cosmology, and astrophysics,				

Comprehensive study about the ancient astronomy, geocentric model, Copernicus heliocentric model, Tycho Brahe's observations, Kepler and the orbits of planets, Gallio and telescope observation, Newton laws of motion, Newtonian gravity etc., Introduction to celestial sphere, Brief introduction about the Sun and its structure, planets and the solar system objects such as asteroids, comets etc, Natural astronomical phenomena such as solar eclipse, lunar eclipse, phases of moon, planetary conjunctions, oppositions etc., low and high tides, planetary conjunctions, planetary oppositions, planetary transits, meteorites and meteor showers

PST 22217	Industrial Metrology	T		

Basic units of measurements

Historical Background, Base Units, Derived units, Decimal multiples and sub multiples, Recommendation for writing SI unit names and symbols, Non SI units, other units

Fundamental concepts

Measurand and Influence quantities, True Value of a quantity, Nominal value, conventional true value, Error and relative error, Random errors, Systematic errors, Accuracy and precision, Calibration, Hierarchy of measurement standards, Traceability, Resolution, Discrimination and sensitivity, Reproducibility of measurements

Measurement equipments

Standard equipments and industrial measurement equipments in various fields such as Temperature, Mass, Dimensional, Electrical, Pressure and force

Calibration Methods

Temperature: (Thermometer, Oven, Incubator, Autoclave)
Mass: (Balance)
Dimensional: (Vernier caliper, Micrometer, Dial gauge, Height gauge)

Estimation of combined uncertainty of measurements

PST 22218	Management Information Systems	T		

Management within the organization: Management activities, Roles and Levels; Management Planning, Controlling and Strategic planning, Decision making and using MIS: Measurement of MIS performance and capabilities, MIS applications and relationships: Introduction to different types of Information Systems, Databases and data warehouses and their relevance to MIS; Networks, Internet and MIS.

Development of MIS: Managing MIS Project, Techniques and methodologies for supporting MIS development, Customer Relationship Management (CRM) and Supply Chain Management (SCM), Financial Systems and E-Commerce, Business Process Redesigning using new trends in MIS (ERP, Mobile and Cloud enabled MIS etc.)

PST 22219	Molecular Spectroscopy	T		

Rotational spectroscopy: Rigid diatomic rotator, Boltzmann distribution, Effect of isotopic substitution, Non-rigid diatomic rotator. Rotational fine structure, Vibrational Spectroscopy: Simple harmonic oscillator, Zero point energy, Anharmonic oscillator, Fundamental band and overtones, Hot bands, Diatomic vibrating rotator, Rotational fine structure. Raman spectroscopy. Electronic spectroscopy: Born–Oppenheimer approximation, Frank-Condon principle, Absorbance, Fluorescence. NMR spectroscopy: ^{1}H-NMR and ^{13}C-NMR spectra. Mass spectrometry: Elemental composition, Electron

impact ionization, Chemical ionization, Fragmentation mechanisms. Application of these spectral methods for structure elucidation of organic molecules.

PST-EAP-2201	Academic English II	T			
https://www.sab.ac.lk/app/eltu-curriculum					

**One day training workshop on leadership, professional and skill development at an institution outside the University*

GENERAL DEGREE COURSE UNITS

Year III Semester I					
For BSc Degree in Physical Sciences (Majoring in Physics)					
PST 31201	Solid State Physics	T			
Crystal Lattice & Translation Vectors, Symmetry Operations, Type of Lattices, Bravais lattice, Lattice Directions and Planes, Miller index, Inter-planar Spacing, Packing density, Simple crystal structures (close & loose packed), X-Ray diffraction, Bragg's law, The Von Laue treatment, X-Ray diffraction methods (Laue's, Rotary crystal & Powder methods), Atomic scattering factor, Geometrical structure factor & its applications to crystals, Lattice vibrations (Mono-atomic Lattice & Diatomic Lattice), Phonons, and Various theories of lattice specific heat (Classical theory, Einstein's theory)					

PST 31202	Nuclear Physics and Application	T			
General Survey of Radioactive Decay, Radioactivity, Rutherford Scattering, Discovery of the Neutron, Stable and unstable nuclei, Degree of Instability (Radioactive Half Life), Radioactive equilibrium; Binding Energies of Nuclei in their Ground States; Semi Empirical Mass Formula; Systematic of Beta Decay, Fermi Theory of Beta Decay; Theory of Alpha Decay; Theory of Gamma decay, Electron Capture, Auger Effect, Experiments on the Neutrino; Liquid Drop Model; Nuclear Potential Well, Introduction to Shell Model; Magic Numbers; Energy levels of the Shell theory potential; Nuclear Reactions; Conservation Laws; Nuclear Fission; Induced Fission; Chain reactions; Cross-section and differential cross-section; Nuclear Reactors; Nuclear Fusion; Sun; Hydrogen Burning; Applications of Radioactivity in different fields; Biological effects of Radiation; Introduction to Particle Physics, Standard Model and relativistic kinematics					

PST 31203	Quantum Mechanics	T			
Brief History of Quantum Physics, Photoelectric Effect, Compton Scattering, Photons, Franck-Hertz Experiment, the Bohr Atom, Electron Diffraction, De-broglie Waves and the Wave-particle Duality of Matter and Light, Heisenberg's Uncertainty Principle, Time Dependant Schrödinger equation (T.D.S.E.), Klein–Gordian equation, Time Independent Schrödinger equation (T.I.S.E), Normalization, Discrete Spectrum of Energy, Continuous Spectrum of Energy, Application of (T.I.S.E) to solve some Simple Problems in Quantum Mechanics for a Free Particle and a Particle in One-dimensional					

Potentials (Square, Barrier, etc.) and in Three–Dimensional Potentials, Probability Current Density, Some Applications of the Tunnel Effect in Physics, Hilbert Space, "Ket" and "Bra" Vectors, Matrix Formulation of Quantum Mechanics, Mean Values

PST 31104	Material Physics	T		
Crystalline and Amorphous Solids, Space-Lattice and Primitive Cell, Bravais lattices, Crystal structures (BCC, FCC & HCP), Introduction to Miller indices, Point defects (Vacancy, Interstitial, Frenkel, Substitutional, Colour or F-Centres, Polarons), line imperfection (Edge Dislocation & Screw Dislocation), Burgers Vector and Burgers Circuit, Surface Defects (Grain Boundaries, Tilt Boundaries, Twin Boundaries & Stacking faults), Reciprocal Lattice concept and Ewald's sphere, Superconductivity, Sources of Superconductivity, Meissner Effect, Type I & Type II Superconductors, Super electrons, Cooper Pair, Normal Tunnelling and Josephson Effect, Isotope Effect & High-T_C Superconductivity			

PST 31205	Special Relativity	T		
Introduction, Michelson-Morley Experiment; Einstein's Postulates, Lorentz Transformations, Time Dilation & Proper Time, Simultaneity, Length Contraction & Proper Length, 4–Vectors, Space–Time Interval, Space – time Diagrams, Minkowski Diagrams, Relativistic Velocity Transformations, Thomas Precession, Relativistic Doppler Effect, Relativistic Mass and Energy, Momentum and Energy Transformations, Decay of Elementary Particles				

PST 31206	Optical Fiber & Telecommunication	T		
Classic communication methods and basic optics, structure of optical fibers, attenuation and pulse dispersion, parabolic-index-fibers and material dispersion, single mode fibers and parameters, fiber optic sensors, basics of fiber optic communication, types of fibers and dispersion in fiber optic communication, pulse code modulation and digital encoding, fiber optic sources and cable, fiber optic detectors				

PST 31107	Introduction to Nanotechnology	T		
Brief History of Industrial Revolution, Introduction to Nanotechnology, Understanding the Atom, Length scale, Feynman's Challenges, Importance of One Billionth of a Meter, Definitions of Nanoscale, Nanomaterials and Nanotechnology, Classification of Nanoscale Objects, Surface Effects, Size−dependent Properties, Nanotechnology in Everyday Life, Nanotechnology in Nature, Economics of Nanotechnology, Introduction to Miniaturization, Moor's Law, Scaling Laws in Mechanics, Electricity and Magnetism, Optics, Heat Transfer and in Biology, Quantum Tunnelling of Electrons, Principles, Operation, Image Generation, Applications and Limitations of Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM Scanning Tunnelling Microscopy (STM), and Atomic Force Microscopy (AFM),), Nanofabrication methods: Bottom-up and Top−down Approaches, Self-assembly, Introduction to Lithography				

PST 31108	Physics Laboratory 3-I		P	
AC Circuits, Semiconductor Physics, Geometrical & Physical Optics, Advanced Electronics, Computer Sensors and Arduino				

PST 31209	The Origin and Evolution of the Universe	T		
The expanding Universe emerged from a cataclysmic event called the Big Bang. The universe before recombination, Olbers's paradox, observable universe, the Cosmic Microwave Background and the universe before recombination, Primordial fireball etc, Hubble's law, Hubble diagram, cosmological redshift, cosmological constant, the Plank's time, mass density radiation, the shape of the Universe, Critical density of the universe, density parameters, matter density parameter Ω_m , missing density and dark matter, dark density parameter $\Omega_{A,}$ understanding of accelerating universe through the observation of distant supernovae, how did astronomers first discover other galaxies, how did determine distance to galaxies, how do the spectra of galaxies tell that the universe is expanding, what happen when galaxies collide etc, study about the discovery of Quasars, ultra-luminous galactic nuclei, Seyfert and Radio galaxies, active galaxies, supermassive black hole as central engine, Unified model, Gamma ray bursters, the size and shape of the galaxy, spiral arms, Sun's orbit around the MW, density waves, etc			

PST 31210	Multimedia and Hypermedia Systems Development	T		
Definitions for multimedia, Usage of multimedia, delivering multimedia, Fonts and faces, Using text in multimedia, Font editing and design tools, Hypermedia and Hypertext, Making still images, Bitmaps, Vector-drawing, 3-D drawing and rendering, Understanding natural light, Computerized color, Color palettes. Introduction to image processing, Introduction to audio and video processing and streaming, Practical use of multimedia processing tools				

PST 31211	Mathematical Programming	T		
Constrained Optimization: Linear Programming (Introduction, Mathematical Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)				

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31213	Economics	T		
This course explains both microeconomics concepts and macroeconomics concepts. The theory of consumer behavior, price determination in competitive market, theory of production and cost, profit maximization market models, national income and accounting, income and expenditure equilibrium, inflation, exchange rate policies and money market topics are the major component of this course unit.				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers. Research, Development and Service Laboratories, NERD Centre. Industrial, Scientific and Engineering organizations involve in Computer based technologies.				

PST-EBP-3101	Business English	T		
https://www.sab.ac.lk/app/eltu-curriculum				

For BSc Degree in Physical Sciences (Majoring in Chemical Technology)				
PST 31107	Introduction to Nanotechnology	T		
Brief History of Industrial Revolution, Introduction to Nanotechnology, Understanding the Atom, Length scale, Feynman's Challenges, Definitions of Nanoscale, Nanomaterials and Nanotechnology, Classification of Nanoscale Objects, Surface Effects, Size−dependent Properties, Nanotechnology in Everyday Life, Nature's Nanotechnology, Economics of Nanotechnology, Introduction to Miniaturization, Moor's Law, Scaling Laws in Mechanics, Electricity and Magnetism, Optics, Heat Transfer and in Biology, Quantum Tunnelling of Electrons, Principles, Operation, Image Generation, Applications and Limitations of Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), Nanofabrication methods: Bottom-up and Top-down Approaches, Self-assembly, Introduction to Lithography				

PST 31211	Mathematical Programming	T		
Constrained Optimization: Linear Programming (Introduction, Mathematical				

Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31213	Economics	T		
This course explains both microeconomics concepts and macroeconomics concepts. The theory of consumer behavior, price determination in competitive market, theory of production and cost, profit maximization market models, national income and accounting, income and expenditure equilibrium, inflation, exchange rate policies and money market topics are the major component of this course unit.				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers, salt, milk products, cement, mineral sands, graphite, quartz etc. Research & Development and Service Laboratories,				

PST 31216	Biochemistry – I	T		
Review of cells, Introduction to Biochemistry, Carbohydrates Simple sugars disaccharides, Polysaccharides, Storage and structural polysaccharides, Structure and functions of lipids, Phospholipids, Sphingolipids, Cholesterol, Membrane structure and membrane fluidity, Transport across membranes, Protein structure and function,				

amino acids, Isoelectric points of amino acids and proteins, Primary secondary, tertiary and quaternary structures of proteins, Denaturation of proteins, Structure and function of haemoglobin, Sequencing of amino acids, Vitamins and Cofactors, Enzyme Catalysis, Activation Energy, Enzyme Kinetics

PST 31217	Electroanalytical Techniques	T		

Faraday's law of electrolysis, Strong and weak electrolytes and their conductivity, Kohlrausch's law of independent migration of ions, Determination of ionic concentrations, equilibrium constants and rate constants, Transference numbers, Conductometry and potentiometry, Nernst equation, Concept of e.m.f., Electro chemical cells and applications, Electroanalytical methods; Polarography, cyclic voltammetry, Amperometry, Electro-gravimetry, Coulometry, Electrophoresis, Electrochemical sources of energy, Fuel cells , Electroplating, Electrochemistry of corrosion.

PST 31218	Industrial Chemistry and Technology - II (Inorganic)	T		

Minerals of Sri Lanka: Silica, Quartz, Clay, Mineral Sands, Calcium Carbonate, Dolomite, Apatite, Gems, Graphite, Mica, Iron containing minerals and feldspar. Mineral based industries: Glass, Ceramic, Cement, Fertilizer etc. Mineral processing and extraction. Metallurgical techniques: Hydrometallurgy, Pyrometallurgy, Electrometallurgy. Metallurgy of Iron, Aluminium, Copper, Magnesium, Titanium and Sodium. Introduction to Alloys and their applications. Chemistry and value addition of gems.

PST 31219	Environmental Chemistry	T		

Air pollution: Structure of the atmosphere, Generation of air pollutants and sources, Classes of air pollutants and photochemical smog. Air quality standards, Air quality index (AQI) and air pollution monitoring. Indoor air pollution. Greenhouse effect and global warming. Kyoto protocol, Ozone layer depletion. Acid rain and its environmental consequences.

Water pollution: Pollutants in water and their origin. Water quality standards, analysis of water quality, Water treatment. Eutrophication and algal blooms. Industrial pollutants and industrial pollution control. Pollutants in soil, soil analysis, Health effects of water pollutants

Waste management: Types of wastes, Waste disposal practices (open dumping, sanitary landfills, Incineration, and biogas generation). Special types of wastes and their treatment: hospital, chemical, oil and radioactive wastes. 3R system of waste management, waste as a resource

PST 31120	Coordination Chemistry	T		

Co-ordination complexes, Structures, Stability constants, Chelate effect, Nomenclature, Co-ordination numbers, Coordination geometries, Reaction mechanism, Crystal field theory, Ligand field theory, Valence bond theory, d-orbital splitting in various geometries, Jahn-Teller effects, Consequences of d-orbital splitting (ionic radii, thermodynamic data), Spectra of co-ordination complexes

PST 31121	Laboratory Quality Control and Assurance	T		
Principles of QC (Matrix interference and spike analysis, Precision & accuracy, Blind samples, Sensitivity, Selectivity, Detection limits, Standard reference samples, Control charts, Instrument calibration, SOP, QC plan) Principles of QA (Method validation, Inter laboratory checks, Laboratory plans, QA plans, Data auditing and accreditation), Legal accreditation (ISO, SLS etc.)				

PST 31122	Physical Chemistry Laboratory II		P	
Organic electronic: Preparation of solid-state thin film, Fabrication and characterization of standard organic light emitting diode (OLED), Preparation and characterization of organic solar cells				

PST 31123	Analytical Chemistry Laboratory II		P	
Analytical Instrumentation, Spectroscopic analysis, Electroanalytical methods, Spectroscopic Identification of Organic molecules				

For BSc Degree in Physical Sciences (Majoring in Computer Science & Technology)				
PST 31210	Multimedia and Hypermedia Systems Development	T		
Definitions for multimedia, Usage of multimedia, delivering multimedia, Fonts and faces, Using text in multimedia, Font editing and design tools, Hypermedia and Hypertext, Making still images, Bitmaps, Vector-drawing, 3-D drawing and rendering, Understanding natural light, Computerized color, Color palettes. Introduction to image processing, Introduction to audio and video processing and streaming, Practical use of multimedia processing tools				

PST 31211	Mathematical Programming	T		
Constrained Optimization: Linear Programming (Introduction, Mathematical Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)				

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers. Research, Development and Service Laboratories, NERD Centre. Industrial, Scientific and Engineering organizations involve in Computer based technologies.				

PST 31215	Agile Software Development	T		
Agile and Lean Software Development, Basics and Fundamentals: Values, principles, stakeholders, Lean Approach, Agile and Scrum Principles, Agile Product Management, Agile Requirements, Agile Architecture, Agile Risk Management, Agile Review, Agile Testing, Scaling Agile for large projects.				

PST 31224	Artificial Intelligence & Expert Systems	T		
Artificial intelligence: Intelligent Agents, Search Techniques, Game Playing, Knowledge and Reasoning, First order logic, Logical reasoning systems, Uncertainty, Probabilistic Reasoning, Simple and complex Decisions, Learning. Expert systems: Characteristics and components of Expert systems, Machine learning, Knowledge base and bank, Rule Knowledge, Inference engine, transit fare rule, Rule interpreter, Inference tree				

PST 31225	Software Project Management	T		
Introduction to Software Project Management: Projects and Processes, The Process Framework, project integration Management, Scope Management, Time Management, project cost Management, Quality management, Human Resource Management, Communication Management, Risk Management, project management tools, advanced life cycle models, testing and maintenance and software project documentation and IT Management				

PST 31226	Software Quality Assurances	T		
Introduction to Quality Assurance, Quality Concepts, Software Quality Assurance				

Activities, Software Reviews and their importance Statistical SQA, Software Reliability, ISO 9000 approach to SQA, Software testing tools

PST 31227	Object Oriented Analysis and Design	T		
High level overview of OO Development Process, Use Case/Responsibility Driven Design: Contract based approach, Responsibility identification, Responsibility allocation, Roles, stereotypes and interfaces, Collaborations; CRC cards Object-Oriented Principles: Why OO, Structured Engineering and Information Engineering, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Abstraction, Objects and Classes, Object Relationships, UML Diagramming, Design Patterns, testing objects.				

PST 31128	Computer Laboratory 3-I		P	
Python Basics – variables, identifiers, indentation, conditional, iterative, Data Structures -list , string, sets, tuples, dictionary, Overview of Data Analysis, Python for Data Analysis – NumPy, Pandas, Matplotlib Working with Python AI libraries - Tensorflow, Keras etc. , Develop models and simple applications using AI				

PST 31229	Advanced Database Management Systems	T	P	
Database Design and Implementation: Relational Database Design, Database Implementation & Tools, Advanced SQL, Database System Catalog, DBMS Advance Features: Query Processing & Evaluation, Transaction Management and Recovery, Database Security & Authorization, Distributed Databases: Enhanced Database Models, Object Oriented Databases, Database and XML, Introduction to Data Warehousing, Introduction to Data Mining, Emerging Trends and Example of DBMS Architecture: Emerging Database Models, Technologies and Applications, Big data.				

PST 31230	Social and Professional Issues in Computing	T		
History of computing, social context of computing, methods and tools of analysis, professional and ethical responsibility, risks and liability of computer-based systems, intellectual property, privacy and civil liberties, computer crime, customs and law, economical issues in computing, philosophical frameworks.				

Year III Semester II				
BSc Degree in Physical Sciences (Majoring in Applied Physics)				
PST 32801	Project Work: BSc Thesis in Physical Sciences (Majoring in Applied Physics)			**TH**
Industrial/ laboratory studies on a research problem relevant to Physical Sciences, Students will be required to conduct either research or survey related to physics, chemistry or computer science/ Information Technology either at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted				

by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately

For BSc Degree in Physical Sciences (Majoring in Chemical Technology)				
PST 32802	Project Work: BSc Thesis Physical Sciences (Major in Chemical Technology)			**TH**
Industrial/ laboratory studies on a research problem relevant to Chemical Sciences, Students will be required to conduct either research or survey related to, chemistry either at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately				

For BSc Degree in Physical Sciences (Majoring in Computer Science and Technology)				
PST 32803	Project Work: BSc Thesis in Physical Sciences (Majoring in Computer Science & Technology)			TH
Industrial/ laboratory studies on a research problem relevant to Physical Sciences, Students will be required to conduct either research or survey related to computer science at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately				

HONOURS DEGREE COURSE UNITS					
Year III Semester I					
BSc Honours in Applied Physics					
PST 31201	Solid State Physics	T			
Crystal Lattice & Translation Vectors, Symmetry Operations, Type of Lattices, Bravais lattice, Lattice Directions and Planes, Miller index, Inter-planar Spacing, Packing density, Simple crystal structures (close & loose packed), X-Ray diffraction, Bragg's law, The Von Laue treatment, X-Ray diffraction methods (Laue's, Rotary crystal & Powder methods), Atomic scattering factor, Geometrical structure factor & its applications to crystals, Lattice vibrations (Mono-atomic Lattice & Diatomic Lattice), Phonons, and Various theories of lattice specific heat (Classical theory, Einstein's theory)					

PST 31202	Nuclear Physics and Application	T		
General Survey of Radioactive Decay, Radioactivity, Rutherford Scattering, Discovery of the Neutron, Stable and unstable nuclei, Degree of Instability (Radioactive Half Life), Radioactive equilibrium; Binding Energies of Nuclei in their Ground States; Semi Empirical Mass Formula; Systematic of Beta Decay, Fermi Theory of Beta Decay; Theory of Alpha Decay; Theory of Gamma decay, Electron Capture, Auger Effect, Experiments on the Neutrino; Liquid Drop Model; Nuclear Potential Well, Introduction to Shell Model; Magic Numbers; Energy levels of the Shell theory potential; Nuclear Reactions; Conservation Laws; Nuclear Fission; Induced Fission; Chain reactions; Cross-section and differential cross-section; Nuclear Reactors; Nuclear Fusion; Sun; Hydrogen Burning; Applications of Radioactivity; Biological effects of Radiation; Introduction to Particle Physics, Standard Model and relativistic kinematics				

PST 31203	Quantum Mechanics	T		
Brief History of Quantum Physics, Photoelectric Effect, Compton Scattering, Photons, Franck-Hertz Experiment, the Bohr Atom, Electron Diffraction, De-broglie Waves and the Wave-particle Duality of Matter and Light, Heisenberg's Uncertainty Principle, Time Dependant Schrödinger equation (T.D.S.E.), Klein–Gordian equation, Time Independent Schrödinger equation (T.I.S.E), Normalization, Discrete Spectrum of Energy, Continuous Spectrum of Energy, Application of (T.I.S.E) to solve some Simple Problems in Quantum Mechanics for a Free Particle and a Particle in One-dimensional Potentials (Square, Barrier, etc.) and in Three–Dimensional Potentials, Probability Current Density, Some Applications of the Tunnel Effect in Physics, Hilbert Space, "Ket" and "Bra" Vectors, Matrix Formulation of Quantum Mechanics, Mean Values				

PST 31104	Material Physics	T		
Crystalline and Amorphous Solids, Space-Lattice and Primitive Cell, Bravais lattices, Crystal structures (BCC, FCC & HCP), Introduction to Miller indices, Point defects (Vacancy, Interstitial, Frenkel, Substitutional, Colour or F-Centres, Polarons), line imperfection (Edge Dislocation & Screw Dislocation), Burgers Vector and Burgers Circuit, Surface Defects (Grain Boundaries, Tilt Boundaries, Twin Boundaries & Stacking				

faults), Reciprocal Lattice concept and Ewald's sphere, Superconductivity, Sources of Superconductivity, Meissner Effect, Type I & Type II Superconductors, Super electrons, Cooper Pair, Normal Tunnelling and Josephson Effect, Isotope Effect & High-T_C Superconductivity

PST 31205	Special Relativity	T		

Introduction, Michelson-Morley Experiment; Einstein's Postulates, Lorentz Transformations, Time Dilation & Proper Time, Simultaneity, Length Contraction & Proper Length, 4–Vectors, Space–Time Interval, Space – time Diagrams, Minkowski Diagrams, Relativistic Velocity Transformations, Thomas Precession, Relativistic Doppler Effect, Relativistic Mass and Energy, Momentum and Energy Transformations, Decay of Elementary Particles

PST 31206	Optical Fiber & Telecommunication	T		

Classic communication methods and basic optics, structure of optical fibers, attenuation and pulse dispersion, parabolic-index-fibers and material dispersion, single mode fibers and parameters, fiber optic sensors, basics of fiber optic communication, types of fibers and dispersion in fiber optic communication, pulse code modulation and digital encoding, fiber optic sources and cable, fiber optic detectors

PST 31107	Introduction to Nanotechnology	T		

Brief History of Industrial Revolution, Introduction to Nanotechnology, Understanding the Atom, Length scale, Feynman's Challenges, Importance of One Billionth of a Meter, Definitions of Nanoscale, Nanomaterials and Nanotechnology, Classification of Nanoscale Objects, Surface Effects, Size−dependent Properties, Nanotechnology in Everyday Life, Nanotechnology in Nature, Economics of Nanotechnology, Introduction to Miniaturization, Moor's Law, Scaling Laws in Mechanics, Electricity and Magnetism, Optics, Heat Transfer and in Biology, Quantum Tunnelling of Electrons, Principles, Operation, Image Generation, Applications and Limitations of Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM Scanning Tunnelling Microscopy (STM), and Atomic Force Microscopy (AFM),), Nanofabrication methods: Bottom-up and Top-down Approaches, Self-assembly, Introduction to Lithography

PST 31108	Physics Laboratory 3-I		P	

AC Circuits, Semiconductor Physics, Geometrical & Physical Optics, Advanced Electronics, Computer Sensors and Arduino

PST 31209	The Origin and Evolution of the Universe	T		

The expanding Universe emerged from a cataclysmic event called the Big Bang. The universe before recombination, Olbers's paradox, observable universe, the Cosmic Microwave Background and the universe before recombination, Primordial fireball etc, Hubble's law, Hubble diagram, cosmological redshift, cosmological constant, the Plank's time, mass density radiation, the shape of the Universe, Critical density of the universe, density parameters, matter density parameter Ωm , missing density and dark matter,

dark density parameter ΩA, understanding of accelerating universe through the observation of distant supernovae, how did astronomers first discover other galaxies, how did determine distance to galaxies, how do the spectra of galaxies tell that the universe is expanding, what happen when galaxies collide etc, study about the discovery of Quasars, ultra-luminous galactic nuclei, Seyfert and Radio galaxies, active galaxies, supermassive black hole as central engine, Unified model, Gamma ray bursters, the size and shape of the galaxy, spiral arms, Sun's orbit around the MW, density waves, etc

PST 31210	Multimedia and Hypermedia Systems Development	T		

Definitions for multimedia, Usage of multimedia, delivering multimedia, Fonts and faces, Using text in multimedia, Font editing and design tools, Hypermedia and Hypertext, Making still images, Bitmaps, Vector-drawing, 3-D drawing and rendering, Understanding natural light, Computerized color, Color palettes. Introduction to image processing, Introduction to audio and video processing and streaming, Practical use of multimedia processing tools

PST 31211	Mathematical Programming	T		

Constrained Optimization: Linear Programming (Introduction, Mathematical Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)

PST 31212	Numerical Methods	T		

Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution

of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)

PST 31213	Economics	T		
This course explains both microeconomics concepts and macroeconomics concepts. The theory of consumer behavior, price determination in competitive market, theory of production and cost, profit maximization market models, national income and accounting, income and expenditure equilibrium, inflation, exchange rate policies and money market topics are the major component of this course unit.				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers. Research, Development and Service Laboratories, NERD Centre. Industrial, Scientific and Engineering organizations involve in Computer based technologies.				

BSc Honours in Chemical Technology				
PST 31107	Introduction to Nanotechnology	T		
Brief History of Industrial Revolution, Introduction to Nanotechnology, Understanding the Atom, Length scale, Feynman's Challenges, Definitions of Nanoscale, Nanomaterials and Nanotechnology, Classification of Nanoscale Objects, Surface Effects, Size−dependent Properties, Nanotechnology in Everyday Life, Nature's Nanotechnology, Economics of Nanotechnology, Introduction to Miniaturization, Moor's Law, Scaling Laws in Mechanics, Electricity and Magnetism, Optics, Heat Transfer and in Biology, Quantum Tunnelling of Electrons, Principles, Operation, Image Generation, Applications and Limitations of Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), Nanofabrication methods: Bottom-up and Top-down Approaches, Self-assembly, Introduction to Lithography				

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31213	Economics	T		
This course explains both microeconomics concepts and macroeconomics concepts. The theory of consumer behavior, price determination in competitive market, theory of production and cost, profit maximization market models, national income and accounting, income and expenditure equilibrium, inflation, exchange rate policies and money market topics are the major component of this course unit.				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers, salt, milk products, cement, mineral sands, graphite, quartz etc. Research & Development and Service Laboratories,				

PST 31216	Biochemistry – I	T		
Introduction to Biochemistry, Review of cells: Organization of Eukaryotic cell structure and the functions of subcellular components, Importance of unique properties of water in biological systems. pH and buffers, Importance of buffering action in biological systems in maintaining structural and functional properties. The structure and function of Carbohydrates: Simple sugars, disaccharides, Polysaccharides, Storage and structural polysaccharides, Structure and functions of lipids: Phospholipids, Sphingolipids, Cholesterol, Membrane structure and membrane fluidity, Transport across membranes, Protein structure and function: amino acids, Isoelectric points of amino acids and proteins, Primary secondary, tertiary and quaternary structures of proteins, Denaturation of proteins, The structure and function of nucleic acid, Vitamins and coenzymes: structure and functions, Enzyme biochemistry: Enzyme Catalysis, kinetics of inhibition				

PST 31217	Electroanalytical Techniques	T		
Faraday's law of electrolysis, Strong and weak electrolytes and their conductivity, Kohlrausch's law of independent migration of ions, Determination of ionic concentrations, equilibrium constants and rate constants, Transference numbers, Conductometry and potentiometry, Nernst equation, Concept of e.m.f., Electro chemical cells and applications, Electroanalytical methods; Polarography, cyclic voltammetry, Amperometry, Electro-gravimetry, Coulometry, Electrophoresis, Electrochemical sources of energy, Fuel cells , Electroplating, Electrochemistry of corrosion.				

PST 31218	Industrial Chemistry and Technology - II (Inorganic)	T		
Minerals of Sri Lanka (Silica, Clay, Mineral Sands, Calcium Carbonate, Dolomite, Apatite, Gems, Graphite, Iron containing minerals), Mineral based industries (Glass, Ceramic, Cement, Fertilizer etc), Mineral processing and extraction, Metallurgical techniques such as hydrometallurgy, pyrometallurgy, electrometallurgy, metallurgy of Iron, Aluminium, Copper, Magnesium, and Sodium. Introduction to Alloys and their applications, Chemistry, and value addition of gems.				

PST 31219	Environmental Chemistry	T		
Air pollution: Structure of the atmosphere, Generation of air pollutants and sources, Classes of air pollutants and photochemical smog. Air quality standards, Air quality index (AQI) and air pollution monitoring. Indoor air pollution. Greenhouse effect and global warming. Kyoto protocol, Ozone layer depletion. Acid rain and its environmental consequences. Water pollution: Pollutants in water and their origin. Water quality standards, analysis of water quality, Water treatment. Eutrophication and algal blooms. Industrial pollutants and industrial pollution control. Pollutants in soil, soil analysis, Health effects of water pollutants Waste management: Types of wastes, Waste disposal practices (open dumping, sanitary landfills, Incineration, and biogas generation). Special types of wastes and their treatment: hospital, chemical, oil and radioactive wastes. 3R system of waste management, waste as a resource				

PST 31120	Coordination Chemistry	T		
Co-ordination complexes, Structures, Stability constants, Chelate effect, Nomenclature, Co-ordination numbers, Coordination geometries, Reaction mechanism, Crystal field theory, Ligand field theory, Valence bond theory, d-orbital splitting in various geometries, Jahn-Teller effects, Consequences of d-orbital splitting (ionic radii, thermodynamic data), Spectra of co-ordination complexes				

PST 31121	Laboratory Quality Control and Assurance	T		
Principles of QC (Matrix interference and spike analysis, Precision & accuracy, Blind samples, Sensitivity, Selectivity, Detection limits, Standard reference samples, Control charts, Instrument calibration, SOP, QC plan) Principles of QA (Method validation, Inter laboratory checks, Laboratory plans, QA plans, Data auditing and accreditation), Legal accreditation (ISO, SLS etc.)				

PST 31122	Physical Chemistry Laboratory II		P	
Organic electronic: Preparation of solid-state thin film, Fabrication and characterization of standard organic light emitting diode (OLED), Preparation and characterization of organic solar cells. Computer application in physical chemistry				

PST 31123	Analytical Chemistry Laboratory II		P	
Analytical Instrumentation, Spectroscopic analysis, Electroanalytical methods, Spectroscopic Identification of Organic molecules				

BSc of Science Honours in Computer Science and Technology				
PST 31210	Multimedia and Hypermedia Systems Development	T		
Definitions for multimedia, Usage of multimedia, delivering multimedia, Fonts and faces, Using text in multimedia, Font editing and design tools, Hypermedia and Hypertext, Making still images, Bitmaps, Vector-drawing, 3-D drawing and rendering, Understanding natural light, Computerized color, Color palettes. Introduction to image processing, Introduction to audio and video processing and streaming, Practical use of multimedia processing tools				

PST 31211	Mathematical Programming	T		
Constrained Optimization: Linear Programming (Introduction, Mathematical Modelling of Problems, Feasible Solution, Optimal (Optimum) Solution, Basic Feasible Solution, Basic Variables, Non-Degenerate Basic Feasible Solution, Degenerate Basic Feasible Solution, Convex Sets, Graphical Method, Simplex Methods, Development of Simplex Technique, Artificial Variables, Charne's Method of Penalties, Problem of Degeneracy, Duality of Linear Programming, Interpretation and Properties of Dual), Integer Programming (Introduction, Method of Solution, Gomory's Method of all Integer Programming Problem, Branch and Bound Method) Transportation Technique (Introduction, Mathematical Formulation, The initial Basic Feasible Solution, North-West Corner Rule, Row Minima and Column Minima Method, Matrix Minima Method, Vogel's Approximation Method, Optimal Basic Feasible Solution, Stepping Stone Method, Modi Method) Assignment Models (Introduction, Hungarian Method, Balanced and Unbalanced Assignment Problems), Unconstrained Optimization: Functions of One Variable (Derivatives, Maximum and Minimum, Binary Search, Convexity), Functions of Several Variables (Gradient, Maximum and Minimum, Global Optima)				

PST 31212	Numerical Methods	T		
Errors in Computation (Representational error, Computational error – relative and absolute, Computer rounding approaches), Taylor Series representation of a function (Error term in the representation, Properties of alternating series, Appropriate and inappropriate applications), Finding Roots of Equations (Bisection method, Newton's method, Secant method, Analysis of convergence for each technique), Interpolation (Lagrange's interpolation, Newton's form for the interpolating polynomial, Hermite Interpolation, Divided differences algorithm, Inverse interpolation, Errors in interpolation, Theorems regarding error, Derivatives and divided differences), Solution of Linear System of Equations (Gaussian elimination, Gauss-Seidel method, Jacobi method)				

PST 31014	Industrial Visits			F
Industrial visits (3) covering various chemical industries such as Sugar Cane, Glass, Rubber, Fertilizers. Research, Development and Service Laboratories, NERD Centre.				

Industrial, Scientific and Engineering organizations involve in Computer based technologies.

PST 31215	Agile Software Development	T		

Agile and Lean Software Development, Basics and Fundamentals: Values, principles, stakeholders, Lean Approach, Agile and Scrum Principles, Agile Product Management, Agile Requirements, Agile Architecture, Agile Risk Management, Agile Review, Agile Testing, Scaling Agile for large projects.

PST 31224	Artificial Intelligence & Expert Systems	T		

Artificial intelligence: Intelligent Agents, Search Techniques, Game Playing, Knowledge and Reasoning, First order logic, Logical reasoning systems, Uncertainty, Probabilistic Reasoning, Simple and complex Decisions, Learning. Expert systems: Characteristics and components of Expert systems, Machine learning, Knowledge base and bank, Rule Knowledge, Inference engine, transit fare rule, Rule interpreter, Inference tree

PST 31225	Software Project Management	T		

Introduction to Software Project Management: Projects and Processes, The Process Framework, project integration Management, Scope Management, Time Management, project cost Management, Quality management, Human Resource Management, Communication Management, Risk Management, project management tools, advanced life cycle models, testing and maintenance and software project documentation and IT Management

PST 31226	Software Quality Assurances	T		

Introduction to Quality Assurance, Quality Concepts, Software Quality Assurance Activities, Software Reviews and their importance Statistical SQA, Software Reliability, ISO 9000 approach to SQA, Software testing tools

PST 31227	Object Oriented Analysis and Design	T		

High level overview of OO Development Process, Use Case/Responsibility Driven Design: Contract based approach, Responsibility identification, Responsibility allocation, Roles, stereotypes and interfaces, Collaborations; CRC cards Object-Oriented Principles: Why OO, Structured Engineering and Information Engineering, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Abstraction, Objects and Classes, Object Relationships, UML Diagramming, Design Patterns, testing objects.

PST 31128	Computer Laboratory 3-I		P	

Python Basics – variables, identifiers, indentation, conditional, iterative, Data Structures -list , string, sets, tuples, dictionary, Overview of Data Analysis, Python for Data Analysis – NumPy, Pandas, Matplotlib

Working with Python AI libraries - Tensorflow, Keras etc. , Develop models and simple applications using AI

PST 31230	Social and Professional Issues in Computing	T		
History of computing, social context of computing, methods and tools of analysis, professional and ethical responsibility, risks and liability of computer-based systems, intellectual property, privacy and civil liberties, computer crime, customs and law, economical issues in computing, philosophical frameworks.				

Year III Semester II				
BSc Honours in Applied Physics				
PST 32201	Statistical Physics	T		
Introduction, Concept of Probability, Statistical Distribution, Mean Free Path & its Microscopic Calculation, Temperature and Thermal Equilibrium, Zeroth Law, Measuring Temperature, Kinetic Theory and the Ideal Gas, Equation of State, Ideal Gas Model, Work Done on an Ideal Gas (Constant Volume, Constant Pressure, Constant Temperature & Thermal Isolation), Internal Energy of an Ideal Gas, Heat Capacity & Specific Heat (at Constant Volume & Pressure), First Law of Thermodynamics & its Applications, Reversible & Irreversible Process, Heat Engine & Second Law, Refrigerator & Second Law, Carnot Cycle, Carnot Theorem and the Second Law, Absolute Zero Temperature, Entropy, Macroscopic and Microscopic States, Classical and Quantum Statistics, Maxwell−Boltzmann Statistics (Distribution of Speed, Distribution of Energies), Fermi−Dirac Statistics & Bose−Einstein Statistics				

PST 32102	Interaction of Radiation with Matter	T		
Introduction to interaction of radiation with matter, Photoelectric effect, Thomson Scattering, Compton effect, pair creation, photonuclear effect, attenuation, Interaction of electrons with matter, Interaction of heavy charged particles with matter, X-rays, Radiation protection basics, Introduction to particle detectors, Applications in interaction of radiation with matter				

PST 32203	Atmospheric Physics	T		
Introduction: Composition of the Atmosphere and its Vertical Structure Basics of Atmospheric Thermodynamics: The Gas Laws, Hydrostatic Equation and its Applications, The First Law of Thermodynamics, Work Heat, Adiabatic Processes, Second Law of Thermodynamics and its Applications in Atmospheric Science. Thermodynamics of Moist Air: Thermal Properties of Water Substance, Equation of State, Phase Change and Latent Heats, Vapour Pressure and Clausius–Clapeyron Equation, Adiabatic Process of Saturated Air, Thermodynamic Diagrams (e.g., Skew-T log-P diagram) Atmospheric Stability:				

Upper Air Soundings, Dry and Moist Adiabatic Lapse Rates and Static Stability
Fundamentals of Radiation:
Spectrum of Electromagnetic Radiation, Black–Body Radiation: Planck Function, Absorptivity and Emissivity. Wien's Displacement Law, Stefan-Boltzmann Law, Kirchhoff's Law, Physics of Scattering (Rayleigh and Mie) and Absorption and Emission, Atmospheric Phenomena (Rainbows, Blue and Red Skies etc.)
Applications of Radiation in the Earth-Atmosphere System:
Latitudinal and Seasonal Distribution of Solar Radiation, Radiative Heating and Cooling in Clouds, Atmospheric Absorption of Solar Radiation, Atmospheric Absorption and Emission of Infrared Radiation, Atmospheric Energy Balance and Greenhouse Effect
Properties of Cloud Particles:
Atmospheric Aerosols, Intermolecular Forces and Surface Tension, Equilibrium Vapour Pressure over Ice and Water Surfaces, Equilibrium Vapour Pressure over a Curved Surface, Condensation Nuclei and Equilibrium Vapour Pressure over a Solution, Formation and Growth of Cloud Droplets, classifications of basic types of clouds, Rain Formation, Ice Formation, Change Separation in Clouds and Lightning Discharges

PST 32104	Advanced Electronics	T		

Latches & Flip-Flops (S-R, J-K, D & Master), Shift Registers (Serial in-serial out, Serial in-parallel out, Parallel in-serial out & Parallel in-parallel out), Asynchronous & Synchronous Counters (MOD 8, MOD 16 & MOD 10), Alternative Representation of Logic Gates, Digital Arithmetic (Binary Addition, Subtraction using 2s Complement System & Multiplication with their Circutrary Diagrams), Decoders (BCD to Decimal, BCD to Seven Segment), Encoders, BCD Code & ASCII Code, Multiplexer, Analysis of Sequential Logic Circuits, Transition Tables, Sequential Circuit Design, Excitation Tables, Field Effect Transistors (FET), JFET & MOSFETS, FET Amplifiers, Data Busing, and Introduction to Memory Devices

PST 32205	Solid State Devices	T		

Physical Electronics & Devices, Electronic Properties of Materials, Solid State Electronic Devices, Optoelectronics, Microelectronic Technology and Applications of solid state devices in the Industry.

PST 32206	Astrophysics	T		

Classification Systems for Stars, Physical Parameters of Stars (Surface Intensities, Fluxes, Surface Flux and the Effective Temperature, Flux and the Anisotropy of the Radiation Field, Radiation Density), Principles and Theories of Star Formation, Stellar Interior Modelling, What powers the stars, What does hold a star up (Different Absorption Processes for Hydrogen, Boltzmann Formula, Saha Equation, H absorption coefficient in the Sun, Helium Absorption in the Sun, Metallic Absorption in the Sun, Scattering by Atoms and lons, Thomson Scattering by Free Electrons, Absorption Coefficients), Stellar interior and Atmosphere Modelling (Radiative Energy Transport through a Gas Volume with Absorption and Emission, Source Function, Absorption versus Emission Lines, Radiative Transfer Equation, Surface Intensities, Plane Parallel Atmosphere, Grey

Atmosphere, Local Thermodynamic Equilibrium (LTE), , Effects of Radiation Pressure, Formation of Optically thin Lines, Line Absorption Coefficient, Doppler Profile, Voigt Profile, Line Broadening due to Turbulent Motions, Other Distortions of the Line Profiles, Equivalent Widths for (Optically Thin Lines, Optically Thick Lines, Curve of Growth, Hydrogen Lines), Introduction of Hertzprung –Russell (HR) Diagram, Main Sequence Evolution of the Stars, Introduction of Variable, Binary Stars and their Properties, End Product of Star Evolution (White Dwarf/ Planetary Nebula, Neutrons Stars and Supernovae Type II, Concept of Black Holes)

PST 32207	Atomic and Molecular Spectroscopy	T		

Atomic Spectra

Energy Levels in Free Ions, Quantum Numbers, Pauli Exclusion Principle, Russel-Saunders Coupling, JJ-coupling, Multi Electron Atom and the Vector Model of the Atom, Hund's Rules for finding the Ground Term of a given Configuration, Lande Interval Rule, Selection Rules for Electric-dipole Transitions, Zeeman Splitting, Stark Splitting. Energy Levels of an Ion in a Crystal Field, Crystal-field Splitting d- and f- levels in a Cubic Crystal Feld

Molecular Spectra

Fundamentals–Rules and Principles, Separation of Molecular Energy – electronic, Vibrational and Rotational, Molecules in Rotation and Infrared Spectroscopy, Rotational Selection Rules, Experimental Methods and Centrifugal Distortion, Molecular Vibration and Infrared Spectroscopy, Vibrational Selection Rules, An-harmonic Oscillators, Frequency of Overtones, Vibrational-Rotational Fine Structure and Experimental Techniques, Raman Effect, Classical and Quantum Mechanical Description, Selection Rules, Depolarization Ratios, Experimental Methods. Vibration of Polyatomic Molecules, Introduction to Symmetry, Electronic Spectra, Frank-Condon Principle, Selection Rules

PST 32108	Current Topics in Physics (Solar Cells)	T		

Introduction, History, Thin Film Solar Cell Technology, Synthesis and Preparation of Semiconductor Films (Physical Vapour Deposition, Chemical Vapour Deposition, Molecular Beam Epitaxy, Sputtering, Chemical Deposition, Electrochemical Deposition, Spray Pyrolysis Deposition & Sol−gel method), Fundamentals of Photovoltaic Conversion, p−n Junction, Drift Current & Diffusion Current, Fill Factor, IPCE, Equivalent Circuit of a Solar Cell, Interfaces (Homo−Junction, Schottky−Junction & Hetero−Junction), Composite Semiconductor Nano−cluster and Quantum Well, Dye−sensitized Solar Cells (History, Theoretical Aspect, Dye−sensitized Solid-state & Electrochemical Photovoltaic Solar Cells, Hot Carrier Generation), Roughness Factor, Porosity, Finding the Band Gap and Band Edge Position, Transient Photocurrent, Fluorescence Spectrum, Dark I−V Measurements, Fourier Transform Infrared (FTIR) Spectroscopy, Scanning Electron Microscope (SEM), Transmission Electron Microscopy (TEM) and Scanning Probe Microscopy (SPM)

PST 32109	Human Resource Management	T		
Human resource management (HRM) and its environment, the importance of effective HRM, Strategic Human Resource Management (SHRM), HRM goals, HRM functions; Job designing, Job analysis, HR planning, Recruitment, Selection, Hiring and contract of employment, Orientation, Training and development, Performance appraisal, Reward management, Grievance handling, Disciplinary management, Labour manager relations, Termination of employment.				

PST 32210	Statistics in Quality Control	T	P	
Introduction to Modern Quality Management and Improvement, Statistical Process Control, Control Charts: Control charts for Attributes (p-chart, c-chart, and u-chart), Control chart for variables (X-bar & R chart and X-bar & S chart), OC curve, and Process Capability Analysis. Acceptance Sampling Procedures: Single sampling plan for attributes, Double Sampling Plan for attributes, and Sequential Sampling by Variables. Quality Standards: ISO 9000 (QMS), ISO 14000 (EMS), 5S & KIZEN, TQM, Six Sigma and Lean, Introduction to Operations Research , Analysis the real world data by using statistical software and interpret the results, Group Research Assignment on Statistical Process Control				

PST 32111	Physics Laboratory 3 – II		P	
AC Circuits, Semiconductor Physics, Geometrical & Physical Optics, Advanced Electronics, Computer Sensors and Arduino				

PST 32212	Graph Theory	T		
Graphs and Digraphs (Graphs isomorphism, Subgraphs, Degrees, Indegrees, and outdegrees, Adjacency and Incidence matrices), Connectivity (Paths, Circuits and Cycles, Connected Graphs and Digraphs, trees and spanning trees, Eulerian and Hamiltonian Graphs), Optimization Involving Trees (Minimum weight spanning trees, Minimum weight branching, Matroids and the Greedy algorithm, Shortest path Problems, Flows and connectivity, Matching and Factors), Graph Embedding (Planer graph and duality, Hamiltonian plane graph), Colouring of Graphs (Vertex colouring, Edge colouring, colouring of planer graphs)				

PST 32213	Resource Efficient and Cleaner Production	T		F
Metrics of resource consumption (ecological footprint, water footprint (ISO 14046) and carbon footprint (ISO 14064)), Principles of Cleaner Production (CP), Introduction to CP auditing, Introduction to ergonomics, Introduction to Green Productivity (GP) Management system elements according to ISO 14001, Occupational health and safety management, ISO 45001, Quality management, ISO 9000 standards, Environment Performance measurements, Green reporting, Resource efficiency indicators, Benchmarking, Circular economy, Life cycle thinking, Biomimetics, Eco design, Environmental auditing and compliance, Environmental accounting, Chemical management				

BSc Honours Degree in Chemical Technology				
PST 32109	Human Resource Management	T		
Human resource management (HRM) and its environment, the importance of effective HRM, Strategic Human Resource Management (SHRM), HRM goals, HRM functions; Job designing, Job analysis, HR planning, Recruitment, Selection, Hiring and contract of employment, Orientation, Training and development, Performance appraisal, Reward management, Grievance handling, Disciplinary management, Labour manager relations, Termination of employment				

PST 32210	Statistics in Quality Control	T		
Introduction to Modern Quality Management and Improvement, Statistical Process Control, Control Charts: Control charts for Attributes (p-chart, c-chart, and u-chart), Control chart for variables (X-bar & R chart and X-bar & S chart), OC curve, and Process Capability Analysis. Acceptance Sampling Procedures: Single sampling plan for attributes, Double Sampling Plan for attributes, and Sequential Sampling by Variables. Quality Standards: ISO 9000 (QMS), ISO 14000 (EMS), 5S & KIZEN, TQM, Six Sigma and Lean, Introduction to Operations Research, Analysis the real world data by using statistical software and interpret the results, Group Research Assignment on Statistical Process Control			

PST 32213	Cleaner Production & Green Productivity	T		
Metrics of resource consumption (ecological footprint, water footprint (ISO 14046) and carbon footprint (ISO 14064)), Principles of Cleaner Production (CP), Introduction to CP auditing, Introduction to ergonomics, Introduction to Green Productivity (GP) Management system elements according to ISO 14001, Occupational health and safety management, ISO 45001, Quality management, ISO 9000, Environment Performance measurements, Green reporting, Resource efficiency indicators, Benchmarking, Circular economy, Life cycle thinking, Biomimetics, Eco design, Environmental auditing and compliance, Environmental accounting, Chemical management			

PST 32214	Chemistry of Drug Design and Drug Action	T		
History of Medicinal Chemistry, Comparison of Traditional medicine and western Medicine, Chemical Modification of Drugs, Introduction to the pharmacokinetics process of a Drug (Absorption, Distribution metabolism and excretion (ADME) of a drug. Types of receptors, Enzymes as sites for drug action. Types of receptor-drug interaction. Dose–response curves, stereochemistry and drug action, Structural activity relationship (SAR) and drug design including, antipyretic, analgesics, NSAIDs, Opiate, antihistamines, anesthetics and antibiotics. Clinical Trials (stages, ethics, controls)			

PST 32215	Polymer Chemistry & Technology	T		
Introduction: Basic concepts, Properties and characterization of polymers , Types of polymers, Types of polymerization, Properties of polymers and specific uses, Synthetic polymers (Polystyrene and Styrene co-polymers, Dyes and related polymers, Acrylic				

polymers, Polyethers, Polyamides, Poly esters), Natural polymers (Rubber, Cellulose etc.), Processing of polymers, Polymer based industries, Polymer classification based on mechanical and thermal properties, Glass transition temperature (Tg) of a polymer, determination of Tg, Molecular weight of polymers, Number and Weight average molecular weight, Methods of molecular weight determination of polymers (Osmometry, light scattering, end group analysis, size exclusion chromatography), Molecular interactions in polymers, Solubility of polymers, Optical polymers, Mechanism of addition polymerization (Free radical, ionic, coordination), Polymer kinetics, Carother's equation for linear and non-linear step-growth polymerization, Polymer fabrication, Natural rubber products, Applications of polymers, Biodegradable polymers

PST 32216	Surface and Colloid Chemistry	T		

Introduction to surface phenomenon, Adsorption & absorption, Surface tension, Kelvin equations, and its application, Physisorption & Chemisorption, Sticking probability, Condensation coefficient, absorption theories, determination of surface area and molecular cross section (Langmuir methods, Gibbs adsorption isotherms) Colloidal systems, Electrophoresis & isolelectric points, Electrical double layer theory, Surfactants and their applications

PST 32217	Biochemistry II	T		

Regulation of the central metabolic pathways: Glucose metabolism, Glycolysis, Gluconeogenesis, Pentose Phosphate Pathway, The Citric acid cycle, Metabolic regulation of glucose, Glycogen metabolism, Electron Transport chain and Oxidative phosphorylation, Photosynthesis (light reactions and Calvin cycle). Amino acid metabolism: Essential, non-essential amino acids, Biosynthesis of nonessential amino acids, Amino acid catabolism, Urea cycle, Genetic diseases/disorders associated with Amino acid metabolism, Lipid metabolism: Lipid transport, Biosynthesis of fatty acids, Metabolism of odd chain, even chain fatty acids

PST 32118	Advanced Organic Chemistry	T		

Structure and reactivity: Hammond's postulate, Free energy diagrams. Linear free energy relationships. Kinetic isotope effect: Primary and secondary effects. Pericyclic reactions: Molecular orbital theory, Woodward-Hoffmann rules, Electrocyclic reactions, Correlation diagrams, Cycloadditions, Sigmatropic rearrangements, Stereochemistry.

PST 32119	Introduction to Organic electronics	T		

The Fermi-Dirac distribution, Semi-conductors, Organic polymers, Conducting polymers and their applications, Solid state batteries, Nanostructures, Semiconductor catalysts, Photochemical solar cells, Photovoltaic solar cells.

PST 32220	Structures and Properties of Solids	T	P	
Crystal Lattice: Seven crystal systems, Bravais Lattice, Reciprocal Lattice, Miller Indices, Interplanar spacing, Packing Density, Screening constants and effective nuclear charge. Ionic radii. Radius ratio and coordination number. Lattice energy formulae. X-ray Diffraction: X-ray generation, Single Crystal and Powder Diffraction techniques, Bragg's Law, Structure determination and refinement using XRD data and applications. Types of crystal structures: Rock salt, Zinc blende, CsCl, etc.				

PST 32121	Advanced Inorganic Chemistry Laboratory		P	
Experiments in inorganic chemistry, Thermodynamics and kinetics of transition metal ion complexes, X-ray diffraction, Crystal field theory, Non-aqueous solvent titrations, Ion exchange chromatography, Solid state synthesis, Synthesis of nitrogen doped carbon catalysts, Value addition of gems.				

PST 32122	Biochemistry Laboratory		P	
Writing a Biochemistry related research paper, Usage of micropipette, Buffer Preparation, Tests for carbohydrate, proteins and lipids, Titration curve to determine pKa, Separation of lipids from carbohydrates and identification of carbohydrates by TLC method, Calculation of glucose concentration in samples by UV/VIS Spectroscopic method, DNA Extraction, Polymerase Chain Reaction (PCR), Agarose gel electrophoresis, Analysis of Proteins, Subcellular fractionation and protein purification, Ammonium sulfate precipitation, SDS-PAGE Analysis.				

PST 32223	Organometallic Chemistry	T		
Organo transition metal chemistry; Eighteen electron rule, Classification of Ligands, Metal Ligand Binding (Carbon Monoxide, Dinitrogen, Olefins, Acetylenes, Nitric Oxide, Isocyanides, Carbenes, Carbynes) Reactivity, Patterns, Metal centered organometallic Reactions & (Oxidative Addition, Reductive Eliminations, Substitution reactions), Ligand modification Reactions (Insertion Reaction, Nucleophilic addition & abstraction, Electrophilic addition & abstraction), Homogeneous catalysis, Organometallic compounds as catalysts in industrial chemistry.				

BSc Honours Degree in Computer Science & Technology				
PST 32109	Human Resource Management	T		
Human resource management (HRM) and its environment, the importance of effective HRM, Strategic Human Resource Management (SHRM), HRM goals, HRM functions; Job designing, Job analysis, HR planning, Recruitment, Selection, Hiring and contract of employment, Orientation, Training and development, Performance appraisal, Reward management, Grievance handling, Disciplinary management, Labour manager relations, Termination of employment.				

PST 32210	Statistics in Quality Control	T		
Introduction to Modern Quality Management and Improvement, Statistical Process Control, Control Charts: Control charts for Attributes (p-chart, c-chart, and u-chart), Control chart for variables (X-bar & R chart and X-bar & S chart), OC curve, and Process Capability Analysis. Acceptance Sampling Procedures: Single sampling plan for attributes, Double Sampling Plan for attributes, and Sequential Sampling by Variables. Quality Standards: ISO 9000 (QMS), ISO 14000 (EMS), 5S & KIZEN, TQM, Six Sigma and Lean, Introduction to Operations Research , Analysis the real world data by using statistical software and interpret the results, Group Research Assignment on Statistical Process Control				

PST 32212	Graph Theory	T		
Graphs and Digraphs (Graphs isomorphism, Subgraphs, Degrees, Indegrees, and outdegrees, Adjacency and Incidence matrices), Connectivity (Paths, Circuits and Cycles, Connected Graphs and Digraphs, trees and spanning trees, Eulerian and Hamiltonian Graphs), Optimization Involving Trees (Minimum weight spanning trees, Minimum weight branching, Matroids and the Greedy algorithm, Shortest path Problems, Flows and connectivity, Matching and Factors), Graph Embedding (Planer graph and duality, Hamiltonian plane graph), Colouring of Graphs (Vertex colouring, Edge colouring, colouring of planer graphs)				

PST 32224	Artificial Neural Networks	T	P	
Elementary neurophysiological principles, Artificial neuron models, Single layer networks (perceptions), Multi-layer feed forward networks (+back propagation), Cascade correlation (correlation training), Recurrent networks, Bi-directional associative memory, Counter propagation networks, Hopfield model, Adaptive resonance theory, Spatiotemporal sequences, SOFM, Individual projects				

PST 32225	Digital Image Processing	T		
Introduction to image processing, Elements of a digital image processing system; image acquisition, storage, processing, transmission and display, Image processing fundamentals; human vision system, sampling and quantization (spatial and brightness resolution), pixels and their relationships, Digital image processing techniques; image enhancement and restoration, pixel point processing, pixel group processing, frequency domain processing(Fourier transform), image analysis, coding systems; error detection and correction, data compression schemes.				

PST 32226	Data Mining and Applications	T		
Introduction: Data Mining, Machine learning, Patterns, Example data sets, applications, Input, Output, Basic Learning Algorithms: Inference Rudimentary rules (1R), Statistical Modeling, Divide and Conquer, Covering algorithms, Association rule mining, Instance-Based Learning, Clustering, Evaluating Learning Algorithms: Cross-Validation, Comparing data Mining schemes, predicting probabilities, counting cost, ROC Curves, Evaluating Numeric Prediction, Data mining tools, Individual Project.				

PST 32227	Data Communication and Computer Networks	T		
Introduction to Data Communication, The Physical Layer, Framing, Error Detection and Correction, Channel Allocation, Routing and Congestion Control Algorithms, Internet Working, Transport Protocols, Network Security and Administration, Applications (SMTP, HTTP, NNTP).				

PST 32228	Computer Graphics and Visualization	T		
Basics of Computer Graphics: Introduction, Graphics Pipeline and Coordinate Systems, Transformations in 2D, Three Dimensional Graphics, 3D Viewing, Scan Converting Lines, Circles and Ellipses, Lines And Polygons, Solid Modelling, Visible Surface Detection, Illumination and Shading, Curve Representation, Anti-Aliasing ,Colour, Soft Objects, Rendering: Lighting Models, Fast-Phong Algorithm, A-buffer, V-buffer, Ray-tracing Algorithms, Geometric Transformations Animation: Key-frame Systems, Animation Languages, Kinetic vs. Dynamic Systems, Modelling Human and Animal Motion				

PST 32229	Project in Computer Science and Technology (Mini Project)	P		
Independent practical will be conducted on one or more on the given topics				

PST 32130	Computer Laboratory 3-II		P	
Implement Graphics and Digital image processing techniques using MATLAB, Working with Data mining tool.				

PST 32231	Human Computer Interactions	T		
Foundation of HCI, Usability principles, building a simple GUI, Human abilities, human-centered software development, cultural aspects, human-centered software evaluation, GUI design, GUI programming, HCI aspects of multimedia systems, HCI aspects of collaboration and communication, validation of usability and user experience, Handling errors & help				

PST 32232	Bioinformatics	T		
Introduction to bioinformatics, Bioinformatics algorithms Basic concepts in Molecular Biology, Nucleic acids and Proteins, Bioinformatics Databases, Sequence alignment, Similarity searching, DNA sequence analysis and protein Sequence analysis, protein structure prediction, Genome bioinformatics, Applications of bioinformatics. Computational approaches to biological science concepts of bioinformatics the computational skills for problems solving in biology, Establish, and maintain research information in biology, Solutions to bioinformatics, software packages, usages, and development				

PST 32133	Current Topics in Computer Technology	T		
Current trends and demands in the field of Computer Science and technology. Topics like policies and laws in software industry, Software quality assurance, Design Patterns, Blockchain Technologies				

Year IV Semester I				
BSc Honours Degree in Applied Physics				
PST 41201	Research Methodology and Scientific Communication	T		
Some reflections on the theory of evolution of knowledge, Inductive and deductive methods in research, Research design: identifying issues and problems, defining research problem(s) and objectives, identifying data requirements, sources, and instruments for data gathering, Introduction to design science.				

PST 41202	Computational Physics	T	P	
Introduction to Mathematica, Execute commands in Syntax method, Palette's and Plain English format Mathematics & Algorithms: Develop mathematical functions, Vector analysis, Probability and statics, Differentiate, Integration, Solve linear equations, first order, second order and third order differential equations, Interpolation and extrapolation, linear and non-linear situations and modeling of practical scenarios Visualization & Graphics: Visualization of 2D, 3D functions, Develop histogram, Bar charts, pie charts for financial data, Styling the functions, Import and export of image, word, excel document to interface and vice versa, Manipulation of Physical scenarios, mathematical modeling, Object animation, Develop sound and wave's for practical situations				

PST 41203	Robotics	T	P	
General Introduction, Analog and Digital Circuits for Control Applications, Electronic Devices used in Robotics, Microprocessor/ Microcontroller & Interfacing, DC and Stepper Motors, Design of Mechatronics Systems, Sensors and Signal Processing, Power Electronics, Two wheel Driven Autonomous Robot Applications				

PST 41204	Remote Sensing & GIS	T		
Remote Sensing : Basic Principles of Remote Sensing ;(Introduction to Remote Sensing Key Words: Platforms, Satellite Orbits, Sensor, Electromagnetic Spectrum, Introduction to a Digital Image and Active and Passive Satellites Systems), Earth Observation Satellites and Sensors; (Introduction to Different Satellite Systems, Sensor Characteristics and Image Resolution), Distortions and Corrections; (Radiometric / Geometric Distortions and Corrections, Image Enhancement Techniques, Basic Digital Image Processing; (Image Interpretation, Classification and Image Fusion), Microwave Remote Sensing; (Basic Theory and Applications), Applications of Remote Sensing.				

Geographic information systems (GIS): Introduction to GIS, Cartographic Data Structures such as Vector Raster and Attribute Data, Digitizing, Editing and Geo-referencing, Development and Use of a GIS, Basic Concepts of Spatial Modelling and Analysis, Data Visualization and Presentation for GIS.

PST 41205	Geophysics	T		

Introduction to Geophysics; Principles and Processes; Methods of Investigation, Materials of the Earth, Seismic Methods, Gravity and Magnetic Methods, Electrical and Electromagnetic Methods, Borehole Geophysics, Introduction to Global Geophysics, Principles of Geophysical Exploration

PST 41206	Medical and Bio Physics	T		

Physics of the Body (Body Structure) Analyzing Forces in the Body, Forces on (Hip Joint & Backbone), Body Movements (Standing, Walking), Eye (Optical System), Defects in the Eye's Optical System, Ear (Threshold of hearing, loudness, Hearing Defects), Body Electric (Nerve Cells, Heart, Measuring Electrical Signals of the Heart, ECG.)

Introduction to Medical Physics, Production of Radioactive Materials in Medicine and their Properties and Applications, Various Attenuation Coefficients, Interaction Processes and their Practical Consequences, X - ray Tube and Generators, X – ray Production and Properties , Imaging with X ray an Film Processing, X ray Imaging Modalities (General Radiography, Mammography Fluoroscopy and Computed Tomography), Image Quality Influence Factors, Introduction to Nuclear Imaging (Gamma Camera), Basics of Radiotherapy (Teletherapy Machines, Simple Treatment Planning, Dosimetry Principles and Detectors), Basics of Radiobiology and Radiation Protection

Light in Medicine (Visible Light, IR, UV and Laser), Interaction of Light with Biological Systems, Trans-illumination and Endoscopy, Principles of Laser Production, Types of Commercially Available Laser and their Features, Biological Effects Caused by Lasers, Laser Instrumentation, Clinical Application of Lasers and Laser Hazards, Properties of Ultrasound (US), Generation and Reception of US, Imaging with US and Scanning Methods, Types of US Scanners and their Features, Artifacts of US Imaging, Typical Applications of US in Diagnostic Radiology and Biological Effects, Nuclear Magnetic Resonance Imaging(MRI), Principles of Nuclear Magnetic Resonance, MRI Instrumentation, MRI Safety, Medical Applications of MRI

PST 41207	Advanced Nanotechnology	T		

Nanomaterials and/ or Nanopowders, Bonding Atoms to make Solids and Molecules (Ionic, Metallic and Covalent Bonding in Materials), Forces at Nanoscale, van der Wall Force versus Gravity, Crystal Structures (14 Bravis lattices), Structure Small enough to be different and useful, (Particles, Colloidal Particles, Wires, Films, Layer and Coating, Porous Materials etc), Widely used Method for Nanoparticle Preparation, Nucleation, Growth and Termination of Growth of Nanoparticles, Types of Interactions between Nanomaterials, Stabilization of Nanomaterials in Sols, Quantum Dots of Many Colours and Metal Nanoparticles, the Carbon Age, Carbon Nanotubes and Fullerenes-

Synthesis, Properties, Characterization, and Applications of, Graphene as a Mother of all Carbon Allotropes-Synthesis, Properties, Characterization and Applications of, Vein graphite as a source to produce nanocarbon materials (CNT, GO, rGO and graphene), Introduction to Electronic and Chemical Characterization of nanostructured materials using Surface Science and other (Raman, XRD, FTIR, TGA, Particle size Analyzer) Techniques: Basic Physical Concepts and Operationof X-ray Photoelectron Spectroscopy(XPS), Ultraviolet Photoelectron Spectroscopy (UPS), Auger Electron Spectroscopy (AES). Brief Introduction to Synchrotron Radiation and Techniques based on it, Physics based Experimental Approaches to Nanofabrication and Nanotechnology, Bottom-up and Top-down Approaches of Nanofabrication, Molecular Self-assembly, Lithography, Applications of Nanotechnology in: (here or somewhere it is needed to introduce course contents on organic electronics, bioelectronics, and nano-electronics as was mentioned in the course description), Energy, Agriculture, Water Treatment, Disease Diagnosis, Drug Delivery, Food Processing and Storage, Air pollution Monitoring, Construction Industry, Health Monitoring, Vector and Pest Control

PST 41208	Data Acquisition and Signal Processing Methods	T		

Elements of a Computer Controlled Data Acquisition System, Various Types of Sensors and Detectors, Signal Processing; Noise, Pile-up Effects, Signal to Noise Ratio, Improving Signal to Noise Ratio; CR-RC Pulse Shaping, Linear Wave Shaping, Passive Filters, Active Filters, Delay Lines, Non-linear Wave Shaping, Signal Processing Electronics; Discriminators, Comparators, Schmitt Trigger, Timing Circuits, Leading Edge Trigger, Zero Crossing Trigger, Constant Fraction Trigger, Signal Conversion Methods; Converters and Analyzers, Encoders, Decoders and Multiplexers, Coincidence Units, Coincidence Techniques used in Nuclear Physics Experiments, Basic Computer System Organization; Memory Devices; Semiconductor ROMs and RAMs, ROM Applications, Static and Dynamic RAMs and their Operations, Microprocessor Architecture; Machine Language Representation, Assembly Language Programming, Microprocessor Applications in the Laboratory, Computer Controlled Electronics; CAMAC Standard, FASTBUS, GPIB Interfaces, examples of Data Acquisition Systems

PST 41209	Advanced Laser Physics	T		

Normal Laser Oscillation, Theory of Q-switching, Types of Q-switch
Effects Leading to Multi-mode Oscillation, Homogeneous & Inhomogeneous Broadening, Spectral & Spatial Hole Burning, Doppler Broadening, Lamb Dip, Mode Pulling.
Mode Selection, Isolation of a Single Laser Transition, Selection of Longitudinal Modes, Selection of Transverse Modes, Effects of Mode Selection on the Laser Output
Mode Locking, Longitudinal Mode Locking, Other Types of Mode Locking, Active &Passive Mode Locking Techniques, Isolation of a Single Mode Locked Pulse, Amplification and Detection of Mode Locked Pulses.
Rate Equation Model for 3-level and 4-level Lasers, Introduction to Laser Media-Solid, Liquid and Gaseous Media, Resonator Design, Reflector Types and Laser Rod Design

Three- and Four-level Laser Systems, Parameters Affecting Laser Threshold, Advantages of Four-level Systems, Optical Pumping and Power Threshold, Energy Threshold for a Pulsed Laser, Energy Threshold for a Pulsed Laser, Power Threshold for CW Lasers, Energy output for Pulsed Lasers and Power Output for CW Lasers, Optimum Output Coupling Factor.
Gas Lasers – Methods of Excitation, Electron Collision Kinetics, Impurity Gas Kinetics, Different Types of Gas Lasers, Semiconductor Lasers & Dye Lasers
Non-Linear Optics

PST 41210	Automation	T	P	

Intelligent Controllers, Programmable Logic Control, Automation Elements, Hardware Components for Automation and Process Control, Logical Design for Automation, Electro Pneumatic Automation
Industrial Networks (RS232, RS485/422, SPI, I2C, CAN, MODBUS, PROFIBUS), Basic Programming in PLC and the PID at the Industry SCADA Systems and Software

PST 41211	Astronomical Instruments and Data Reduction & Analysis Techniques	T	P	

Introduction to celestial coordinate systems, right ascension, declination, altitude and azimuth sidereal time sidereal day and solar day, hour angle, celestial equator, Basic optics, optical telescopes refracting telescopes, refractor telescopes, catadioptric telescopes, classical Cassegrain and smidth Cassegrain telescopes, equatorial mount and alta-azimuth mount, angular resolution, spectrographs, gratings, photomultiplier tubes, internal electronics of CCD camera and its mechanism, celebration of an astronomical image using dark, bias and flat field CCD frames, what are the variable stars, why they change the brightness, types of variable stars and their current research
Observational Project
Prepare a telescope with an aperture more than 30 cm (12 inch) and a CCD camera to observe lower magnitude short period variable stars. Using astronomical software and variable star catalogues find out appropriate variable stars to observe. Learn how to capture dark, bias, flat and object frames and prepare the object frame for the analysis. Using Image Reduction and Analysis Facility (IRAF) software (your instructor will teach of usage of IRAF) reduce the object frame into the magnitudes. Using various codes draw the light variation diagrams, the light curve, to identify the light variation of the object star.

PST 41212	Electrochemical Power Conversion	T		

Principles of electrochemical energy conversion: Thermodynamics, Kinetics, Transport phenomena. Electrochemical techniques and their applications: Electrochemical impedance spectroscopy, Cyclic voltammetry, Galvanostatic intermittent titration. Electrochemistry of batteries. Lithium-ion battery: Nanostructured materials for lithium-ion batteries. Metal-oxygen battery: Aqueous and non-aqueous metal-oxygen batteries, Supercapacitors: Principle of operation and advanced supercapacitor technologies. Fuel cell design and principles: Proton exchange membrane fuel cells,

alkaline anion exchange membrane fuel cells, Solid oxide fuel cells, Advanced electrocatalysts and membranes for fuel cells. Redox flow batteries.

PST 41013	Literature Search Seminar in Physics	T		
A topic would be provided where the student is required to conduct a literature survey and present the obtained data at a seminar series				

PST 41014	Independent Research / Project in Physics		P	
Independent practical will be conducted on one or more on the given topics				

PST 41215	Industrial Management	T		
Business Organization & the economical effective planning, Production Management, Production process planning & control, Industrial Engineering: plant management Inventory & warehouse management, marketing management				

PST 41216	Classical Mechanics	T		
Mechanics of a particle and system of particles, constraints and D'Alembert's principle, Lagrange's Equations, Hamilton's principle, conservation laws and symmetry, two-body problem, orbits, virial theorem, scattering in central force field, three-body problem, rigid body motion, Hamilton equations of motion, principle of least action, canonical transformations, Poisson brackets, canonical perturbation, introduction to general theory of relativity				

PST 41235	Critical Thinking	T		
Introduction to Critical Thinking, Practical uses of Critical Thinking for personal development, Way of inspiring Critical Thinking in individual and Groups. Defining problems and making critical decisions, Critical Thinking for personal goal setting				

BSc Honours Degree in Chemical Technology				
PST 41201	Research Methodology and Scientific Communication	T		
Some reflections on the theory of evolution of knowledge, Inductive and deductive methods in research, Research design: identifying issues and problems, defining research problem(s) and objectives, identifying data requirements, sources, and instruments for data gathering, Data analysis and Interpretation, Writing and Presentation of research results, Research management.				

PST 41207	Advanced Nanotechnology	T		
Introduction to Nanoscale Physics, Quantum Nature of Nanoworld, Revisit the Fundamental Concepts of Quantum Mechanics, Atomic Orbital, Electromagnetic Waves and their Production, the Quantization of Energy, Atomic Spectra and Discreteness, the Photoelectric Effect, Wave-particle Duality of Matter, the Double Slit				

Experiment, the Uncertainty Principle, Particle in a Well and Esaki Quantum Tunnelling Diodes. Nanomaterials and/ or Nanopowders, Bonding Atoms to make Solids and Molecules (Ionic, Metallic and Covalent Bonding in Materials), Forces at Nanoscale, van der Walls Force versus Gravity, Crystal Structures (14 Bravais lattices), Structure Small enough to be different and useful, (Particles, Colloidal Particles, Wires, Films, Layer and Coating, Porous Materials etc), Widely used Method for Nanoparticle Preparation, Nucleation, Growth and Termination of Growth of Nanoparticles, Types of Interactions between Nanomaterials, Stabilization of Nanomaterials in Sols, Quantum Dots of Many Colours and Metal Nanoparticles, the Carbon Age, Carbon Nanotubes and Fullerenes-synthesis, Properties, Characterization, and Applications, Graphene as a Mother of all Carbon Allotropes synthesis, Properties, Characterization and Applications, Introduction to Nanostructure Electronic and Chemical Characterization using Surface Science Techniques: Basic Physical Concepts and Operation (these topics are first time in the university system in SL) of X-ray Photoelectron Spectroscopy, Ultraviolet Photoelectron Spectroscopy, (May be include scanning tunneling spectroscopy) Auger Electron Spectroscopy and Brief Introduction to Synchrotron Radiation and Techniques based on it, Physics based Experimental Approaches to Nanofabrication and Nanotechnology, Bottom-up anTop-down Approaches of Nanofabrication, Molecular Self-assembly, Lithography, Applications of Nanotechnology in: Energy, Agriculture, Water Treatment, Disease Diagnosis, Drug Delivery, Food Processing and Storage, Air pollution Monitoring, Construction Industry, Health Monitoring, Vector and Pest Control

PST 41212	Electrochemical power conversion	T		
Thermodynamics of Electrochemical Reactions, Kinetics of Electrochemical Reactions, Electrochemical Techniques (Electrochemical Impedance Spectroscopy (EIS) and its Applications, Cyclic voltammetry and Linear Polarization, Galvanostatic Intermittent Titration); Principles of Batteries, Advanced Rechargeable Battery, Li-ion Battery, Nanostructured Materials for Li-ion Battery, Principle of Super Capacitors, Advanced Super Capacitor Technology, Difference between Batteries and Super Capacitors, Principle of Fuel Cells, Types of Fuel Cells, New Material for Proton Exchange Membrane Fuel Cells, Alkaline Fuel Cells and Solid Oxide Fuel Cells, Applications of Fuel Cells, Fuel Cells, Battery and Super Capacitor Hybrid Power System				

PST 41215	Industrial Management	T		
Business Organization & the economical effective planning, Production Management, Production process planning & control, Industrial Engineering: plant management Inventory & warehouse management, marketing managements				

PST 41217	Natural Products Chemistry	T		
Primary and secondary metabolism, Enzymes and coenzymes, Construction mechanisms in biological systems such as alkylation, Wagner-Meerwein rearrangement, Aldol and Claisen condensations, Schiff base formation, Mannich reaction, Transamination, reductions and oxidations in biosynthesis. Fatty acids and				

polyketides from acetate pathway: Saturated/Unsaturated fatty acids, Prostaglandins, Aromatic polyketides (Cyclization to give simple phenols and Anthraquinones), alkylation and coupling reactions of polyketides, Macrolides and polyether, Cyclization through Diels-Alder reaction to give statins. Aromatic amino acids and phenylpropanoids from shikimate pathway: Aromatic amino acids and simple benzoic acids, Lignans and lignin, Phenylpropanes, Benzoic acids from C6C3 compounds, Coumarins. Terpenoids and steroids from mevalonate pathway: Monoterpenes, Sesquiterpenoids, Diterpenoids, Sesterterpenoids, Triterpenoids, Carotenoids, Steroids. Steroid skeleton, numbering, conformations, main types of steroids and their biological functions, important reactions and synthesis/partial synthesis of steroids. Biosynthesis of Alkaloids from amino acids: Chemical structure, Biosynthesis of alkaloids derived from ornithine, lysine, nicotinic acid, tyrosine, tryptophan, anthranilic acid, and histidine, important reactions of alkaloids. Mixed biogenesis: Flavonoids and stilbenes, Meroterpenoid, Carbohydrates: Conformations of carbohydrates and conformational effects. Reactions of carbohydrates. Synthesis of modified carbohydrate molecules and other natural products

PST 41218	Biotechnology	T		

Introduction to biotechnology and multidisciplinary in biotechnology (What is Biotechnology, Brief history and different areas of biotechnology, "traditional" vs "modern" biotechnology). The impact of biotechnology on society. DNA structure and function. DNA as genetic material. DNA replication to protein synthesis. DNA sequencing. Recombinant DNA technology. Techniques in analyzing DNA (PCR, southern blotting). Human Genome Project, DNA typing (paternity testing, criminal investigation, disease identification). Genetic engineering and gene therapy. Vaccine production, Genetic engineering for improving quality and productivity in agriculture, fuel production etc. Introduction to bioinformatics.

PST 41219	Advanced Solid State Chemistry	T		

Solid state materials. Solid solutions: Substitutional and interstitial solid solutions, Alloys. Crystal defects, Solid state Diffusion. Solid state synthesis: Ceramic method, Co-precipitation, Sol-gel method, Microwave synthesis, Hydrothermal synthesis. Characterization of solid-state products: Microscopy, Spectroscopy, Thermal analysis. Metallic bonding and band theory of solids: Band structure of metals, Insulators and semiconductors, The Fermi-Dirac distribution.

PST 41120	Bioinorganic Chemistry	T		

Introduction, Composition, and structure of metals in biological systems, Role of metals in biological systems, Metals in human health, Specification and speciation of metal complexes, Hard and soft acid and base theory, Classification of metals in biological systems, Transition metals in biological redox reactions. Oxygen transport and nitrogen fixation. Inorganic model systems. Inorganic model systems to mimic active sites in enzymes. Vitamin B12. Transport and storage of iron. Biological role of metals: zinc and copper

PST 41221	Instrumental Analysis	T	P	
Atomic spectroscopic methods: Atomic Absorption Spectroscopy (AAS), Inductively Coupled Plasma spectroscopy (ICP). Direct current plasma spectroscopy (DCP); X-ray fluorescence spectroscopy (XRF) **Surface analytical methods**: Ultraviolet photoelectron spectroscopy, X-ray photoelectron spectroscopy, Rutherford back scattering (RBS) **Chromatographic methods**: Gas chromatography (GC); High performance liquid chromatography (HPLC), Ion chromatography (IC), Supercritical fluid chromatography (SFC); Affinity chromatography; Size exclusion chromatography; Hyphenated techniques: GC-MS, LC-MS, EPMA, FTIR-GC, Recent advances and applications of the above techniques)				

PST 41222	Applied Molecular Modelling	T		
Chemical structure and property calculations and drawing, molecular mechanics methods (Force fields, Inter intra molecular forces), Stable conformers calculations & energy minimization algorithms , Molecular dynamics (Classical treatment of system of particles, Montecarlo methods, Prediction of thermodynamic Properties, QSAR prediction method), Ab-inito methods (HF theory, Molecular orbitals and HOMO LUMO), Vibrational and rotational spectroscopic calculations, Efficient use of public domain soft ware				

PST 41223	States of Matter	T		
Review of the gas laws and the kinetic theory of gases. Statistical thermodynamics. Intermolecular forces and potential energy surfaces. Properties and theories of liquids. Ionic liquids and their applications. Liquid crystals and their applications. Properties and theories of solids: Heat capacities, Einstein and Debye models, Free electron theory of a metal. Introduction to crystal engineering.				

PST 41124	Literature Search in Chemistry	T		
A topic would be provided where the student is required to conduct a literature survey and present the obtained data at a seminar series				

PST 41225	Independent Research / Project in Chemical Technology		P	
Independent practical will be conducted on one or more on the given topics Research methodology; Hypothesis, Theory and scientific laws & models, Peer, nonpeer literature surveying methods and data bases, Critical analysis of literature for problem identification, Research methodology designing methods, Research planning & time management, Laboratory book & record keeping, Results analysis, Research proposal & report format, Research manuscripts				

PST 41226	Computer Applications in Instrumentation	T		
Logic gates, Computer memory organization, Digital conversation, Data acquisition				

and instrument interfacing, graphical programming exercises, Plotting of radical functions, Computational chemistry; Ab initio methods, Density functional theory methods (DFT), Semi-empirical methods, Molecular mechanics, Methods for solids, Chemical dynamics, Molecular dynamics, Quantum mechanics/Molecular mechanics (QM/MM)

PST 41235	Critical Thinking	T		
Critical Thinking Scientific Approaches, Decision Making, Creative Process, Leaning process, Breaking Problems down, Problem Analysis, Role Play, Logic				

BSc Honours Degree in Computer Science & Technology				
PST 41201	Research Methodology and Scientific Communication	T		
Some reflections on the theory of evolution of knowledge, Inductive and deductive methods in research, Research design: identifying issues and problems, defining research problem(s) and objectives, identifying data requirements, sources, and instruments for data gathering, Introduction to design science				

PST 41203	Robotics	T	P	
General Introduction, Analog and Digital Circuits for Control Applications, Electronic Devices used in Robotics, Microprocessor/ Microcontroller & Interfacing, DC and Stepper Motors, Design of Mechatronics Systems, Sensors and Signal Processing, Power Electronics, Two wheel Driven Autonomous Robot Applications				

PST 41215	Industrial Management	T		
Business Organization & the economical effective planning, Production Management, Production process planning & control, Industrial Engineering: plant management Inventory & warehouse management, marketing management				

PST 41227	Web services	T	P	
Communication Protocols: RESTFul services, SOAP services (WS-* protocols), Serialization Formats: XML (XML Schema, XPath and XSLT), JSON, Text Encoding Formats, Binary Formats (Protobuf), Security: OAuth, JWT, SWT, Distributed Web applications development using a Java Web Framework.				

PST 41228	Computer System Security	T		
Introduction to security, Features of security systems, Threats and attacks on security, Introduction to cryptography, Cryptographic systems, Digital Signatures, Secure Protocols, Kerberos, VPN, L2TP, PPTP IP Sec, SSL, HTTPS, firewalls				

PST 41229	Advanced Computer Networks	T		
Layered communication architecture: layers, services, protocols, layer entities, service access points, protocol functions, IPv6, Advanced Routing algorithms, Advanced				

Network Congestion Control algorithms, Quality of service, Real Time Transport Protocol, Internetworking, Performance Issues, Overview on VPN networks, Overview on Wireless Networks and Mobile Networks: LAN, PAN, Sensor Networks, Ad-hoc Networks, Mobile IP, Mobile TCP, IP Security, Network Programming Development

PST 41230	Internet of Things (IoT)	T	P	

Introduction to IoT: Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs. IoT & M2M: Machine to Machine, Difference between IoT and M2M, Software define Network. Network & Communication aspects, Challenges in IoT Design challenges, Development challenges, Security challenges, other challenges. Components of an IoT Solution, Competing Standards for IoT, Domain specific applications of IoT: Home automation, Industry applications, Surveillance applications, Other IoT applications.
Developing IoTs: Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor based, application through embedded system platform, Implementing IoT, concepts with python

PST 41231	Natural Language Processing	T		

Introduction: Brief history of NLP research, some current applications, components of NLP systems. Linguistic Phenomena: Morphology, Parts of Speech, Syntax, Model-Theoretic Semantics, Lexical Semantics, Pragmatics. Formal Representations: Finite State Automata, Context-Free Grammars, First Order Logic, Frame Semantics, Other Structures. Formal Methods: Hidden Markov Models, Sequence Classification, Syntactic Parsing, Forward Algorithm, Viterbi Algorithm, Rule-Based Systems, Statistical Classifiers.
Prediction and part-of-speech tagging: Corpora, simple N-grams, word prediction, stochastic tagging, evaluating system performance. Interpretation: compositional semantics and entailment, pragmatic inference. Recent NLP research, Practical on sentiment analysis.

PST 41232	Cloud Computing	T		

Cloud Computing Concepts: Introduction to cloud computing, Properties, characteristics & disadvantages, Gossip, Membership & Grids, P2P Systems, Key-Value Stores, Time & Ordering Classical Distributed Algorithms. Cloud Systems & Infrastructure: Cloud computing stack, Service model, Deployment models, Containers, virtual machines, MAAS, PAAS, Web Services. Storage: Ceph, SWIFT, HDFS, NAAS, SAN, Zookeeper. Big Data & Applications in the Cloud: Spark, Hortonworks, HDFS, CAP, Streaming Systems, Graph Processing & Machine Learning. Cloud Resource management & Service management in cloud computing. Cloud Networking: Introduction to cloud networking SDN with cloud, Data center networking. Cloud security: Identity & Access management, Access control, Authentication in cloud computing. Developing application in cloud platform, Introduction to Cloud Computing with AWS, Azure google's cloud platform. Research

trends in cloud: Edge & Fog computing, cloud & IoT. Hands on experience using a cloud-based tool.

PST 41233	Business Process Management Systems	T		
Simulation in management decision making, Queuing theory, Concepts of discrete-event simulation, Construction of models: modeling issues, verification and validation of models, development of simulation models using selected software, analysis of results				

PST 41234	Mobile Computing	T	P	
Introduction to Mobile Computing, Applications, Characteristics, Mobile computing architecture, Mobile networks: GSM, Mobile IP, Bluetooth, WiMAX, IPV6, Smart cards, Mobile Applications development				

PST 41135	Critical Thinking	T		
Introduction to Critical Thinking, Practical uses of Critical Thinking for personal development, Way of inspiring Critical Thinking in individual and Groups. Defining problems and making critical decisions, Critical Thinking for personal goal setting				

Year IV Semester II				
BSc Honours Degree in Applied Physics				
PST 42801	Project Work: B.Sc. Thesis in Applied Physics			TH
Industrial/ laboratory studies on a research problem relevant to Physical Sciences, Students will be required to conduct either research or survey related to physics, chemistry or computer science/ Information Technology either at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately				

PST 42102	Literature Search Seminar in Applied Physics	T		
A topic would be provided where the student is required to conduct a literature survey and present the obtained data at a seminar series				

PST 42203	Independent Research / Project in Applied Physics		P	
Independent practical will be conducted on one or more on the given topics				

BSc Honours Degree in Chemical Technology				
PST 42804	Project Work: B.Sc. Thesis in Chemical Technology			TH
Industrial/ laboratory studies on a research problem relevant to Chemical Sciences, Students will be required to conduct either research or survey related to, chemistry either at a relevant industry, research institution, or at the faculty. The duration of the project period should be 15 weeks. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester and the thesis should be presented and defended by the respective student before an Examination Committee appointed by the department. A guideline for the preparation of report will be given separately				

Year IV Semester II				
PST 42805	Project Work: BSc Thesis in Computer Science & Technology			TH
The research problem should be selected from any area in Computer Science. The research project will be stretched throughout the year, during the semesters I and II. It will include three progress reports, a dissertation, and an oral presentation. During the period students may have to attend for any special lectures conducted by the supervisors and or resource personnel on request from the supervisor/ department. Students must submit their project proposals and present them to a panel appointed by the department at the 4th week of the semester I. A dissertation should be submitted at the end of semester II and presented and defended in front of an Examination Committee appointed by the department. A guideline for the preparation of the dissertation will be given separately.				

PST 42606	Industrial Training		P	
Each student will undergo full time training to carry out tasks of the project assigned by the industry. The duration of the project period should be 15 weeks. Students must submit their project proposals and present them to a panel appointed by the department at the 3rd week of the semester. The record book, which is provided by the department, should be maintained by the students. Students are required to submit three evaluation reports during their training period. A project report should be submitted at the end of the semester. A guideline for the preparation of the report will be given separately.				

Rules and Regulations:

1. To obtain a minimum grade of D+ for each English language component (i.e. General English I, General English II, Academic English I, Academic English II and Business English) offered in the first five semesters is also a compulsory

requirement to be eligible for graduation.

2. In order to be eligible for the end-semester examination of a course unit, a student must have at least sat for the end-semester exam of each of the prerequisite course units (irrespective of the grade obtained), if any, listed under that course unit.
3. A student should maintain 80% attendance in each course unit in order to become eligible for the end-semester examination of that particular course unit. If the attendance falls below 50%, the student is considered to have failed the course unit and the student may sit for the end-semester exam in the following academic year and it will be considered the student's second attempt at the exam. If the attendance lies between 50% and 80%, a student may become eligible for the end-semester exam as recommended by the instructor in charge of the course unit (based on additional assessment procedures set by the instructor to evaluate the student's competence in the course unit).

Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

Department of Sports Sciences and Physical Education

https://www.sab.ac.lk/app/sport-sciences-and-physical-education

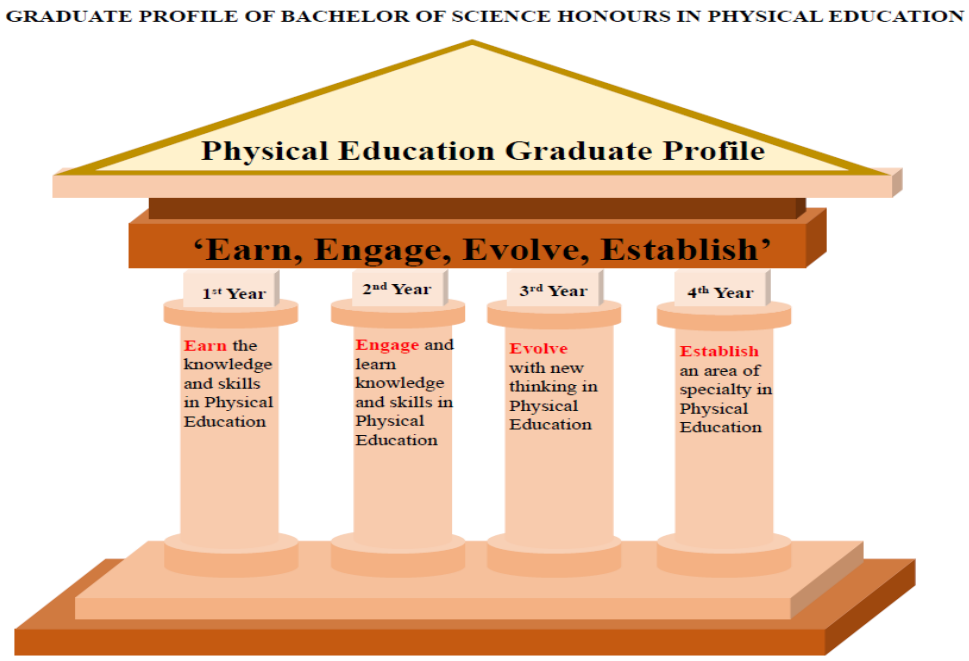
https://www.linkedin.com/company/faculty-of-applied-sciences-sabaragamuwa-university-of-sri-lanka/

DEPARTMENT OF SPORT SCIENCES & PHYSICAL EDUCATION

Degree Program:

Bachelor of Science Honours in Physical Education

Anticipated Graduate Profile



Guidelines for course codes and credits

- Each course code consists of four digits together with the prefix (alphabet letters)
- Prefix alphabet letters denote the abbreviation to the name of degree program (PED)
- The first digit of each course code is the corresponding Year of study (1-4).
- The Second digit of each course code is the corresponding semester of study (1 & 2).
- Third digit represents the number of credits assigned for the subject.
- Fourth and fifth digits represent the subject code.

Example: The course code of PED 11101 denotes the following.

Abbreviated name of degree program	Year	Semester	No of credits	Subject Code
PED (Physical Education)	1	1	1	01

Summary of the Courses

Year I Semester I			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
PED 11101	General Fitness I	1	C
PED 11202	Fundamental Motor Skills Development	2	C
PED 11303	Foundation of Movement Skill Acquisition (Gymnastics, Swimming, Volleyball)	3	C
PED 11204	Foundation of Movement Skill Acquisition in Athletics (Track Events)	2	C
PED 11105	Foundation of Physical Education	1	C
PED 11206	First Aid and Injury Prevention in Sports	2	C
PED 11207	Human Anatomy and Physiology	2	C
PED 11108	Information Technology I	1	C
PED EGP1101	General English I	-	C
Total Credits = 14 (Compulsory = 14 and Elective = 0)			

Year I Semester II			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
PED 12101	General Fitness II	1	C
PED 12302	Foundation of Movement Skill Acquisition (Badminton, Cricket, Netball)	3	C
PED 12203	Foundation of Movement Skill Acquisition in Athletics (Field Events – Throws and Jumps)	2	C
PED 12104	Aerobics and Rhythmic Activities	1	C
PED 12205	Principals of Physical Education and Sports	2	C
PED 12206	Sports Exercise Physiology	2	C
PED 12107	Basic Mathematics	1	C
PED 12108	Sports Kinesiology	1	C
PED 12109	Information Technology II	1	C
PED EGP1201	General English II	-	C
Total Credits = 14 (Compulsory = 14 and Elective = 0)			

Year II Semester I			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
PED 21101	General Fitness III	1	C
PED 21302	Foundation of Movement Skill Acquisition (Basketball, Hockey, Soccer)	3	C
PED 21203	Practicum I	2	C
PED 21204	Dance	2	C
PED 21205	Physical Education in Pre School & Primary School	2	C
PED 21206	Health and physical Education	2	C
PED 21207	Educational Psychology	2	C
PED 21208	Basic Statistics	2	C
PED EAP2101	Academic English I	-	C
Total Credits = 16 (Compulsory = 16 and Elective = 0)			

Year II Semester II			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
PED 22301	Foundation of Movement Skill Acquisition (Elle, Judo, Table Tennis)	3	C
PED 22202	Practicum II	2	C
PED 22203	Physical Education in Secondary School & Tertiary Institution	2	C
PED 22204	Curriculum Perspective and Issues in Physical Education	2	C
PED 22205	General Theory of Sports Training	2	C
PED 22206	Sports Biomechanics	2	C
PED 22307	Sports Nutrition	3	C
PED EAP2201	Academic English II	-	C
Total Credits = 16 (Compulsory = 16 and Elective = 0)			

Year III Semester I			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
PED 31301	Foundation of Movement Skill Acquisition (Baseball, Karate, Weight Lifting)	3	C
PED 31202	Practicum III	2	C
PED 31203	Sport Psychology	2	C

PED 31204	Teaching outdoor pursuits and Contemporary Activities	2	C
PED 31205	Advanced Statistics	2	C
PED 31206	Advance Theory of Sports Training	2	C
PED 31207	Sport Business and Human Resource Management	2	C
Elective (Two credits to be selected from the following elective subjects)			
PED 31108	Strength and Conditioning	1	E
PED 31109	Cultural Sports in Sri Lanka	1	E
PED 31110	Minor Games in Sports	1	E
PED 31111	Politics, Economy and Sports	1	E
PED-EBP-3101	Business English	0	C
Total Credits = 17 (Compulsory = 15 and Elective = 02)			

Year III Semester II			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
PED 32201	Specialization of Selected Sport - I	2	C
PED 32202	Test and Measurement in PE	2	C
PED 32203	Comparative Physical Education	2	C
PED 32204	Sociology of Sports	2	C
PED 32205	Sport, Education Ethics & Law	2	C
PED 32206	Olympic Movement	2	C
PED 32207	Research Methodology in Physical Education	2	C
Elective (0ne credit to be selected from the following elective subjects)			
PED 32108	Child and Adolescent Psychology	1	E
PED 32109	Sexual Health, Relationships and Sexualities	1	E
PED 32110	Sport Journalism	1	E
PED 32111	Drugs and Sports	1	E
Total Credits = 15 (Compulsory = 14 and Elective = 01)			

Year IV Semester I			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
PED 41101	Professional Development	1	C
PED 41302	Sports Administration	3	C
PED 41203	Adapted Physical Education	2	C
PED 41204	Community Service Project	2	C
PED 41205	Sport Facility Design	2	C

PED 41206	Science of Yoga and Relaxation	2	C
PED 41207	Specialization of Selected Sport (Coaching)	2	C
PED 41208	Physical Literacy	2	C
Elective (Two credits to be selected from the following elective subjects)			
PED 41109	School Policy and Programs in Sri Lanka	1	E
PED 41110	Reflective Practices in Physical Education	1	E
PED 41111	Guidance and Counselling	1	E
Total Credits = 18 (Compulsory = 16 and Elective = 02)			

Year IV Semester II			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
PED 42801	Research Project	8	C
PED 42202	Industrial Training	2	C
Total Credits = 10 (Compulsory = 10 and Elective = 0)			

Summary of credits offered:

	Semester I	**Semester II**	**Total**
Year I	14	14	28
Year II	16	16	32
Year III	17	15	32
Year IV	18	10	28
Total			**120**

Detailed syllabus

N.B.

T - Theory
P - Practical
F - The department organizes the field visit relevant to the particular subject area.
W - The department organizes workshops relevant to particular course unit.
TH - Thesis
GP **-** Group Project

Year I Semester I				
PED 11101	General Fitness I	T	P	-
Introduction to fitness; Benefits of exercise; Exercise is medicine: acute and chronic adaptation to exercise; Importance of physical activity in health and fitness;				

Components of fitness: health related and skill related; Methods to develop general fitness; Test batteries and norms for testing general fitness; Testing physical fitness.

PED 11202	Fundamental Motor Skills Development	T	P	-
Introduction to FMS, Sequence of instruction, Critical FMS, Issues in teaching FMS, Fundamental motor skills assessment: Purpose of the FMS assessment; Age and sequence of acquisition of FMS components; Administration and scoring procedures; Scoring and interpretation of results; Safety considerations and standards. Historical review, Classification, Games and their influence in bio psycho social development during the pre-school and school stages, Important of games in the formation of values, Games as an education means: Appropriate selection of games; Teacher's roll as a leader of the game, Teaching learning methodology of games.				

PED 11303	Foundation of Movement Skill Acquisition (Gymnastics, Summing ,Volleyball,)	T	P	-
History of the sport, Basic movements of the sport. Basic techniques and skills of selected sport, teaching methodology of techniques for beginners, Rules of the game, Basic formation systems for beginners.				

PED 11204	Foundation of Movement Skill Acquisition in Athletics(Track Events)	T	P	-
History of the sport, Basic movements of the Track Events. Basic techniques and skills of selected sport, teaching methodology of techniques for beginners, Rules of the game, Basic formation systems for beginners.				

PED 11105	Foundation of Physical Education	T	-	-
The General History of Sport and Physical Education - Sports and Society, the Ancient Olympics, the Modern Olympics; Why take part in sports and physical activities at all?; Definition of Sports, Science and Management; Definition of Physical Education; The reflective performer in Physical Education and the field of study; Physiological foundation of physical education; Philosophical foundation of physical education; Psychological foundation of physical education; Sociological foundation physical education and equity in sports and physical education; Major discourses in Physical Education in the world context; Sources available to improve knowledge related to Physical Education.				

PED 11206	First Aid and Injury Prevention in Sports	T	P	-
Introduction to the First Aid and history of First Aid, How to deal with normal medical incidence that happen during sporting activities; Muscle cramp; Communication and casualty care; Managing a casualty outdoors; Minor bleeding; Primary survey; Role of the sports first aider; Basic information on accident reporting. Introduction to safety in sports and injury prevention: How to do a proper Warm-up; Importance of stretching; Taping and bracing; Protective equipment and Appropriate surfaces; Appropriate training; Adequate recovery, Introduction to sports first aids : Basic sports first aids skills; Anatomy and sport				

injury terminology, Emergency action steps and providing life supports: Physical assessment and first aid techniques; Moving injured or sick athlete Sport first aids for specific injuries; Respiratory emergencies and illnesses; Closed head and spine injuries; First aids for wounds and bleeding; First aids for Weather related problems; First aids for musculoskeletal injuries (upper and lower body).

PED 11207	Human Anatomy and physiology	T	P	W
General introduction to human anatomy, Cellular forms and functions, The integumentary system, The skeletal system, Muscular system, Circulatory system, The lymphatic system, Nervous system, Endocrine system, Digestive system, Respiratory system, Reproductive system, Embryology, Excretory system, Body fluids.				

PED 11108	Information Technology I	T	P	
Introduction to Computer Systems: Elements of Computer System (Block diagram of main components and their functions), Hardware & Software, CPU, Computer memory types, Input/ Output devices, Storage devices, Types of computers and generations, Introduction to Operating Systems: Functions of an operating system, Types of operating systems, Introduction to Information systems, File handling and management, Introduction to Information Systems: Difference between data and information, Introduction to database systems, Introduction to Network: Networking devices, Network types, Internet & World Wide Web: E-mail and Internet Details, Web browsers				

PED EGP1101	General English I	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Year I Semester II				
PED 12101	General Fitness II	T	P	-
Weight management: Popular diets, Adipose tissue, distribution of body fat, Energy balance, Effective dietary interventions, Creating energy deficit; Modern systems for weight management: The dietary guidelines for whole food carbohydrate diet, Ketogenic diets and Paleolithic diet; Programming personal training with clients: Introduction to personal training, fitness and the health care continuum, advantages of personal training, linking with other professions, goal setting; Appraisal and lifestyle analysis: Rationale for conducting a health and fitness appraisal, Health evaluation, Life style analysis; Consultation and goal setting; Designing aerobic training programs. Practical session covers one-hour moderate intensity physical activities such as brisk Walking, Jogging, Running, Cycling and sports such as Swimming or Football daily.				

PED 12302	Foundation of Movement Skill Acquisition (Badminton, Cricket, Netball)	T	P	W
History of the sport, Basic movements of the sport. Basic techniques and skills of selected sport, teaching methodology of techniques for beginners, Rules of the				

game, Basic formation systems for beginners.

PED 12203	Foundation of Movement Skill Acquisition in Athletics (Field Events –Throws and Jumps)	T	P	W
History of the sport, Basic movements of the Throws and Jumps. Basic techniques and skills of selected sport, teaching methodology of techniques for beginners, Rules of the game, Basic formation systems for beginners.				

PED 12104	Aerobics and Rhythmic Activities	T	P	W
Introduction to Aerobics: History and evolution, Importance of Aerobics, Basic Rhythmic exercises and conditioning activities performed to music, Types of Aerobics, Special muscle toning exercises, Aerobics session planning and brief knowledge of equipment using: Methods and materials of teaching rhythmic aerobic activities.				

PED 12205	Principals of Physical Education and Sports	T	-	F
Introduction; Historical development of physical education in England; The British Public School traditions; The British public school games traditions; Thomas Arnold's (Principal at Rugby School in England from 1828 to 1842) sports and physical education philosophy; Sports in Sri Lanka before the European Colonization; Sports in Sri Lanka during the European ruling period; Sports in Sri Lanka after Independence (1948); Social constructionists approach to study physical education history (Major attentions to Ivor Goodson).Introduction and present physical education programs in Sri Lanka: Physical education in the general education and higher education systems; Physical education at present in the United Kingdom, Portugal, Netherlands and in the Germany; Physical education at present in the USA and in Canada; Physical education at present in China, India and Japan; Physical education at present in Australia and in New Zealand; Physical education at present in Brazil, and in Cuba; Physical education at present in South Africa and in Kenya; Comparison of physical education systems in deferent countries mentioned above with Sri Lankan system. Field trips:				

PED 12206	Sports Exercise Physiology	T	P	-
Physical fitness through healthy life, Energy for physical activities, Respiratory control during exercise, Cardiovascular control during exercise, Cardiovascular adaptation to endurance training, Muscular control during exercise, Hormonal regulation during exercise, Thermoregulation during exercise, Neural control of human movement, Body composition and assessment techniques.				

PED 12107	Basic Mathematics	T	-	-
Sets and number line, Basic algebra; expressions, functions, and equations. Basic Calculus; limits, differentiation, and integration.				

PED 12108	Sports Kinesiology	T	-	-
Introduction to kinesiology ,Brief history of kinesiology, meaning and definition of				

kinesiology , important of kinesiology for games and sports , functional/kinesiology classification of muscles, role of muscles

PED 12109	Information Technology II	T	P	-
Introduction to Web design: Introduction to web designing software, Introduction to html, Creating blogs, Graphics and image editing, Word processing (how to add reference, table of content, reports etc.), Spreadsheet, database management software, presentation tools. Introduction to sports analysis and performance analysis software.				

PED EGP1201	General English II	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Year II Semester I				
PED 21101	General Fitness III	T	P	-
Practical session covers one-hour moderate intensity physical activities such as continuous running, speed running, upper body strength, fundamental Movement on bars and jumps.				

PED 21302	Foundation of Movement Skill Acquisition (Basketball, Hockey, Soccer)	T	P	-
History of the sport, Basic movements of the sport. Basic techniques and skills of selected sport, teaching methodology of techniques for beginners, Rules of the game, Basic formation systems for beginners.				

PED 21203	Practicum I	T	P	F
Teacher and the teacher's role; Teachers' concern theory and check list; Methods of knowing to become a competent physical education (PE) teacher; Major characteristics that should be possessed by a competent PE teacher; Code of Ethics for teachers in physical education; Objective model and Procedures model in curriculum designing in physical education; Bloom's Taxonomy; Objective statements and lesson planning; School/Industrial plant; Practical teaching sessions at school settings (Two days block within the mid semester and three days block before the end semester).				

PED 21204	Dance	T	P	-
Introduction to dance: Elements of dancing; Importance of dance to physical fitness: Health benefits; Perform dances using simple movement patterns: Body Awareness; Introduction to Falk dance: History, Perform dances using Falk dance styles; Characteristics of Falk dance; Develop co-ordination and rhythm with free dancing styles: Four gestures (Abhina), Expressions (Bhava), Spatial Awareness: Formations, Levels, introduction to classical Dance, Dance Arrangement; Create a dance using a range of movement patterns: Group, Individual.				

PED 21205	Physical Education in Pre School & Primary School	T	-	F
Pre-school education in world context; Primary education in the world context; Pre-school PE in world context; Primary school PE in world context; Pre-school education and physical education in Sri Lanka (Theory with practical); Primary school education and physical education in Sri Lanka (Theory with practical). Pre-School visits and a minor project work of a report with presentation. Primary School visit and a minor project work of a report with presentation.				

PED 21206	Health and physical Education	T	-	-
The concept of disease, iceberg phenomenon of disease, concept of disease control and Prevention, non-communicable diseases, Communicable diseases, Universal infection control precautions, Sexually transmitted diseases (STDs), Contraceptive methods; Indicators of health National immunization schedule in Sri Lanka: illness-wellness continuum; Maslow's hierarchy of needs; Health care of the community -Concept of health care, Health system, Levels of health care, Model of a health care system; Health and Wellness definitions, skill related physical fitness terms; Introduction to health and health behavior; concept of health, health and disease; dimensions of health; determinants of health; Health behavior- models of health behavior, global health issues in 21st century; Public health services in Sri Lanka.				

PED 21207	Educational Psychology	T	-	-
Introduction: the importance of studying educational psychology; Teacher and the teacher's role; Teachers' concern theory; Learning theories: cognitive approaches including constructivists approach (Piaget &Vygotsky), behaviorist approaches, social approach, humanistic and biological approach; learning types: cognitive, psychomotor and affective learning; Intelligence; Memory; Motivation and emotion; Perception; Personality.				

PED 21208	Basic Statistics	T	P	-
The nature of probability and statistics, variables, and types of data. Frequency tables and distribution, graphs, shapes of distributions, summary measures, principles of probability and conditional probability, Random variables, and probability distributions. Introduction to statistical software for data management, presentation, description, and solve probability problems				

PED EAP2101	Academic English I	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Year II Semester II				
PED 22301	Foundation of Movement Skill Acquisition (Elle, Judo, Table Tennis)	T	P	W
History of the sport, Basic movements of the sport. Basic techniques and skills of selected sport, teaching methodology of techniques for beginners, Rules of the				

game, Basic formation systems for beginners.

PED 22202	Practicum II	T	P	
Learning theories; Teaching methods/ strategies; Preparation and usage of teaching/ learning resources; Teaching models in PE: technical model and 5E approach to lesson planning, game sense, sport education etc.; Other contemporary approach to curriculum designing in PE: key learning areas; Fundamental motor skills, outcome base education; Vocational education, Bicultural awareness etc.; Practical teaching sessions at school settings (Two days block within the mid semester and three days block before the end semester).				

PED 22203	Physical Education in Secondary School & Tertiary Institution	T	-	-
Secondary school education in world context; Tertiary education in world context; Secondary school PE in the world context; PE in Tertiary Intuitions in the world context; Secondary school education and physical education in Sri Lanka; Education and physical education in tertiary institutions in Sri Lanka. Secondary school visits and a minor project work and a presentation with a report. Tertiary institutes visit and a minor project work and a presentation with a report.				

PED 22204	Curriculum Perspective and Issues in Physical Education	T	-	-
The origin of curriculum: Greeks' notion of curriculum (the running track); Definitions of curriculum; The history of the present; Social constructionists approach to design physical education curriculum; Major discourses in physical education; Contemporary curriculum practices in physical education in the world context; The major issues facing the physical education in the world context; Capitalist, socialist and mixed mode physical education curriculum in Sri Lanka; Major issues for the development of physical education curriculum in Sri Lanka; Physical education curriculum designers in Sri Lanka.				

PED 22205	General Theory of Sports Training	T	P	-
Basic aspect of athlete preparation: A coaching Philosophy; Basic concepts of sports training; Principles of sports training; The load and biological adaptation, Sport as a long period process: Component of fitness (Physical qualities); Energy systems training; Content and objectives in the planning of the training process; Periodic and cyclic Scheme of Matveev and their characteristics; Planning of training – the yearly plan; Planning a practice session; Forms of control and evaluation				

PED 22206	Sports Biomechanics	T	P	-
Introduction of Biomechanics; concepts of mechanics as they apply to human movement; Determination of the center of mass of the human body; Fundamentals of angular kinetics; The body's movements; The joints of the body, Muscles, the power house of movement; Biomechanical experiment procedures; Data processing; Linear velocities and accelerations caused by rotations; Fundamental				

movements; Movement patterns; Introduce human motion analyzing software for sporting activities.

PED 22307	Sports Nutrition	T	-	F
Basics of nutrition, Energy expenditure during physical activity, Carbohydrate and exercise performance: Fueling up before exercise; carbohydrate intake during exercise; Post exercise refueling, Fat and exercise performance: Fat oxidation and fat intake during exercise; High fat diets, Protein requirement for exercise, Weight maintenance and body weight issues: Strategies for eating to loss body fat, Vitamins, minerals and antioxidants requirement for exercise, Fluid and electrolyte loss and replacement in exercise, Sport supplements and their side-effects..				

PED EAP2201	Academic English II	T	-	-
https://www.sab.ac.lk/app/eltu-curriculum				

Year III Semester I				
PED 31301	Teaching games in Physical Education (Karate, Baseball, Weight Lifting)	T	P	F
History of the sport, Basic movements of the sport. Basic techniques and skills of selected sport, teaching methodology of techniques for beginners, Rules of the game, Basic formation systems for beginners.				

PED 31202	Practicum III	T	P	F
Developing relationship skills- personal qualities and characteristics; Actions for establishing personal relationships; Actions to help students feel good about themselves; Developing instructional skills - Clarity of communication; Beginning a lesson; Concluding a lesson; Questioning and responding; Practical teaching sessions at school settings (Two days block within the mid semester and three days block before the end semester).				

PED 31203	Sport Psychology	T	-	-
Introduction to sports psychology; Basic psychological concepts; Motivation in sports and exercise; Arousal, attention and personality of athlete; Situational factors related to anxiety and mood; Improve your self-confidence; Psychological obstacles in the clay of performance.				

PED 31204	Teaching outdoor pursuits and Contemporary Activities	T	P	
History, resources, programs, facilities, operations and management philosophy of OBT; Governmental agency, private sector, and non-profit sector cooperation in nature park management & Outdoor recreation; Current issues, research and professional practice related to OBT in its programs; Committee updates and preliminary presentations by student Track Teams. Final Trip Logistics and Preparations; Outdoor Recreation Consortium Non-Perial Mountains, Natural Resource Park; Course wrap- up, conclusions and evaluation.				

PED 31205	Advanced Statistics	T	P	
Point and interval estimation, testing of hypothesis; principles of hypothesis, tests for mean, proportions, and variance. The strategy of experimentation, basic principles of experiments, experiments with a single factor, analysis of variance (ANOVA), randomized blocks design, mean comparisons methods, and factorial experiments. Nonparametric statistics: Single sample tests, Two-sample tests, Multiple sample tests, and Rank Correlation. Practical: Testing hypothesis and constructing confidence intervals, Analysis of rank data, Analysis of simple and factorial experiments data.				

PED 31206	Advance Theory of Sports Training	T		
Methods of sports training, Strength, Endurance, Speed, Agility, Flexibility and Coordination; High altitude training, Planning and preparation of macro cycles, Planning and preparation of meso cycles, Planning and preparation of micro cycles, Planning and preparation of training work outs, Training in extreme conditions, Psychology of athlete preparation and performance, Forms of control and evaluation Of the physical component of the preparation, Forms of control and evaluation of the technical component of the tactical preparation.				

PED 31207	Sport Business and Human Resource Management	T	-	-
Introduction to sports development; Sports development policy; sport, development and community; community sports development; sports development continuum; sectors and levels of provision; sports development stake holders; current system of SD; Sports Ministry and its role: Department of sports development, Provincial department of Sports, Roles and nature of duty ,Introduction to human resources management: Definition of human resources management; Evaluation of human resources management; Advantages of human resources management and significance; Functions of human resources management, Human recourses planning, Job analysis, Job designing, Recruitment and selection, Induction, Performance evaluation, Training and development.				

PED 31108	Strength and Conditioning	T	P	-
Discovering where to locate strength and conditioning research; Anaerobic exercise prescription: needs analysis, exercise selection, training frequency, exercise order, training load and repetitions, volume and rest periods; Strength and power development; Plyometric training: plyometric mechanics and physiology, plyometric program design and age considerations, plyometric and other forms of exercise, safety considerations, plyometric drills; Speed development; Endurance development; Core stabilization: spinal stabilizing program creation; SAQ training; Resistance training and spotting techniques; Aerobic conditioning; Anaerobic conditioning; Periodization for bio motor abilities; Agility training; Designing strength and conditioning programs for different sports. Practical sessions covering the demonstration and evaluation of: dead lift, squat, Olympic				

lifts and derivatives; plyometric exercises; SAQ and speed development exercises; agility exercises; and core stabilization.

PED 31109	Cultural Sports in Sri Lanka	T	-	-
Introduction to Sinhala combative, Field and aquatic sports and games; Combative Sports; Field sports (with animals); Field games (religious); Aquatic sports; Asian Children's game; Traditional games and sports in Sri Lanka, Traditional games and sports in Asian countries festivals; Festivities and games associated with the Sinhala and Hindu New Year				

PED 31110	Minor Games in Sports	T	-	-
Overview of minor and major games for children's physical activity participation small-sided and modified games from different game categories including; team building and cooperation games; reaction and chasing games; warm-up games; Game Sense games; general games; circuit activities; and cultural games. Students will develop an understanding of these game categories; develop knowledge and skills to apply movement concepts and strategies in minor and major games; modify games and activities for participation and skill development; and instruct games and activities for participation and skill development.				

PED 31111	Politics, Economy and Sports	T	-	-
Apply theoretical information as it relates to the Sports and International Relations. Students examine the history of sports and its significance in economics, politics, and the development of a national identity. Students also examine specific issues such as the emergence of professional sports in Canada, UK, USA etc. questions of ethics, commercialization, the relationship between sports and media, the internationalization of sports, and the Olympic movement				

PED-EBP-3101	Business English	T	P	W
https://www.sab.ac.lk/app/eltu-curriculum				

Year III Semester II				
PED 32201	Specialization of Selected Sport - I	T	P	-
Tactics of the game (Attacking & Defensive), Formation systems (Attacking & Defensive). Match Systems, Planning of training, Training Sessions, Role of the Coach, Statistics especially for the sport, and Different type of game situation drills. Students need to select a one sport that will be listed by the department in the assigned semester for the both specialization part 1 and part 2. Students need to do an action research minor project related to the selected sport (group project) and they need to submit the project report with a presentation. The department organizes workshops relevant to particular sports.				

PED 32202	Test and Measurement in PE	T	P	
Introduction to Test, Measurement and Evaluation, Types of tests, Characteristics of an assessment tools, Purpose of assessment in PE, Test selection procedure,				

Statistical analysis, Test administration, Physical fitness measurement, Health related physical fitness test, Skill related physical fitness tests, The measurement of Flexibility; Cardiovascular fitness; strength; endurance; agility; balance; power; speed; coordination; reaction. Anthropometric measurements, Body composition measurements.

PED 32203	Comparative Physical Education	T	-	F

Introduction and present physical education programs in Sri Lanka: Physical education in the general education and higher education systems; Physical education at present in the United Kingdom, Portugal, Netherlands and in the Germany; Physical education at present in the USA and in Canada; Physical education at present in China, India and Japan; Physical education at present in Australia and in New Zealand; Physical education at present in Brazil, and in Cuba; Physical education at present in South Africa and in Kenya; Comparison of physical education systems in deferent countries mentioned above with Sri Lankan system. Field visits: the first one to study general physical education curriculum in the National Institute of Education (NIE) at Maharagama where the existing curriculum designing is being carried out, the second field visit to Ministry of Higher Education/University Grants Commission to study physical education in higher educational institution in Sri Lanka.

PED 32204	Sociology of Sports	T	-	-

Sport, theory and the problem of values; Sport, history and social change; Sport, politics and culture; Sport and globalization; Internationalism, reconciliation and sport in the making of nations; Sport, media and television; Sport, law and governance; Other' sporting communities; Sport, violence and crime; Sport, body and society; Sport and the environment; Sport and religion; Sport, lifestyles and Alternative cultures; Sport, identities and recognition.

PED 32205	Sport, Education Ethics & Law	T	-	-

The history of the legal systems in Sri Lanka, Legal systems in Sri Lanka, A brief introduction to the constitution of Sri Lanka and the powers of the constitution, Introduction to the personal laws: Kandyan law; Muslim law; Thesawalamei law, Functions of legislative, Executive and judiciary systems of Sri Lanka. The laws relating to the sport in the world: History of sport law in the world, the laws relating
to the sport in Sri Lanka: Sport law in Sri Lanka (no.25 of 1973); Sport (amendment) acts, the rule of law and principles for good governance and ethical practice: Corporate governance, Moral reasoning and ethical theory, Stakeholder relationships, Managerial ethics and the rule of law, Improving the ethical climate in organizations and code of ethics, Social responsibility and organizations.

PED 32206	Olympic Movement	T	-	

Foundations of the Olympic Movement and the modern Olympic Games; The International Olympic Committee- Role and structure of the IOC, Olympic

financing, Olympic solidarity, The Olympic museum; The national Olympic committees; The Olympic Games; Values and issues.

PED 32207	Research Methodology in physical Education	T	-	-
What is research; What is science; Methods of inquiry; Scientific method; Characteristics of research; Types of research; Research Methodology; Qualitative, quantitative and mixed-method research; Ethics of research; The process of research (identifying the problem, literature review, formulating a hypothesis, developing the research plan, collecting data, analyzing data using appropriate techniques, interpreting results and forming conclusions); Writing a research proposals. Scientific writing.				

PED 32108	Child and Adolescent Psychology	T	-	-
Introduction and history of Child and Adolescent Psychology; Developmental theories; Genetics; Prenatal development and birth; Two years and biosocial development; Two years and cognitive development; Two years and psychosocial development; Childhood and biosocial development; Childhood and cognitive development; Early childhood and cognitive development; Middle childhood and biosocial development; Middle childhood and cognitive development; Middle childhood and psychosocial; Adolescence and biosocial development; Adolescence and cognitive development; Adolescence and psychosocial development; Finals.				

PED 32109	Sexual Health, Relationships and Sexualities	T	-	-
This subject explores the concepts of sexual health, sexuality, identities and relationships. It examines sexuality and sexual health from a range of perspectives, including medical, psychological and socio-critical perspectives. In addition to developing content specific knowledge across these three areas, this subject provides students with the opportunity to consider the teaching and learning contexts required for teaching sensitive areas of sexuality and sexual health education. In doing so, this subject aims to provide pre-service teachers with i) content specific knowledge in relation sexual health, reproduction, relationships and sexuality; ii) opportunities for the critical examination of sexuality norms and discrimination; iii) the opportunity to consider the specific pedagogical approaches required for the development of teaching and learning in sexuality education that is sensitive, considers the cultural and social locations of students, and considers the needs and identities of young people; and iv) the opportunity to review and implement sexual health and relationships resources and websites, and examine them in relation to their uptake and implementation in health education.				

PED 32110	Sport Journalism	T	-	-
Ethics and law for the sports journalist; Writing sports stories; Sport, society and the sporting media; Sports studio TV skills; Sports news and reporting; Multiplatform sports journalism; Writing sports features; Writing criticism; Web production for sports journalists; The sports journalist's toolbox; Life as a freelance sports journalist; Presenting skills				

PED 32111	Drugs and Sports	T	-	-
Introduction to drugs and sports: Define the drug; Development process of new drugs; Drugs and their targets; Agonist drugs and Antagonist drugs; Drug reactions, Drug toxicity, Side effects of drugs, Complex drug reactions, Drug use and abuse in sports, Legal aspects of drugs use in sports, Historical perspective of drug abuse in sports, Introduction to doping and doping classes and methods: CNS stimulants; Sympathomimetic amines and their antagonists; Drug treatment of inflammation in sports injuries; The anabolic steroids and peptide hormones; Anti-anxiety drugs and sports; Diuretics; Physical and Chemical manipulation; Gene doping.				

Year IV Semester I				
PED 41101	Professional Development	T	-	W
Career exploration and Graduate school preparation: Career Development Models, Steps in the career planning/ graduate school process, Job search and graduate school search skills and strategies, Marketing Yourself, Overview of resume, Cover letter, Professionalism & First Year on the Job, Ethics and Etiquette. Money management: Financial Planning & Money Matters. Leadership and Community development, Professional/ Academics Portfolio. Students are expected to prepare Portfolio and at the end of the course need to submit for grading.				

PED 41302	Sports Administration	T	P	F/W
Principles, structure and leadership of the sport organizations: Structure of major Games organizing: Player management in sports; supporting athletes, athletes and commercialization, promotion of anti-doping practices in sport governance, athlete agreements and dispute resolution in Sport organizations, developing coaching leadership, social media management of sport administration, Promoting values through sport; promoting the inclusion and gender equality in sport administration; Managing harassment, abuse and violence in sport through Sport Administration, Management Skills, Managing the organization, managing resources, managing activities, Sport Administration in Sri Lankan context; governmental and non-governmental organization, Future directives of the Sport Administration				

PED 41203	Adapted Physical Education	T	P	F/W
Physical Education for children and with special intellectual education needs and behavioral disorders: Review of main aspects of the subject; Curricula adaptation; Mental reiteration; emotional and behavioral disorders, PE for children and youngsters with sensory dysfunction and communication disorders: Sensory dysfunction blind and visually impaired people; Hearing and sight impairment, PE for the children and youngsters with motor disorders: Physical – motor disorders; Strategies for educational intervention.				

PED 41204	Community Service Project	T	GP	-
This course will provide students with an opportunity to undertake a community service project in order to develop an appreciation for how their discipline				

knowledge intersects with community need. Students will work in multidisciplinary teams to manage real projects and solve real problems experienced by community organizations/ area. They will work with the community to understand their needs, scope the project and develop viable and sustainable solutions. Students will complete a learning journal throughout the course which reflects on the progress of the project, their use of the knowledge and skills taught throughout their degree, and the relevance of the community service project experience to their future careers. Student need to submit a project report relevant to their project.

PED 41205	Sport Facility Design	T	P	F
Introduction to Sport facility, Facility provision principles, Facility Planning objectives, Facility planning process, Facility need assessment, Feasibility study for the sport facility, designing sport facility, Construction process of the sport facility, Basic surveying for the sport facility, Methods of establishing new point with reference to two points. Introduction to the measuring equipment, Errors of measurement, Drawing track and field facilities and different court layouts.				

PED 41206	Science of Yoga and Relaxation	T	P	W
Introduction, Basic technique and practice of yoga, Breath control (pranayama), Meditation techniques, Physical postures (yoga asana), Mantras (sacred chants) and Philosophical and religious scriptures, Yoga sutras.				

PED 41207	Specialization of Selected Sport (Coaching)	T	P	W
Refereeing & Officiating, Match and Techniques analyzing, coaching practice, Code of Ethics of the Coaches, Coaching of the match and coach's behavior, Advance training of deferent evaluations of the techniques and tactics. Students need to continue the specializing the same sport that they selected in the Specialization of a Selected Sport – Part 1. Students need to do an action research minor project related to the selected sport (Individual mini-project) & students need to submit the project report with a presentation. The department organizes workshops relevant to particular sports.				

PED 41208	Physical Literacy	T	P	
Introduction to physical literacy, High Five principle of healthy child development, High five sport, NCCP fundamental movement skill, Sport for life quality physical literacy experiences and program evaluation, Relationship between physical literacy, physical activity, & physical fitness.				

PED 41109	School Policy and Programs in Sri Lanka	T	P	W
Introduction and history of education policy in Sri Lanka; The role of an education system in a society; General education system; Education policy reforms; Status of the education system of Sri Lanka prior to the implementation of free education policy; Government policies on the provision of free education and its key milestones.				

PED 41110	Reflective Practices in Physical Education	T	-	-
The reflective student/ teacher; Learning to reflect; Becoming a reflective teacher/ coach- Habitual teaching and intentional reflection; An action research approach to reflective teaching; Monitoring and reflecting, getting good data, different types of data; Keeping a journal for reflection; Reflective practice, playing the game of reflection; Reflecting on sport and PE teacher/ coach education programs: Coaching philosophy, Effective coaching, Principles of coaching, Planning and organization, Pedagogy for coaching, Communication skill acquisition, Psychology for coaches, Principles of management, Inclusive coaching, Reflective coaching timetable and teaching. School visits and the department organize a Workshop				

PED 41111	Guidance and Counselling	T	-	-
Introduction of Education and Vocational Guidance, Meaning of guidance, need for guidance and its scope in Sri Lanka, aims of guidance; Foundations of guidance (Philosophical, Psychological and Socio-cultural); History of Guidance Movement in Sri Lanka; Types of guidance (Education, Vocational and Personal); Non-Testing Techniques in Guidance; Testing Techniques in Guidance; Guidance Services; Roles of the following in the Guidance Services; Occupational information, meaning and importance, information about education and job opportunities; Counseling				

Year IV Semester II				
PED 42801	Research Project	TH		
Students have to be required to conduct either research or survey related to Physical Education either at a relevant industry, research institution, or at the faculty. Students can conduct a product development for the research project, in which case they have to evaluate the product using a research methodology. The thesis should compulsorily consist of the following parts: 1. Introduction 2. Literature review and the theoretical framework 3. Methodology 4. Results and Discussion 5. Conclusion and recommendations 6. References 7. Annexes The duration of the project period should be 15 weeks. Project proposal needs to be submitted to the department for the approval through the internal supervisor within the first two weeks and the project report (Thesis) should be submitted at the end of the semester. Guidelines for the preparation of report will be given separately. Students are advised to plan their project, review relevant literature, develop methodologies and establish links with relevant organizations during the first semester				

PED 42202	Industrial Training	TH	
Student will be required to conduct either training related to Physical Education at a relevant industry duration of the project period should be minimum of 15 weeks. A project report should be submitted at the end of the semester and should be presented and defended by the respective student in front of an Examination Committee			

appointed by the department. A guideline for the preparation of report will be given separately.

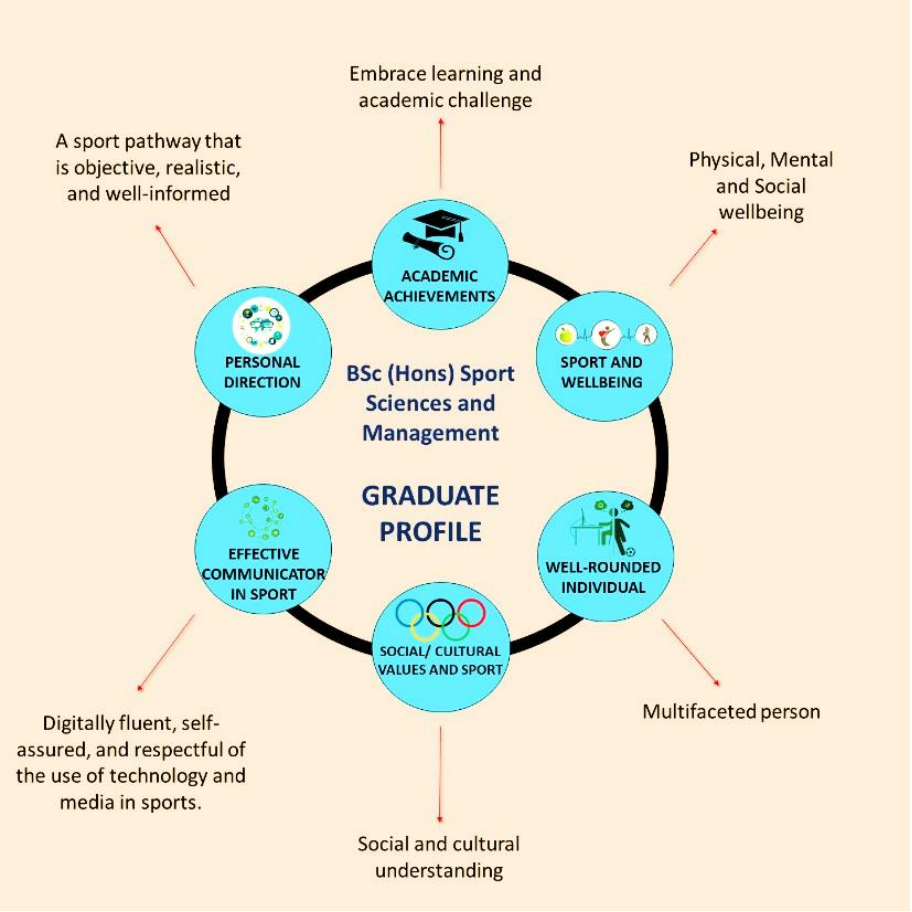
Rules and regulations

- Elective course unit will be offered provided a minimum of five (05) of the registered students apply for the given course unit.
- Student should follow at least courses which are not less than total credits of five (05) out of eleven (11) credits elective course in the Year III Semester I, Year III Semester II and Year IV Semester I.
- Students should do the Community Service Project (PED 41204) relevant to Health and Physical Education promotion or Sports infrastructure development.
- Student should go for the Industry training relevant to the Physical Education & Sports in the Year IV Semester II, which is compulsory for all. Also, students should submit Internship Placement Offer Letter to the Department prior to the commencement of Semester VI.
- Depending on the availability of the resources, Specialization of Selected Sport – I and Specialization of Selected Sport (Coaching) will be decided by the Department.
- 6. Obtaining a pass for the General, Academic and Business English Program (PED-EGP-1101, PED-EGP-1201, PED-EAP-2101, PED-EAP-2201 and PED-EBP-3101) is a requirement for the award of the B.Sc. Honours Degree in Physical Education.

Degree Programme:

BSc. Hons Degree Programme in Sport Sciences and Management [BScHons (Sport Sc & Mgmt)]

Anticipated Graduate Profile



A graduate of BSc Honours Degree Programme in Sport Sciences and Management will possess the following attributes:

- Knowledgeable and skilled in Sport Science and Sport Management.
- Knowledgeable and skilled in sport coaching/teaching at the National level and International Levels.
- Ability to design, apply and evaluate scientific training methods to sport training in optimize sport performances in athletes at all levels.
- Critical thinkers with analytical and problem-solving skills in the fields of sport coaching/teaching and sport management.
- Engaging adopted lifelong physical activities.

- Ability to do the right effort to improve mindfulness and concentration.
- Skilled in communicating sport science and sport management programmes in professional and sport coaching/teaching contexts.
- Skilful leaders in the field of sport.
- Responsible citizens who are ethical and professional in action.

Course notation

A course code contains an abbreviation to the name of the degree program, year of study, semester of study, number of credits assigned for the subject and the subject code respectively.
Example: The course code of SSM 12308 denotes the following.

Degree Program	Year	Semester	No. of Credits	Subject Code
Sports **S**ciences and **M**anagement	**1**	**2**	**3**	**08**

Summary of the courses

YEAR I SEMESTER I			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 11101	Foundation of Sports Sciences and Management	1	C
SSM 11202	Foundation of Professional Development	2	C
SSM 11103	Foundation of First Aid in Sport	1	C
SSM 11104	Movement Concepts, Skill Analysis, Performance, and Practices in **Gymnastics**	1	C
SSM 11105	Movement Concepts, Skill Analysis, Performance, and Practices in **Swimming & Life Saving**	1	C
SSM 11106	Movement Concepts, Skill Analysis, Performance, and Practices in **Athletics (Track Events)**	1	C
SSM 11107	Movement Concepts, Skill Analysis, Performance, and Practices in **Basketball**	1	C
SSM 11108	Movement Concepts, Skill Analysis, Performance, and Practices in **Volleyball**	1	C
SSM 11209	Basic Mathematics	2	C
SSM 11210	Human Anatomy	2	C
SSM 11211	Introduction to Sport Management	2	C
SSM-EGP- 1101	General English I	0	C
Total Credits = 15 (Compulsory = 15 and Elective = 0)			

YEAR I SEMESTER II			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 12101	Fundamental Motor Skills	1	C
SSM 12102	Movement Concepts, Skill Analysis, Performance, and Practices in **Athletics (Field Event-Jumps)**	1	C
SSM 12103	Movement Concepts, Skill Analysis, Performance, and Practices in **Netball**	1	C
SSM 12104	Movement Concepts, Skill Analysis, Performance, and Practices in **Soccer**	1	C
SSM 12305	Exercise Biochemistry	3	C
SSM 12206	Basic Physics	2	C
SSM 12207	Human Physiology	2	C
SSM 12208	Olympic Movement and Olympism	2	C
SSM 12109	Introduction to Information Technology	1	C
SSM-EGP- 1201	General English II	0	C
One credit to be selected from the following elective subjects			
SSM 12110	Movement Concepts, Skill Analysis, Performance, and Practices in **Cricket**	1	E
SSM 12111	Movement Concepts, Skill Analysis, Performance, and Practices in **Elle**	1	E
Total Credits = 15 (Compulsory = 14 and Elective = 1)			

YEAR II SEMESTER I			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 21101	Movement Concepts, Skill Analysis, Performance, and Practices in Athletic (**Field Event-Throws)**	1	C
SSM 21102	Movement Concepts, Skill Analysis, Performance, and Practices in **Weightlifting**	1	C
SSM 21203	Fundamentals of Statistics	2	C
SSM 21204	Education Psychology	2	C
SSM 21205	Introduction to Sport Biomechanics	2	C
SSM 21206	Concepts of Sport Event Management	2	C
SSM 21207	Sport Facility Design and Management	2	C
SSM 21108	Kinesiology	1	C
SSM-EAP-2101	Academic English I	0	C
One credit to be selected from the following elective subjects			
SSM 21109	Movement Concepts, Skill Analysis, Performance, and Practices in **Table Tennis**	1	E

SSM 21110	Movement Concepts, Skill Analysis, Performance, and Practices in **Tennis**	1	E
SSM 21111	Movement Concepts, Skill Analysis, Performance, and Practices in **Badminton**	1	E
One credit to be selected from the following elective subjects			
SSM 21112	Movement Concepts, Skill Analysis, Performance, and Practices in **Rugby**	1	E
SSM 21113	Movement Concepts, Skill Analysis, Performance, and Practices in **Hockey**	1	E
Total Credits = 15 (Compulsory = 13 and Elective = 2)			

YEAR II SEMESTER II			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 22201	Sport Physiology	2	C
SSM 22202	Sport Injury Prevention and Rehabilitation	2	C
SSM 22203	Theory and Methodology of Sports Training	2	C
SSM 22204	Practicum 1: Teaching Methodology	2	C
SSM 22205	Human Resource Management in Sport and Leisure	2	C
SSM 22206	Design of Experiments and Analysis	2	C
SSM 22207	Marketing Approaches in Managing Sports	2	C
SSM-EAP-2201	Academic English II	0	C
One credit to be selected from the following elective subjects			
SSM 22108	Movement Concepts, Skill Analysis, Performance, and Practices in **Judo**	1	E
SSM 22109	Movement Concepts, Skill Analysis, Performance, and Practices in **Wrestling**	1	E
One credit to be selected from the following elective subjects			
SSM 22110	**Traditional Sport and Sport Culture in Sri Lanka**	1	E
SSM 22111	**Sport for Differently Abled Persons**	1	E
Total Credits = 16 (Compulsory = 14 and Elective = 2)			

YEAR III SEMESTER I			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 31201	Exercise Physiology	2	C
SSM 31202	Sport Biomechanics	2	C
SSM 31303	Sport Nutrition	3	C
SSM 31104	Long Term Athlete Development	1	C
SSM 31205	Outdoor Recreation and Leadership	2	C

SSM 31206	Statistical Modelling and Survey Methods	2	C
SSM 31207	Sport Media and Communication	2	C
SSM 31208	Legal Perspectives in Managing Sport	2	C
SSM-EBP-3101	Business English	0	C
One credit to be selected from the following elective subjects			
SSM 31109	Movement Concepts, Skill Analysis, Performance, and Practices in **Sport Aerobic**	1	E
SSM 31110	Movement Concepts, Skill Analysis, Performance, and Practices in **Fitness Aerobic**	1	E
Total Credits = 17 (Compulsory = 16 and Elective = 1)			

YEAR III SEMESTER II			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 32201	Sport Psychology	2	C
SSM 32202	Advanced Theory and Methodology of Sports Training	2	C
SSM 32203	Specialization I: Foundation of Sport Coaching and Practices	2	C
SSM 32204	Practicum II: Teaching Methodology and Practice	2	C
SSM 32205	Test, Measurement and Evaluation of Physical Activity	2	C
SSM 32206	Research Methods and Design in Physical Activity and Sport	2	C
SSM 32207	Financial Management in Sport Organization	2	C
SSM 32208	Sport Sociology and Community Service	2	C
SSM 32109	Sport Technology, Innovation and Entrepreneurship	1	C
Total Credits = 17 (Compulsory = 17 and Elective = 0)			

YEAR IV SEMESTER 1			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 41201	Exercise Prescription	2	C
SSM 41202	Practicum III: Teaching Practice	2	C
SSM 41303	Specialization II: Sport Coaching and Practices	3	C
SSM 41204	Applied Biomechanics	2	C
SSM 41305	Sport Administration	3	C
SSM 41206	Contemporary Issues in Sport Development	2	C
SSM 41207	Tourism Promotion Through Sport and Leisure	2	C

One credit to be selected from the following elective subjects			
SSM 41108	Digital Society and Sport Application	1	E
SSM 41109	Nutrition Periodization	1	E
Total Credits = 17 (Compulsory = 16 and Elective = 1)			

YEAR IV SEMESTER II			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 42601	Final Year Research Project	6	C
SSM 42202	Industrial Training	2	C
SSM 42003	General Fitness	0	C
Total Credits = 08 (Compulsory = 08 and Elective = 0)			

SUMMARY OF CREDITS OFFERED:

YEAR	SEMESTER I	SEMESTER II	TOTAL
Year I	15	15	30
Year II	15	16	31
Year III	17	17	34
Year IV	17	08	25
TOTAL			120

Detailed Syllabus

Abbreviations

CA - Continuous Assessment
F - The department organizes field visits relevant to the particular subject area
FBA - Field-Based Assessment
FINA - Federation International De Natation
GP - Group Project
MAG - Men's Artistic Gymnastics
MCSAPP - Movement Analysis, Skill Analysis, Performance and Practices
P - Practical
PRC - Prerequisite Course
T - Theory
TH - Thesis
W - The department organizes workshops relevant to a particular sports/course unit
WAG - Women's Artistic Gymnastics

Sports practical and specialization

One of the sports in the MCSAPP is to be selected for Specialization-I and the same sport will be continued in the Specialization-II according to the availability of specialized lecturers (internal or external). Though students select specialization sport from the MCSAPP subjects, which can be categories as group game (Cricket/Elle, Netball, Rugby/Hockey, Soccer, Basketball and Volleyball) and individual game (Athletics, Gymnastics, Judo/Wrestling, Aerobics, Swimming and Lifesaving, and Tennis/Table Tennis/Badminton). Team sport will be offered provided a minimum of 8 of the registered students applies for specialization-1. For individual sport minimum of 2 students need to be registered to offer the Specialization-I. However, the Head of the Department may have the authority to wave off the minimum number of students' requirement considering the course ILOs of sport in Specialization-I.

Department will finalize the specialization offering sports with the concern of senior lecturers who are engaged in MCSAPP courses. Students have to do the research project interact with the specialization sport with the approval of the department. The department organizes workshops relevant to the particular sports/course units. In the special situation, the department will be introduced workshops to cover the course content of sport practical and specialization subjects. For more details, refer to *Sport Specialization in SSM Manual*.

Sport safety

Students have to follow recommended code of ethics which was introduced by the subject lecturer through the entire training plan. Before starting each of the practical sessions, the subject lecturer has to verify whether all relevant apparatus is placed in the safety mode or not. If apparatus and relevant sources (first aid box, relevant demonstrators, instructors, etc.) are in safe mode to prevent injuries, the subject lecturer will be commenced the practical session. Training stimulus will be adjusted in special situations: chronic injury, physique, psychological problem, and any relevant issue. The department will not allow any sport-practical session to students who are receiving medication or treatment or have any existing medical conditions, illnesses or injuries, or physical/mental disabilities, or pregnancy. The student has to inform the department through full written details together with doctor's certificates. All students who like to take up sport practicals (MCSAP&P and Sport Specialization) with the SSM must be physically active with no injuries or medical conditions which must affect his/her performance during the lesson. If a student failed to follow *the safety rules or the instructions or code of ethics* which are released by the department, the subject lecturer will terminate the student's ongoing practical session and consider the student as absent for the practical session.

Prerequisite courses

Students must have taken the Prerequisite Courses (PRC) before enrolling in specific courses in the SSM degree programme. The minimum competency level of PRC is a

D grade or at least 40% from CA for required theory subjects as mentioned under the detail of courses. The minimum requirement to select a Specialization-I subject is a C grade for a particular sport in MCSAPP subjects.

In the first academic year, most of the subjects consist of basics science and foundation of movement concepts and practices. Basic science subject and movement concepts will interact for the foundation of sport specialization in the second academic year. A student can select one sport that is available in the MCSAPP subjects in the SSM curriculum as their specialization subject at end of the third year, first semester. MCSAPP subjects are categorized as Racket sport (Badminton/Table Tennis/Tennis), Inversion sport and Striking sport (Basketball, Volleyball, Soccer; Rugby/Hockey and Cricket/Elle), Combat sport (Wrestling/Judo), Recreational sport (Swimming & Lifesaving and Netball), and other sport (Gymnastics, Athletics, Weightlifting, Sports Aerobics/Fitness Aerobics). Further, students can select to study one of the sports among Traditional Sports & Sports Culture in Sri Lanka and Sports for Differently Abled Persons.

Industrial training

Students have to find suitable institutes for their industrial training with the approval of the Department. The finding of placement will depend on the availability of places in the relevant organizations. In the case of students find placements for themselves and they should inform the Department of Sports Sciences and Physical Education immediately unless the Department will find placements for them. Once placements are found by the Department, open interviews or discussions will be organized to select candidates to relevant organizations. However, Department is not taking responsibility to find the placements for students. For more detail, you are invited to read *Industrial Training Manual SSM 42202*. It included all information for students.

Attendance

Attendance at all classes and other academic appointments is required. Students cannot miss more than 20% of all regularly scheduled courses, which translates into no more than *three lectures out of fifteen lectures*. An excused absence (to be determined by the lecturer, such as for illness, etc.) must be reported to the subject lecturer (via email/official evidence) as soon as possible and before the next class. Written documentation by an external entity must be provided (doctor's note, etc.). Arriving late and leaving early to any classes other academic appointments is unprofessional. If you are more than 10 minutes late or leave more than 10 minutes early to any scheduled course meeting, you will be marked as absent for the entirety of the two-hour/three-hour/workshop: more than three-hour session and will not earn any points for in-class activities.

Special assistance

If students represent Sri Lanka University Games (SLUG) or World University Games or National level sport competition or any official participation, Department may provide essential facilities to cover missed lectures (theory and practical) with the support of the senior lecturers.

	Year I		Year II		Year III		Year IV	
	Semester I	Semester II	Semester I	Semester II	Semester I	Semester II	Semester I	Semester II
Credited and Compulsory courses	15	14	13	14	16	17	17	8
Credited and Optional courses	0	1	2	2	1	0	0	0
Non-credited and compulsory courses	1	1	1	1	1	0	0	1
Total credits	**15**	**15**	**15**	**16**	**17**	**17**	**17**	**08**

Requirements for the completion of the degree

- Students should earn a total of 120 credits to be eligible for the award of BSc Hons Sport Sciences and Management. However, they may take courses to improve total credits by more than 120 credits. Optional courses other than MCSAPP and Specialization in Sports will only be offered upon the registration of a minimum of 20% from the number of registered students in a particular academic year. However, the Head of the Department may consider special requests.
- Obtaining a pass (D+) for the General English I and II/ Academic English I and II and Business English Programmes is also a requirement for the award of the B.Sc. Hons Degree in Sport Sciences and Management.
- Obtaining a pass for the SSM 42003 General Fitness is also a requirement for the award of the BSc. Hons [SSM] Degree in Sport Sciences and Management. The Department will introduce the level of performance for pass marks before offering the subject. The performance level interprets base on a fitness test battery that will be used.

Assessment policy and assessment methods

For each course in the programme, a range of assessment methods is used to enable students to demonstrate their achievement of the Learning Outcomes and to maintain the required academic standard of the degree programme.

Continuous assessments

Quizzes, oral/poster presentations, mid-semester evaluations, assignments, practical reports, field visit reports, field-based reports, progress reports or any other assessments stipulated by the relevant course lecturer.

The proportion of marks allocated is a maximum of 40% for CA (for courses non MCSAPP but with written end semester examinations).
MCSAPP courses/ FMS/ Specialization/ Foundation of Professional Development courses must include a minimum of 3 CA and the lecturer may increase the number of CA according to the course ILO. A 60% should be allocated for CA. Students should obtain a minimum of 24 marks out of 60 for CA in order to qualify for end semester written exam. Students can request eligible tests to qualify for the particular examination.

End semester assessments

Written examinations (1.5 hrs-1 credit courses or 3 hrs-2 and 3 credit courses), practical examinations, viva voce, report, presentations (oral and poster) - as applicable in each case.
The proportion of marks allocated-minimum of 60% for aforementioned end semester exams. MCSAPP courses/ FMS/ Specialization/ Foundation of Professional Development courses end semester marks allocation is 40%.

Requirements for the progression of studies

Prerequisite courses and pre requite abilities are indicated in course synopses. Prerequisite courses are a requirement to offer interrelated courses which are included in the SSM curriculum. If a student either apply medical or obtains less than 40% for the CA of prerequisite courses, henceforth students should not qualify to register subject which is requested particular prerequisite course.

Eligibility for end semester examinations

The students have to maintain 80% attendance or 40% marks from CA to become eligible for sitting the end semester examinations. The list of eligible students for each subject will be published before the commencement of the examinations.

Detailed syllabus

Year I Semester I				
SSM 11101	Foundation of Sports Sciences and Management	T	-	-
The concept of play, sport, and games; The basis of Sport Sciences, Sport Management, and Physical Education; The concept, dimensions, & role of health, wealth, & wellness; Components of physical fitness; Foundation of Exercise & Physical activity; The concepts of training, technique, and skill; The acronyms of FITT (Frequency, intensity, time and type) of exercise and GO SIR (Progression-Gradual increase, overload, specificity, individualization, recovery, and regularity); Professional preparation in Sports career avenues.				

SSM 11202	Foundation of Professional Development	T	-	W
Introduce SSM graduate profile, teaching-learning procedure in SSM, design/planning of professional development activities. Workshop: Professional speech: player development, sports performance, school administration, sport management, job market and career guidance. Soft skills Learning English through drama				

SSM 11103	Foundation of First Aid in Sport	T	P	W
Introduction to sports first aids: Basic sports first aid skills; Anatomy and sport injury terminology; Emergency action steps and providing life supports; Physical assessment and first aid techniques; Moving injured or sick athlete, Sport first aids for specific injuries: First aids for respiratory emergencies and illnesses; First aids for closed head and spine injuries; First aids for wounds and bleeding; First aids for weather-related problems; First aids for musculoskeletal injuries.				

SSM 11104	Movement Concepts, Skill Analysis, Performance, and Practices in **Gymnastics**	T	P	W
Movement Concept: Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of fundamental gymnastic movements in WAG and MAG. **Skill Analysis:** Skill analysis for gymnastic movements (*A* value difficulty elements) will be analyzed according to the updated Code of Points (WAG and MAG) which are introduced by FIG. Also the Dominant Movement Patterns: Spring, Rotation, Statics, Landings, Locomotion and Swing will consider for skill analysis. **Performance:** Selected *A* value difficulty element will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of performance of a student. **Practices:** Selected *A* value difficulty element will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered. **Note:** Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Gymnastics. **Workshop:** Measurements of Apparatus in WAG and MAG and event management for the School National level competition (by the subject lecturer or internal or external expert in the field) **Note:** Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Gymnastics. **Pre-Requisites**: Physically Active, No Injuries/Medical Condition				

SSM 11105	Movement Concepts, Skill Analysis, Performance, and Practices in **Swimming & Life Saving**	T	P	W

Movement Concept: Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of basic swimming skills such as breathing technique, gliding, coordination (various body parts during movement), stroke styles/swimming techniques, and diving

Skill Analysis: Skill analysis for swimming movements and lifesaving movements will be analyzed according to the updated FINA Swimming rules:2017-2021or 2022-2026.

Performance: Basic swimming skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.

Practices: Basic swimming skills and lifesaving movements will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of swimming and lifesaving.

Workshop (by an expert in the field): Measurements based on Swimming skills and event management of National/School level competitions.

SSM 11106	Movement Concepts, Skill Analysis, Performance, and Practices in **Athletics (Track Event)**	T	P	-

Movement Concept:

Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of Athletics (Track Event) movements.

Skill Analysis:

Skill analysis for Athletics (Track Event) movements will be analyzed according to the updated Athletics Technical Manual which is introduced by World Athletics.

Performance: Selected Athletics (Track Event) movements will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of performance of a student.

Practices: Classification of Track events; Fundamentals of running: Biomechanical aspects and movement structure; Teaching running techniques, skills and conditioning exercises; Games to develop running skills; Sprints: technical characteristics, basic exercises and drills; Training methods to improve sprint ability; Starting technique: block placement and adjustment, starting variations and exercises; Relays: Visual and Non-visual change, Inside pass, Outside pass, Mix change, Changing Technique, Upsweep, Down sweep and Push pass exercises and drills; Hurdles: phase description, teaching progression of technique, drills to improve technique; Middle and long-distance running:

Technique teaching progression, training methods for middle and long-distance; Race walking: whole sequence, technique and drills, teaching progression; Basic rules of track events.

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Athletics (Track Event).

Workshop: -

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Athletics (Track Event).
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 11107	Movement Concepts, Skill Analysis, Performance, and Practices in **Basketball**	T	P	-

Movement Concept:
Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of fundamental movements in Basketball.
Skill Analysis:
Skill analysis for Basketball movements will be analyzed according to the updated FIBA Handbook- (International Federation of Basketball).
Performance:
Basic Basketball skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.
Practices:
Passing and receiving, Dibbling, Fast break, Shooting, Blocking, Rebounding, Quick movement of ball, Various techniques, tactics, strategies, attacking & defending, and skills in Basketball will be introduced to practice under the supervision of subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Basketball.
Workshop (By subject lecturer or internal or external expert in the field): Designing of Basketball court and basic Basketball rules in school level competition.
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 11108	Movement Concepts, Skill Analysis, Performance, and Practices in **Volleyball**	T	P	W

Movement Concept:
Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of fundamental movements in Volleyball.
Skill Analysis:
Skill analysis for Volleyball movements will be analyzed according to the updated FIVB Handbook- (Federation of International Volleyball).
Performance:
Basic Volleyball skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.
Practices:
Six basic skills (service, reception, setting, spiking, blocking and defensive) in volleyball will be introduced to practice under the supervision of subject lecturer.

Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Volleyball.
Workshop (By subject lecturer or internal or external expert in the field): Designing of Volleyball court and basic Volleyball rules in school level competition.
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 11209	Basic Mathematics	T	-	-
Basic algebra; expressions, functions, and equations. Basic Calculus; limits, differentiation, and integration. Special topics in mathematics; trigonometry, vectors, friction, equilibrium of systems, basics of multibody dynamics.				

SSM 11210	Human Anatomy	T	P	-
Organization of the Human body, Cell and Cell organelles and tissues of the body, Skeletal system, Muscular system, Nervous system, Endocrine system, Respiratory system, Cardiovascular system, Intergeumentary system, Urinary System, Digestive system, Reproductive system, Sensory organs of the human body, Embryology.				

SSM 11211	Introduction to Sport Management	T	-	-
History of management thoughts, Managerial functions, Characteristic of the manager: Managerial levels, Skills of the managers, Managerial roles, Management of sports organizations, Strategy of sport organization, Sports industry environment, Managing human resource in Sport Organization, Managing sport event, Marketing in Sport and Physical Education, Managing finance in Sport Organization, Sport policy & policy development, Managing sports projects, Decision making in sport organization, Managing the culture of sports organizations, International issues in sport management				

SSM-EGP- 1201	General English I	T	P	W
https://www.sab.ac.lk/app/eltu-curriculum				

Year I Semester II				
SSM 12101	Fundamental Motor Skills	T	P	-
Theory: Introduction to FMS, Categories of FMS, Developmental stages, Movement principles, Performance criteria, and Teacher made tests & evaluations of FMS. **Practical:** Non-Locomotor Skills: Balance, Twist, Turn, Forward roll, Side roll, Land, Bend, Swing, Push, Pull; Locomotor Skills: Walking, Running, Standing Jump, Vertical Jump, Slide, Gallop, Leap, Hop, Skip, Dodge; Manipulative Skills: Ball bounce, Underarm roll, Throwing from the chest, Overhead throw, Overhand Throw, Catch, Forehand Strike, Two hand Strike, Kick, Punt. **Evaluation:** Demonstration through design game including FMS				

SSM 12102	Movement Concepts, Skill Analysis, Performance, and Practices in Athletics (Field Event-Jump)	T	P	-

Movement Concept:
Sport Movement Concept will be covered main four concepts: body awareness, special awareness, space, and relationship of Athletics (Field Event-Jump) movements.

Skill Analysis:
Skill analysis for Athletics (Field Event-Jump) movements will be analyzed according to the updated Athletics Technical Manual which is introduced by World Athletics/IAAF.

Performance:
Selected Athletics (Field Event-Jump) movements will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of performance of a student.

Practices:
Classification of jumping events: Vertical and Horizontal; Fundamentals of jumping: Aims, Biomechanical aspects and movement structure; Teaching jumping technique, skill and conditioning exercises; Games; safety and organization; Long jump, Triple jump, High jump, and Pole Vault: phases, technical characteristics, basic exercises, drills and teaching progression; guidelines for teaching jumping events; Basic rules of jumping events.

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Athletics (Field Event-Jump). Ground arrangement for safety should be concerned.

Workshop: -

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Athletics (Field Event-Jump).

Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 12103	Movement Concepts, Skill Analysis, Performance, and Practices in Netball	T	P	W

Movement Concept:
Sport Movement Concept will be covered in the main seven concepts: footwork, ball handling, passing, defending, attacking, playing and umpiring.
Skill Analysis:
Skill analysis for netball movements will be analyzed according to the INF rules and regulations.
Performance:
Basic Netball skills will be selected to evaluate the students' performance. Per and Post comparison of skill acquisition in the class is the level of students' performance.
Practices:
All fundamentals and strategies related with required Netball knowledge/Skills and umpiring will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.
Teaching Learning Method: Method has to be followed with progression of all skills and techniques.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Netball.
Workshop: (Expert in the field): Measurements in Netball and event management for the School National level competition. Resource personnel who have sound knowledge with motor skills and demand of physical qualities.
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 12104	Movement Concepts, Skill Analysis, Performance, and Practices in Soccer	T	P	-

Movement Concept: Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of Soccer skills such as dribbling, passing, trapping, goal-keeping, shooting, juggling and heading.
Skill Analysis:
Skill analysis for Soccer movements will be analyzed according to the updated FIFA rules:2017-2021or 2022-2026.
Performance:
Soccer skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.
Practices:
Soccer skills (basics Soccer movements, technical, tactical, and attacking skills) will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Soccer.

Workshop (by an expert in the field): Measurements based on Soccer and event management of National/School level competitions and strategic coaching methods appropriate for the school level understanding of the ethics of Soccer. **Pre-Requisite**: Physically Active, No Injuries/Medical Condition

SSM 12305	Exercise Biochemistry	T	-	-
Introduction to chemistry and biochemistry basics; Introduction to carbohydrates, proteins, lipids, vitamins, and minerals: classification and nomenclature, structure, physical and chemical and biochemical properties, functions and reactions, Carbohydrate metabolism during exercise: Glycogen metabolism, Glycolysis, The citric acid cycle; Oxidative phosphorylation; Lactate production of muscles during exercise, Lipid metabolism in exercise: Triacylglycerol metabolism, Exercise and lipolysis; Fatty acid degradation and energy yield of fatty acid oxidation; Effect of exercise on plasma lipoproteins; Triacylglycerol and cholesterols, Protein metabolism of muscles during exercise, Amino acid metabolism of muscles during exercise and contribution of protein to the energy expenditure, Integration of exercise metabolism: Interconnections of metabolic pathways; energy systems and sources in exercise.			

SSM 12206	Basic Physics	T	-	-
Introduction to Physics, SI unit system, Motion in a straight line, Kinematics in two dimensions, Dynamics, Circular Motion and Gravity, Work and energy, Angular momentum, Statics and torque, Relative motion, Basic measurements and error calculation.				

SSM 12207	Human Physiology	T	-	-
The function of Cell and Cell organelles and tissues of the body Functions and Physiology of the following systems, Skeletal system, Muscular system, Nervous system, Endocrine system, Respiratory system, Cardiovascular system, Intergeumentary system, Urinary System, Digestive system, Reproductive system, Embryology				

SSM 12208	Olympic Movement and Olympism	T	-	-
Foundations of Olympic movement and modern Olympic games, The International Olympic Committee; Role structure of IOC, Olympic financing, Olympic Solidarity, The Olympic Museum; The National Olympic Committees, The Olympic Games, Values and issues				

SSM 12109	Introduction to Information Technology	T	P	W
E-mail & Internet Details, Web Browser, Introduction to Web design: Introduction to web designing software, Introduction to HTML, creating blogs, Graphics and image editing, Word processing (how to add a reference, table of content, reports etc.), Spreadsheet, database management software, presentation tools.				

SSM-EGP-12101	General English II	T	P	W
https://www.sab.ac.lk/app/eltu-curriculum				

SSM 12210	Movement Concepts, Skill Analysis, Performance, and Practices in Cricket	T	P	-

Movement Concept: Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of Cricket skills such as passing, catching, balling, keeping, and batting.

Skill Analysis:

Skill analysis for Cricket movements will be analyzed according to the updated ICC rules:2017-2021or 2022-2026.

Performance:

Cricket skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.

Practices:

Cricket skills (such as catching, passing, balling: spring, medium-fast, and fast), technical, tactical, and attacking skills will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will cover.

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Cricket.

Workshop (by an expert in the field): Measurements based on Cricket and event management of National/School level competitions and strategic coaching methods appropriate for the school level understanding of the ethics of Cricket and Basics of Umpiring.

Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 12211	Movement Concepts, Skill Analysis, Performance, and Practices in Elle	T	P	-

Movement Concept: Sport Movement Concept will be covered main four concepts: body awareness, special awareness, space, and relationship of Elle skills such as passing, catching, balling, hit the ball, and a run.

Skill Analysis:

Skill analysis for Elle movements will be analyzed according to the updated rules.

Performance:

Elle skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.

Practices:

Elle skills (such as catching, passing, hit the ball, and running), technical, tactical, and attacking skills will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Elle.

Workshop (by an expert in the field): Measurements based on Elle and event management of National/School level competitions and strategic coaching methods appropriate for the school level understanding of the ethics of Elle.
Pre-Requisite: Physically Active, No Injuries/Medical Condition

Year II Semester I				
SSM 21101	Movement Concepts, Skill Analysis, Performance, and Practices in Athletics (Field Event-Throws)	T	P	-

Movement Concept:
Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of Athletics (Field Event-Throws) movements.
Skill Analysis:
Skill analysis for Athletics (Field Event-Throws) movements will be analyzed according to the updated Athletics Technical Manual which is introduced by World Athletics.
Performance:
Selected Athletics (Field Event-Throws) movements will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of performance of a student.
Practices:
Classification of Throwing events; Fundamentals of Throwing: Aims, Biomechanical aspects and movement structure; Teaching throwing technique; skill and conditioning exercises; Games to introduce throwing events safety and organization; Shot put, Discus throw, Javelin throw, and Hammer throw: phases, technical characteristics, basic exercises and drills and teaching progression; Basic rules of throwing events.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Athletics (Field Event-Throws). Ground arrangement for safety should be concerned.
Workshop: -
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Athletics (Field Event-Throws).
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 21102	Movement Concepts, Skill Analysis, Performance, and Practices in Weightlifting	T	P	-

Movement Concept:
Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of basic weightlifting skills such as breathing technique, griping, skill of technique, coordination and weightlifting technique and development exercise with resistance (weight).
Skill Analysis:

Skill analysis for Weightlifting movements will be analyzed according to the updated IWF-TCRR -Technical and Competition R*ules* & Re*gulations* 2017-2021 or 2022-2024

Performance:

Basic Weightlifting skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.

Practices:

Weightlifting skills (squat, bench press, deadlift, power clean, rows, pull-Ups and Dip, etc) and Weightlifting technique will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of weightlifting event.

Workshop (Expert in the field): Measurements in weightlifting and event management for the school National level competition.

Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 21203	Fundamental of Statistics	T	P	-

The nature of probability and statistics, variables and types of data. Frequency tables and distribution, graphs, shapes of distributions, summary measures, principles of probability and conditional probability, Random variables and probability distributions. Introduction to statistical software for data management, presentation, description, and solve probability problems.

PRC: Basic Mathematics

SSM 21204	Education Psychology	T	-	-

Introduction of Education Psychology, growth and development, teacher and teacher's role, teachers' concern theory, learning theories: cognitive approaches including constructivists approach (Piaget, Vygotsky, and Bloom's taxonomy), behaviourist approaches, social approach, humanistic and biological approach, learning types: cognitive, psychomotor and affective learning, intelligence, memory, motivation, perception, and Personality.

SSM 21205	Introduction to Sport Biomechanics	T	P	-

Introduction of Biomechanics, Maintaining posture according to biomechanical factors, Anthropometric measurements, Center of Gravity/Mass of Human body/body segment, Muscle torque around a joint, Capturing 2D linear sports movement, 2D video analyzing procedure, Kinematics and Kinetics of linear sport movements, Jumps and ground reaction force, Video analysis of exercise on a plane surface/sagittal: for low intensity/high volume and high intensity/low volume.

PRC: SSM 11209 Basic Physics

SSM 21206	Concept of Sport Event Management	T	-	-

Introduction to event studies: Event management career and professionalism, Planning events, Site planning, Operation and logistics, The event experience and

programming, Quality management of the event, Organizing the event and coordination, Human resource management of the event, Financial management, Safety & risk management in events, Security of the event, Marketing & marketing research for the event, Evaluation and impact assessment of the event, Managing sport tournament

SSM 21207	Sport Facility Design and Management	T	-	-
Theory: Introduction to sports facility design and management, The need for facility provision, Facility planning, Facility design: Indoor Sport, Outdoor Sport, and Aquatic Sport; Surveying for sports facility design, Sports facility Layout. **Practical:** Drawing different shapes of ground layouts, Shot Put layout, Discus Throw layout, Javelin throw layout, and 400 m Track layout.				

SSM 21108	Kinesiology	T	P	-
Kinetics & Kinematics, Introduction to Arthrokinematics & Osteokinematics, Shoulder complex: Arthrokinematcs: Osteokinamtics, Scapulohumeral rhythm, Elbow Arthrokinematics: Osteokinematics, Wrist and Hand Arthrokinematics and osteokinematics, Hip complex Arthrokinematics and osteokinematics, Knee Arthrokinematics and osteokinematics, Foot and ankle Arthrokinematics and osteokinematics, Goniometry, Gait analysis **PRC**: 11210 Human Anatomy				

SSM-EAP-2101	Academic English I	T	P	W
https://www.sab.ac.lk/app/eltu-curriculum				

SSM 21109	Movement Concepts, Skill Analysis, Performance, and Practices in Table Tennis	T	P	-
Movement Concept: Sport Movement Concept will be covered main four concepts: body awareness, special awareness, space, and relationship of fundamental movements in Table Tennis. **Skill Analysis:** Skill analysis for Table Tennis movements will be analyzed according to the updated ITTF/PTT Level I Coaching Manual – (International Table Tennis Federation). **Performance:** Basic Table Tennis skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance. **Practices:** Services, Forehand Strokes and Backhand Strokes in Table Tennis will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered. **Note:** Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Table Tennis.				

Workshop: -
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 21111	Movement Concepts, Skill Analysis, Performance, and Practices in Badminton	T	P	-

Movement Concept:
Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of fundamental movements in Badminton.
Introduction to badminton & brief history: The origins of Badminton and Discuss some interesting facts relating to Badminton, Common injuries in badminton, and Rules of the game
Identifying equipment & court dimension: Court dimensions, Shuttle testing area, Racket, and Shuttlecock.
Introduce basic badminton grips & shuttle control drills: Forehand grip, v grip, Backhand grip, thumb grip, and Introduce shuttle control drills
Skill Analysis:
Skill analysis for Badminton movements will be analyzed according to the updated BWF Handbook – (Badminton World Federation).
Performance:
Badminton skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.
Identifying equipments & court dimension: Court dimensions, Shuttle testing area, Racket, and Shuttlecock.
Introduce basic badminton grips & shuttle control drills: Forehand grip, v-grip, Backhand grip, thumb grip, and introduce shuttle control drills.
Service: Forehand high service, Forehand low service, Forehand flick service, Backhand low service, and Backhand flick service.
Basic stroke: Briefly explain badminton shots based on the playing court.
Frontcourt/Fore court stroke: Forehand & backhand net lift, Forehand & backhand net shot, and Forehand & backhand net skill
Mid court: Forehand & Backhand drive and Backhand block of the body
Back court: Forehand clear, Forehand smash, Forehand drop shot, Pulled forehand drop shot, Backhand clear, and Backhand pulled drop shot.
Badminton movement:
Component of badminton movement: Split step, Running step, Chasse, Cross behind, Pivot/hop Jump, Landing, and Lunge.
Movement cycle:
Start – split step, Approach – running step / chasse / cross behind, Hit – lunge / lunge, Recovery – running step / chasse / hop/pivot.
Movement types in single & double: Describe different types of movement types in singles & doubles.
Coaching methods: Describe difference in movement for single & double players.
Biomechanical principal: Backswing, Coordination – big muscles to small muscles, Rotation, Rotation of the upper arm, and Rotation of the lower arm.

Advanced strokes: Backhand cross-court net shot, Forehand cross-court net shot, Backhand drive defense (off the body), Backhand long defense (off the body), Backhand singles cross-court block, Backhand singles straight block, Forehand singles cross-court block, and Forehand singles straight block.
Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Badminton.
Workshop: -
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 21110	Movement Concepts, Skill Analysis, Performance, and Practices in Tennis	T	P	-

Movement Concept:
Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of fundamental movements in Tennis.
Skill Analysis:
Skill analysis for Tennis movements will be analyzed according to the updated ITF Rules of Tennis – (International Tennis Federation).
Performance:
Basic Tennis skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.
Practices:
Services, Forehand Strokes and Backhand Strokes in Tennis will be introduced to practice under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Tennis.
Workshop: -
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 21112	Movement Concepts, Skill Analysis, Performance, and Practices in Rugby	T	P	W

Movement Concept:
Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of movements in Rugby.
Skill Analysis:
Skill analysis for Rugby movements (running, passing, catching, tackling, kicking, and positional skills) will be analyzed according to the updated World Rugby guidelines.
Performance:
Rugby skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.
Practices:

Practice use to develop knowledge, understanding and playing competencies of running, passing, catching, tackling, kicking, and positional skills in the various forms of rugby.
The Sport Education and Games Concept Approaches (GCA) will be adopted, employing the use of modified games to demonstrate the advantages of adjustments to the major game for effective learning.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Rugby.
Workshop (by an expert in the field): **S**trategic coaching methods and player management, umpiring and event management, of national and school level Rugby will be addressed
Pre-Requisite: Physically active, Injuries that prevail from participating practical sessions

SSM 21113	Movement Concepts, Skill Analysis, Performance, and Practices in Hockey	T	P	-

Movement Concept:
Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of movements in Hockey.
Skill Analysis:
Skill analysis for Hockey (dribbling, trapping, passing, tackling, hitting, shooting, etc) will be analyzed according to the updated FIH Handbook – (International Federation of Hockey).
Performance:
Hockey skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.
Practices:
Dribbling, trapping, passing, tackling, hitting, shooting, etc. introduce to practice. The game sense approach will be introduced to practice Hockey skills and rules under the supervision of the subject lecturer. Gradually training concepts (physical, technical, tactical, and psychological training) will be covered.
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Hockey.
Workshop: -
Pre-Requisite: Physically Active, No Injuries/Medical Condition

Year II Semester II				
SSM 22201	Sport Physiology	T	-	-

Introduction to sport physiology: Acute reactions to exercise and chronic physiological adaptations; Muscle, fiber types and exercise; The function of skeletal muscle (action potential, resting membrane potential, excitation coupling, muscle contraction); Reflex action and reflex arc, conditional and unconditional reflexes; Bioenergetics and muscle metabolism: The basic energy systems; Interaction among the energy systems during exercise; Energy expenditure: during rest and exercise; Fatigue, recovery and causes; Physiological foundation to training: Adaptation to resistance (strength) training, Mechanisms for strength gain:

structural and nervous adaptations; Adaptation to aerobic training; Adaptation to anaerobic training; Environmental influences on physical activity: Thermoregulation; Exercising in a hot environment (Body temperature regulation, physiological responses to exercise in the heat, health risk at exercising hot climate, acclimation to exercise in the heat); Exercise in a cold environment (Exercise in the cold, physiological responses to exercise in the cold, health risks during exercise in the cold); Exercise in Altitude: Physiological responses to altitude, Exercise and performance at altitude; Acclimation: chronic exposure to altitude; Altitude: optimizing training and performance; Health risks of acute exposure to altitude; Physiology at overtraining and detraining.
PRC: SSM 12206 Basic Physiology

SSM 22202	Sport Injury Prevention and Rehabilitation	T	P	-

Functional anatomy and relevant terminology, General aspects of sports injuries, Mechanisms and characteristics of sports trauma, Acute soft tissue injury management, Injuries to the shoulder, Injuries to the upper extremities, Injuries to the neck and upper back, Injuries to the trunk and spine, Injuries on the hip and pelvic area, Injuries to the thigh and knee, Injuries on the lower leg, foot and ankle, Injuries on the head and face
PRC: SSM 11210 Human Anatomy or SSM 12206 Basic Physiology

SSM 22203	Theory and Methodology of Sports Training	T	P	-

Conceptualization and determinants of training and physical condition: Definition, functions and objectives of training; Training objectives and areas of sports practice; Objectives, contents and means of conditioning; Coaching philosophy
Performance and health. Principles of sports training: Human physical performance zones. Biological laws of adaptation: adaptation mechanisms and factors; The load, fatigue and recovery: nature, magnitude and orientation; General pedagogical principles of sports training.
Methodology for the development of strength: Definition, Types and forms of strength manifestation; Factors that influence muscle strength: structural, nervous, and biomechanical; Objectives and methods of strength training; Methodology and development of the specific performance of maximum strength, speed strength and strength endurance. *Methodology for the development of endurance:* Definition, Types and forms of manifestation of endurance; Biological factors that influence endurance; Objectives and methods of endurance training; Methodology and performance development in endurance.
Methodology for the development of speed: Definition, Types and forms of manifestation of speed; Factors that influence the different manifestations of speed; Objectives and methods of speed training; Methodology and performance development in speed events.
Methodology for the development of agility and mobility: Definition, Types and conditions of agility and mobility; Agility and mobility development methods and methodological principles of development.
The development of coordination: Definition and types of coordination; Methodology for the preparation and training of coordination.

Energy system training: Definition, Types and conditions of the different energy systems; Role of Adenosine Triphosphate (ATP) and Glycolysis (aerobic and anaerobic); Energy system continuum and it is an application to sport

SSM 22204	Practicum I: Teaching Methodology	T	P	-
Introduction to teaching/ coaching and learning: reflective teacher, on becoming a teacher, teacher's role, aims of schools, good teachers, meaning of learning, categories of learning, theories of learning, the learning environment; Teaching/ coaching practice: getting started, the four-phase model (plan, teach, evaluation and reporting); Lesson planning skills: learning objectives, student outcome statements, writing and formatting of lesson plans; Developing relationship skills: personal qualities and characteristics, actions for establishing personal relationships, actions to help students feel good about themselves; Developing instructional skills: clarity of communication, beginning a lesson, other steps, questioning, concluding, learning/ teaching resources; Teaching methods/ strategies; Classroom management: preventing management problems, techniques to respond inappropriate behavior, punishment; Evaluating student learning: the purpose of evaluation, key concepts in evaluation, types of evaluation, evaluative techniques, teacher-made tests, assessment, judging, making decisions and keeping records.				

SSM 22205	Human Resource Management in Sport and Leisure	T	P	-
Introduction to Human Resource Management; Individuals Within Organizations: Attributes, Personality, Attitude, Satisfaction; Functions of human resources management, Job designing, Human recourses planning, Job analysis, Recruitment and selection, Induction, Performance evaluation, Training & Development; Employee discipline management; Occupational health and safety; Motivation; Rewards; Strategic human resources management.				

SSM 22206	Design of Experiments and Analysis	T	P	-
Point and interval estimation, testing of hypothesis; principles of hypothesis, tests for mean, proportions and variance. Strategy of experimentation, basic principles of experiments, experiments with a single factor, analysis of variance (ANOVA), randomized blocks design, mean comparisons methods, and factorial experiments. Nonparametric statistics: Single sample tests, Two-sample tests, Multiple sample tests, and Rank Correlation. Practical: Testing hypothesis and constructing confidence intervals, Analysis of rank data, Analysis of simple and factorial experiments data. **PRC**: SSM 11209 Basic Mathematics				

SSM 22207	Marketing Approaches in Managing Sports	T	P	-
Introduction and aspects of marketing, Understanding the sports industry, Sports industry environment, Marketing mix, Segmentation, Targeting and positioning of sports products and business, Sport consumer and consumer behaviour, Media relations in sport (Type of media, media usage), Event marketing, Promotion mix,				

Marketing through sports endorsements and sponsorships, Sports product & marketing, Sports marketing in Olympic Games, Issues in marketing sport and ambush marketing

SSM-EAP-2201	Academic English II	T	P	W
https://www.sab.ac.lk/app/eltu-curriculum				

SSM 22108	Movement Concepts, Skill Analysis, Performance, and Practices in Judo	T	P	-

Movement Concept:
Sport Movement Concept will be covered main four concepts: body awareness, special awareness, space, and relationship of movements in Judo.
Principles, aesthetic aspects and comprehensive information on the philosophical and its role in the educational field; Methodological guidelines, didactic applications, security and benefits are used to introduce Judo.
Skill Analysis:
Skill analysis for Judo movements will be done according to the basic rules and refereeing under the updated IJF Handbook – (International Judo Federation).
Performance:
Judo skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.
Practices:
Characteristics of Judo: Ukemi (break falls), Classification of Judo; types of movements (Taisabaki), Stances, balance break (Kushushi); Throwing techniques [Tachi Waza – hand (Te-waza), hip (Koshi-waza) and leg (Ashi-waza)] grappling techniques [Ne Waza – holdings (Osaekomi waza), joint locks and (kansetsu waza) and choke locks (Shime waza)]; Free sparring (Randori).
Basic elements of Judo: Tachi waza and ne Waza
Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Judo.
Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 22209	Movement Concepts, Skill Analysis, Performance, and Practices in Wrestling	T	P	-

Movement Concept:
Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of movements in Wrestling.
Principles, aesthetic aspects and comprehensive information on the philosophical and its role in the educational field; Methodological guidelines, didactic applications, security and benefits of Wrestling are used to introduce Wrestling.
Skill Analysis:
Skill analysis for Wrestling movements will be done according to the basic rules and refereeing under the updated IWF Handbook – (International Wrestling Federation).
Performance:

Wrestling skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.

Practices: Characteristics of Wrestling: Basic skills of wrestling: Stance, motion, level change, penetration, lifting your opponent and the arm drag; Basic attack and defence Style Skills & Drills:

- Standing techniques: Stalking & pressure, scoring from front headlocks, shot defence, stand-ups, clearing the legs, the single-leg takedown and the double-leg takedown.
- Bottom position techniques: Grasshopper and Nelson and it is variations, protecting the ankle and breaking opponents from the top.

and Free sparring;

Basic elements of Wrestling (Standing and bottom position); Basic rules and refereeing: How to stand, Breathing properly, penetrating shot, The basic shoot, Lifting your opponent, The single-leg takedown, The double-leg takedown, The sprawl defence, Escaping techniques, The arm drag.

Note: Students' safety will be highly covered by the subject lecturer who is professionally qualified in the field of Wrestling.

Workshop: -

Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 22110	Traditional Sport and Sport Culture in Sri Lanka	T	P	W

Traditional Sport in Sri Lanka: Introduction to Sinhala combative, field and aquatic sports and games, Combative sports, field sport (with animals), field games (religious), aquatic sports, Asian Children's games, traditional sports in Sri Lanka: folk games (Pancha keliya, Nerenchi edema, Lee keliya, Pora pol gasima, Raban gasima, Coppara Coppara Pipingya, Iniweta Peralima, Mewara keliya, Ath hangeema/hiding hands, Olinda keliya, Eluwan kema/goat game, and Onchili warama/song of the swing)

Sport Culture in Sri Lanka: The historical development of the Sri Lankan Sport in the context of the many different foreign and local social, political, economic and educational forces which have impacted sport culture in the country.

PRC: SSM 11101 Foundation of Sport Science and Management

SSM 22111	Sports for Differently Abled Persons	T	P	F

Introduction of disability, Historical perspective of disability sports, Role of sport and adaptive physical activity for people with disability, The importance of the influence of biological, social and psychological factors on disability, Theoretical approach to disability, and Practical approach for differently-abled persons.

Note: Students have to design Sports Activity Programme (SAP) for selected differently-abled persons. The practical component of this subject will be evaluated through SAB.

PRC: SSM 12101 Fundamental Motor Skills or SSM 21104 Education Psychology

Year III Semester I				
SSM 31201	Exercise Physiology	T	P	-

The general aspect of exercise physiology, Children and adolescents in sport and

exercise: Growth, development, Maturation, Physiological response & adaptation, Growth and Maturation with training; Aging in sport and exercise: Physiological responses to training, Environmental stress, Longevity and risk of injury and death; Gender difference in sport and Exercise: Body type and composition, Effect of gender on physiological responses and adaptation to exercise, Menstruation & menstrual dysfunction and other issues respect to exercise; Exercise physiology for special population: Cardiovascular disease (Forms of cardiovascular disease, Pathology of CD, Risk factors, Reducing the risk through PA, Exercise training & rehabilitating), Obesity (terminology and classification, prevalence of overweight, control of body weight, health problems with obesity, general treatment for obesity, role of PA in weight control), Diabetes (terminology and classification, prevalence, health problems with diabetes, general treatment of diabetes, Role of PA in diabetes), Down Syndrome (characteristics, types, use of exercise for health) and Pregnancy (physiological changes and exercise for health).
PRC: SSM Sport Physiology

SSM 31202	Sport Biomechanics	T	P	-

Muscle torque around a joint, Curve fitting technique, Equation of S-T, V-T, A-T graphs, Capturing 3D linear sports movement, 3D video analyzing procedure, Angular Momentum and moment of inertia, Kinematics and Kinetics in rotational movements, Air dynamics, Video analysis of sports movement around long axis/broad axis, Mechanical understanding of sports movements, Analysis of long jump and triple jump.
PRC: SSM 21104 Introduction to Sport Biomechanics

SSM 31303	Sport Nutrition	T	P	W

Introduction to nutrition and basics of a healthy diet, General dietary advice for a healthy life, Nutritional aspects of optimum performance, Nutritional assessment of athletes – dietary and clinical, Nutritional assessment of athletes anthropometric and biochemical, Energy balance and body composition, Nutritional needs for training, competition and recovery, Ergogenic aids and nutritional supplements, Electrolytes and hydration, Factors affecting to nutritional needs, Basic of meal planning.
PRC: SSM 12305 Exercise Biochemistry

SSM 31104	Long Term Athlete Development	T	P	-

Introduction to LTAD, Importance of LTAD, Growth, Development & Maturation, Physical Literacy, Stages of LTAD, Specialization, Physical Mental/ Cognitive & Emotional development & its' relation with LTAD, Optimal Window of Trainability, Periodization, System alignment, and Continuous improvement.
PRC: SSM Fundamental Motor Skills, SSM 11106 MCSAP&P in Athletic (Track Event), and SSM 11104 MCSAP&P in Gymnastics

SSM 31205	Outdoor Recreation and Leadership	T	P	-

Theory: Introduction to the fundamental concepts of leisure and outdoor recreation, The influence of leisure throughout life, outdoor recreation resources

and safety precaution of outdoor and adventure activities, outdoor management practice in government, the private and nonprofit sector, Introduction to leadership, leadership qualities characteristic and leader's roles. **Practical:** Recreational activities in water base, ground base, mountain base, forest base, and adventure-based activities

SSM 31206	Statistical Modelling and Survey Method	T	P	-
Correlation analysis, modelling of continuous responses; simple linear regression, testing significance of the fitted model and parameter estimates, model diagnosis checking, multiple linear regression, variable selection and model building, and modelling of categorical responses. Data collection methods, questionnaire design and probability sampling methods. The nature of multivariate methods, use of PCA and MANOVA. Practical: Modelling of continuous and categorical responses, Model diagnostic checking, and analysis of multivariate data. **PRC**: SSM 22206 Design of Experiments and Analysis				

SSM 31207	Sport Media and Communication	T	P	-
Introduction to media, sport media & communication; The evolution from print to online platforms for sports journalism; The changing role of sports media producers; Sport public relations and social media; New media and the changing role of sports information; Sport marketing new media; The evolution of sports crisis communication research in an era of new media, communicating corporate social responsibility in sport organization- incorporating new media; The enjoyment and possible effects of sports violence in new and old media; Communicating legitimacy, visibility & connectivity, the functions of new media in adapted sports; Ethics and law for the sport journalism; Skills required for sport journalist.				

SSM 31208	Legal Perspectives in Managing Sport	T	P	W
Legal systems in Sri Lanka, A brief introduction to the constitution of Sri Lanka and the powers of the constitution, Introduction to the personal laws, The Sport law in Sri Lanka (no.25 of 1973); Sport (amendment) acts; Tort liability; Risk management; Contract law The rule of law and principles for good governance and ethical practice.				

SSM-EBP-3101	Business English	T	P	W
https://www.sab.ac.lk/app/eltu-curriculum				

SSM 31109	Movement Concepts, Skill Analysis, Performance, and Practices in Sport Aerobics	T	P	W
Introduction Aerobic gymnastics FIG competitive Discipline, Stages for long term preparation in Aerobic gymnastics, Methodology for initial preparation in Aerobic gymnastics (planning), Aspects of the educational training process in Aerobic gymnastics (physical and technical)				

Movement Concept: Sport Movement Concept will be covered main four concepts: body awareness, special awareness, space, and relationship of fundamental movements in Sport Aerobics. Gymnastics movements patterns, Basic dance movements, seven basic steps, Variety of Arms actions will be discussed.

Skill Analysis:

Skill analysis for Sport Aerobics movements will be analyzed according to the updated Rules of Aerobics – (FIG).

Performance:

Basic Aerobic skills will be selected to evaluate the students' performance. Pre and Post comparison of skill acquisition in the class is the level of students' performance.

Practices: Understand Aerobic movements patterns, Choreography of the routines, Aerobic gymnastics elements pool and values, Age group competition structure, international and local, Aerobic gymnastics routines construction, Routines Evaluations, Control and evaluation of physical and technical preparation, Prohibited movements, Gymnastics material, Training Equipment for Aerobic gymnastics, and Competition structure.

Pre-Requisite: Physically Active, No Injuries/Medical Condition

SSM 31110	Movement Concepts, Skill Analysis, Performance, and Practices in Fitness Aerobics	T	P	-

Theory: Introduction to aerobics, Introduction to Fitness aerobics, Types of fitness aerobics, Target heart rate zone, Structure of an aerobic session, Leading of an aerobic session, Theory of music in aerobic, Planning of the aerobic session.

Practical: Basic aerobic session, Step aerobics, aerobics for fat burning, aerobics for body shaping, Circuit aerobics, Dance aerobics, Fit ball aerobics, Kickbox aerobics, and Water aerobics.

PRC: SSM 11104 MCSAP&P in Gymnastics

Year III Semester II

SSM 32201	Sport Psychology	T	P	-

Introduction to sports psychology, Personality Characteristics and sporting behaviour, Personality development in sports, Attitude to sports, Aggression in sports, Social factors in sports performance, Arousal, Anxiety in sports performance, Motivation in sports, Skill Acquisition and expertise, Psychological obstacles in the clay of performance

PRC: SSM 21204 Education Psychology

SSM 32202	Advanced Theory and Methodology of Sport Training	T	P	-

Conceptualization and foundations of sports planning: Definitions, Introduction to training planning; Planning of sports training; Periodization of sports training.

Designing of training plan: Periodization of single double and triple periodization; Characteristics of Macro, Meso and Micro cycles; The training mesocycle (Types and the structure of the mesocycles); The training microcycle (Types and the

structure of the microcycle); Planning of Macro, Meso and Micro cycle (linear model).
Monitoring and evaluation of sports training: Tapering for performance, Definition, Principles, and types of tapering; Peaking for competition; Tapering strategy and periodization.
High altitude training: Definition, Types and classification; Methodological and practical aspects of altitude training; Physiological adaptation and periodization.
PCR: SSM 22203 Theory and Methodology of Sport Training

SSM 32203	Specialization I: Foundation of Sport Coaching and Practice	T	P	W

Introduction to sport: Sports coaching background in Sri Lanka (This is a common lecture for all sports), History, principles, aesthetic aspects and comprehensive information on the philosophical and its role in the sport field, Code of ethics and role of the coach, coaching of the match and coach's behaviour.
General and special fitness preparation of particular game: Basic concepts of general and special preparation of the particular sport, Classification and particularities of the exercise for the development of general and special physical fitness of the sport, and Traditional and Contemporary training method to develop physical component in a particular sport
Techniques - tactics of the particular sport: Preparation of the techniques - tactics of the particular sport (Attacking and Defensive) and formation system (Attacking and Defensive)
Psychological preparation for enhancing performance in particular sports: Determinants of sports psychology treatment to enhance performance and Applied sport psychology during the training sessions
Nutrition plan for enhancing performance in particular sports: Determinants of nutrition treatment to enhance performance and Applied nutrition plan during the training sessions.

SSM 32204	Practicum II: Teaching Methodology and Practice	T	P	-

Effective teaching: self-evaluation for self-improvement, the cycle of self-improvement, the Context of effective teaching, the typical classroom, teacher classroom behaviours; Relationship skills: people in classroom, contact, and the student as an individual learner; Classroom social interactions: climate, teacher messages to students, opportunities for students to interact, feedback; The teacher expectancy effect: kind of expectations, forming Expectations, the Pygmalion effect, kinds of expectation effects; the students' perspectives: Students' thought process, student perceptions, expectations, motivation and attribution, Beliefs and attitudes; Group processes in the classroom: leadership, attraction, socio-metric Techniques, and sociograms, norms, communication, cohesion; Motivation in the classroom: Motives and needs, expectancy vs. value theory, intrinsic and extrinsic motivation, achievement motivation.
PRC: SSM 21103 Education Psychology and SSM 22204 Practicum I: Teaching Methodology

SSM 32205	Test, Measurement, and Evaluation of Physical Activity and Sport	T	-	-
Introduction to test, measurement; evaluation, reliability, validity and grading, standard error of the measurement, types of tests, physical fitness testing & interpretation; purpose, principles & guidelines: pretest instructions, test organization, test environment, body composition: anthropometric methods, densitometry, bio-electric impedance analyzer (BIA), other techniques, body composition norms; cardiorespiratory fitness: concept, maximal versus submaximal testing, sequence & measures, modes of testing, interpretation; muscular fitness: concept, principle, muscular strength, muscular endurance; flexibility, agility, power, speed, and coordination testing and interpretation, evaluation of a 1RM test. **PCR**: SSM 12207 Basic Physics, SSM 22201 Sport Physiology				

SSM 32206	Research Methods and Design in Physical Activity and Sport	T	-	W
Introduction to research for sport science and management student, ethics in research, the different types and classifications of research, literature search and knowledge creation, Research gap, the formulation of research problematics, action research, quantitative research design, qualitative research design, mixed model research, dissemination of research results. **PRC**: SSM 22206 Design of Experiments and Statistical Methods				

SSM 32207	Financial Management in Sport Organization	T	-	-
Basics of finance: Financial statements, Ratios, Risk, Time value of money; Applications of financial management of sports: Facility finance, Feasibility study, Non-profit sport organizations; Financial attributes of the sport industry: Professional sports and Amateur sport finance.				

SSM 32208	Sport Sociology and Community Service	T	P	-
Sport Sociology: The sociology of sport, social theory and sport about sports in society, the impact of sport on culture, sports for children and youth sports, deviance in sports, socialization and sport, high school and college sports, deviance in sport, violence in sport, gender and sport, race and ethnicity in sport, economics and sport, politics and sport, religion and sport, and the media in sport and trending in sports. **Community Service**: Introduction of community service project, design of community service project structure, planning teamwork, activity-based fundraising, design of the technical report, sustainability of service. **PRC**: SSM 11101 Foundation of Sport Science and Management				

SSM 32109	Sport Technology, Innovation and Entrepreneurship	T	P	W
This course introduces fundamental topics related to sport technology, innovation and entrepreneurship. Fundamentals of sport engineering, mobile applications				

and sport, understanding innovation and its relationship to sports science,
Thinking out of box, Market research, Competitor analysis, identifying what are the value offerings, Prototype the idea and fail fast concept based on customer feedback, How to create a business model, Creating business roadmap and strategies

Year IV Semester I

SSM 41201	Exercise Prescription	T	P	W

Overview of Exercise Prescription: Introduction, principles, energy system and training load (training frequency, repetition, set, rest, intensity and volume)
Program design: overview perspective of program designing on strength training and conditioning, speed, endurance Development, anaerobic, aerobic and core stabilization conditioning: Physiology mechanism, exercise mode, frequency of training and type of exercise.
Speed- strength and agility training: introducing plyometric, plyometric mechanics and physiology, the Stretch-Shortening Cycle and plyometric drills.
Exercise for Special Populations: International recommendations on physical activity and people with Obesity, Hypertension, Diabetes, Pregnant Women and Osteoporosis.
Resistance training and spotting techniques: exercise techniques and fundamentals
Designing strength and conditioning programmes for different sport: team and individual sports
Circuit training as a method of improving body composition.
Functional training and new trends in fitness training (SAID Principle, FITT, SAQ, HIIT, Cross fit, Pilates, resistance band, ladder and BOSU/Medicine ball training).
PCR: SSM Exercise Physiology, and SSM 21102 MCSAP&P in Weightlifting

SSM 41202	Practicum III: Teaching Practice	T	P	W

Developing relationship skills- personal qualities and characteristics; teachers code of ethics; Actions for establishing personal relationships; Actions to help students feel good about themselves; Developing instructional skills, Clarity of communication; modern lesson planning; Concluding a lesson; Questioning and responding; Practical teaching sessions at school settings; Evaluating student learning- key concepts in evaluation, types of evaluation, evaluative techniques, measuring student performances with teacher-made tests (block within the before the end semester).

SSM 41303	Specialization II: Sport Coaching and Practice	T	P	W

Planning of training: Structural aspects of particular sport athlete's preparation; Types, characteristics, and elaboration of the annual training plan with their respective models (Micro, Meso and Macro)
Understanding of manipulating training plan: Conducting training sessions (Warm-up, principal part and final part); Advance training of different evaluations of the techniques and tactics; Practice different advanced training methods to enhance physical components.
Refereeing and officiating

Performance analysis: Match and technique analysis; Statistics especially for the sport; Advance training of different evaluations of the techniques and tactics.
Design strategy and problem resolving: Practice of different types of game situation drills; Design and implement of different strategies; Control and evaluation of different psychological statuses and it is application
Note: Students need to continue specializing in the same sport that they selected in specialization I.

SSM 41204	Applied Biomechanics	T	P	-

Research methodology in Sports Biomechanics, Biomechanics of Human Bone Growth and Development, Biomechanical aspects in the coaching of sports movements, Gait analysis, Dynamic equations and sport performance, Sports performance prediction through biomechanics, Sports movement pattern and injury prevention, Stimulus of sport training and injury, Calculate of mechanical energy of sports movement/exercise, Biomechanical application to high performance/health promotion.
Note: Students have to do a mini project based on the application of sports/health.
PCR: SSM 21108 Kinesiology or SSM 31202 Sport Biomechanics

SSM 41205	Sport Administration	T	-	-

Principles, structure & leadership of the sports organizations: Structure of major Games organizing: Player management in sports; Supporting athletes, Athletes & commercialization, Promotion of anti-doping practices in sport governance, Athlete agreements & dispute resolution, Developing coaching leadership, Social media management, Promoting values through sport; Promoting the inclusion and gender equality; Managing harassment, abuse & violence in sport through, Management skills, Managing the organization, resources, & activities, Sports administration in Sri Lankan context; governmental and non-governmental organization, Future directives of the sport administration

SSM 41206	Contemporary Issues in Sport Development	T	-	-

Introduction to sports development, Sport development policy, Sport development continuum, Community sports development, Sport development stakeholders, Sectors and levels of provision, Sports ministry and its role, Department of sport development, Sport development departments in provincial level and nature of duties

SSM 41207	Tourism Promotion Through Sport and Leisure	T	-	-

Introduction of Tourism sport and leisure concept, Evolution of Sport and leisure tourism, Conceptualizing the sport and leisure tourism experience, Leveraging sport heritage to promote tourism destinations, Local identities in a global game: the social production of sporting events, Factors affecting destination and event loyalty: examining the sustainability of recurrent sporting events, Environment promotion through sport and leisure tourism, Health-related tourism, Plan, development, and marketing sport event tourism, Tourism promotion through

sport and leisure in Sri Lankan context, Issues in sports events tourism, The future of sports and leisure tourism.

SSM 41108	Digital Society and Sport Application	T	P	W
Video editing, designing of an audio track, feed sport practical demonstration to YouTube/social media, sport or movement-related electronics gadgets, sports research conference as a business, online sport practical teaching/evaluation, and digital sports application. **PCR**: SSM 32208 Sport Sociology and Community Service				

SSM 41109	Nutrition Periodization	T	P	W
Introduction to nutrition periodization, Classification of sport based on energy systems, Optimum Body composition for different sports, Setting SMART periodic goals for optimum body composition, Collaboration of trainer and the nutritionist, Sports nutrition prescription Vs diet plan. Practical dietary approaches for players, Diet for power players, Diet for Sprint athletes, Diet for endurance athletes, Diet for contact sports. **PCR**: SSM 31303 Sport Nutrition				

Year IV Semester II				
SSM 42601	Final Year Research Project	T	P	W
Students have to be required to conduct scientific research related to the sport specialization in a relevant industry. Also, students can conduct a product development (related to the sport specialization) for the research project, in which case they have to evaluate the product using a research methodology. The thesis should compulsorily consist of main parts: Introduction, Literature review and theoretical framework, Methodology, Result and discussion, Conclusion and recommendation, References, and Annexes. The duration of the project should be 15 weeks. The project proposal needs to be submitted to the department for approval through the internal supervisor within the first two weeks. The project (Thesis) should be submitted before the end of the semester. Guidelines for the preparation of the report will be given separately. Students are advised to plan their project, review relevant literature, develop a methodology with relevant organizations during the first semester in the fourth year. **PCR**: SSM 32206 Research Methods and Design in Physical Activity and Sport and SSM 32203 Specialization I: Foundation of Sport Coaching and Practice				

SSM 42202	Industrial Training	T	P	-
Industrial Training Programme (ITP) is designed to provide the students with supervised practical training within a specific time frame (6 weeks). The training can be carried out in a government or private sector organization, and it includes job training as well as research-based training. Duration of the ITP: Six (6) weeks are assigned for ITP. Which is the entire last semester of the fourth academic year. However, students must work at least 4 days in the relevant				

organization and next 3 days students can attend any assigned academic activities by the SS&PE department. Note: More details included in the ***SSM 42202 Industrial Training Manual***. **PCR**: SSM 32203 Specialization I: Foundation of Sport Coaching and Practice, SSM 32204 Practicum II: Teaching Methodology and Practice, and SSM 32109 Sport Technology, Innovation, and Entrepreneurship

SSM 42003	General Fitness	-	P	-
Students have to submit their training plans to the department. Students are advised to plan moderated intensity physical activities (one hour per day, at least 3 days per week). Finally, students' general fitness will be evaluated by using a standard test battery.				

ENGLISH CURRICULUM

The English Curriculum of the Faculty of Applied Sciences is made up of three components: General English, Academic English and Business English. It aims to make the students confident in using the language appropriately with fluency and accuracy coupled with communicative competency and performance.

General English

The General English programme, consisting of two parts as General English I and General II, is conducted in the first academic year as a non-credited non-GPA compulsory component for the B.Sc. degree programmes in the Faculty of Applied Sciences. These two parts are evaluated separately.

This General English curriculum is designed to help students make rapid progress in English and focus on the four key language skills – reading, writing, listening and speaking – with additional work on vocabulary, grammar and pronunciation. This curriculum is common to all five Departments in the Faculty of Applied Sciences.

The duration for teaching General English Curriculum is two semesters in the first academic year which consists of 30 weeks. Two hours are allocated per week to complete the lessons outlined in the curriculum.

Teaching Methodology: Portfolio submissions, Lectures, Brainstorming sessions, Case-based learning, Concept maps, Expert speaker, Game-based learning, Interviews, Problem-based learning, Project-based learning, Readings, Role-play, Scenario comparison, Simulation, Discussion sessions, Quizzes, Assignments, Debates, Presentations, and Examinations.

Intended learning outcomes (ILOs)
Reading component

The students should be able to:

1-	Identify and understand basic grammatical structures and the functions of basic punctuation.
2-	Read and understand a variety of moderately complex (3-4 paragraphs) texts such as narrative/biographical/descriptive prose/ short newspaper articles and formal/official letters.
3-	Comprehend moderately complex texts which use a variety of organizational patterns such as cause/effect, compare/contrast, problem-solution, classification and/or diagrammatical information.
4-	Identify the main idea/s in such texts, differentiate main ideas from supporting details in texts.
5-	Distinguish between facts and opinions in such texts.
6-	Comprehend implicit statements in such texts.

7- Use low-level inference skills such as guessing meanings of words in formal and informal texts.
8- Identify and understand intra-textual cohesion and the functions of basic discourse markers in such texts.

Writing component

The students should be able to:

9- Write short texts using compound structures.
10- Construct a coherent paragraph (with a clear main idea and supporting details) on familiar concrete topics.
11- Write a short text of 2-3 paragraphs to relate/ narrate a sequence of events or describe a procedure using correct sequence markers.
12- Write a short text of 2-3 paragraphs about a personal or familiar situation e.g. *event, personal experience, future plans.*
13- Write 2-3 paragraphs to describe a person, object or scene.
14- Write a paragraph to relate/explain information in a simple table, graph, flow chart or diagram.
15- Join 3- 5 paragraphs into a simple essay on a particular topic.
16- Differentiate between main and supporting ideas in extended spoken discourse such as a lecture.

Listening component

The students should be able to:

17- Take down phone/voice mail messages accurately.
18- Respond to questions according to task format *(e.g., true/false, circle the correct answer, etc.*).
19- Identify main ideas, supporting details, statements and examples in a descriptive or narrative presentation, or in a group interaction (*e.g., meeting, discussion*).
20- Identify specific factual details and inferred meanings in video/audio taped conversations and respond to questions.
21- Understand and carry out moderately complex instructions.
22- Understand a set of instructions when not presented in sequence/order must be inferred from the text.

Speaking component

The students should be able to:

23- Respond to introductions by other people and handle courtesy formulas (greet someone familiar/unfamiliar).
24- ask for an explanation/clarification
25- participate appropriately in informal small group discussions
26- outline or give simple instructions and describe a process

27- express and respond to requests and complaints effectively
28- present one's opinion on a topic and defend it
29- give directions, offer assistance *(e.g. Can I help you*)
30- Respond to and produce basic turn taking mechanisms to maintain a conversation. including non-verbal cues and back channeling devices.

Year I Semester I

Subject: General English I
Code: -EGP-1101

Lesson No.	Topic(s)	Content	Activity Resources
01	Listen to the song "Earth". Accept diversity/ Welcome all/ think how, you being science students, can change the world. Introduce self and others.	Introducing everyone to the class. Discussing future goals and ambitions of each individual in the class. Making a simple introduction between two people unknown to each other. Responding to questions about likes/dislikes, family, friends.	The 'Earth' song: https://www.youtube.com/watch?v=R-qZqU3g0do Welcome video: https://cft.vanderbilt.edu/guides-sub-pages/first-day-of-class/ https://www.youtube.com/watch?v=QgjkjsqAzvo https://www.youtube.com/watch?v=UfeLDRQSoEg https://learningenglish.voanews.com/a/lets-learn-english-lesson-one/3111026.html
02	Basic English sentence structures Prefixes and suffixes	The sentence and the sentence patterns. Identifying the structure of grammar of the sentences. (negation, active/passive, conditionals etc.) Answering to YES/NO questions about personal details. Asking assistance and information, Using basic hedging devices and softeners. (e.g. Is it all right if I come in?	https://sites.google.com/site/clil4uprecourse/unit-2 https://www.enchantedlearning.com/grammar/prefixsuffix/index.shtml

		Do you think you can wait a minute?)	
03	Uses, formation and types of Nouns and Pronouns, Singular and Plural	Nouns, Pronouns and Agreement of pronoun with antecedent. Identifying specific details in a simple monologue/dialogue: numbers/times/ dates/ letters/ key expressions/ etc.(listen and complete a simple text by filling in blanks.)	https://sites.google.com/site/clil4uprecourse/unit-1/2---pronouns
04	Reading common / general texts for comprehension	Identifying factual information /specific information in short texts. Distinguish between facts and opinions in texts. Describing pictures/objects using small sentences (There is…./There are….). Learning through stories	
05	basic Capitalization and Punctuation	Using capital letters appropriately. (In the names of people, places, or related words in International Units, At the beginning of a sentence, In abbreviations, In the titles of books, films, organizations, etc.)	https://www.livescience.com/
06	Prepositions and Determiners (a, an, the)	Prepositional phrases And their uses	https://sites.google.com/site/clil4uprecourse/unit-1
07	Greetings and responses	Identifying greetings and other goodwill expressions /gestures in English. Responding to greetings and other goodwill expressions /gestures in English. (*Ex:* *Stud*ent: *Miss, have a nice day!* Teacher: *You too!*) Greet someone familiar/ unfamiliar and asking explanation/clarification. Responding to requests/complaints effectively.	https://www.youtube.com/watch?v=RIQq4BsZa54

08	Writing short compositions.	Deducing meanings of some unfamiliar words and phrases making use of contextual, structural and morphological clues in an English text. The given article can be used to deduce meaning by making use of contextual clues. (Article: Online learning: A panacea).	
09	Uses of "be" and "have" Parts of speech	Using formal and informal writing in social media to learn 'be' and 'have'. Writing different types of paragraphs (Descriptive/Persuasive/Narrative/Expository/Recursive). Describing an event or an object /process or functions of a machine in 1-2 paragraphs.	http://www.5minuteenglish.com/grammar.htm
10	Listening to general conversations and dialogues	Expressing ability/inability, apologies/excuses. Participating in formal/informal discussions at the lecture room.	http://www.5minuteenglish.com/listening.htm https://www.texasgateway.org/resource/paraphrasing-while-listening-and-taking-notes-english-iii-listening
11	Discussions on general topics like family, friends, hobbies, interests, etc.	Positive voice and negative commands and requests. Discussing specific factual details in dialogues. Ex: phone calls, announcements, requests, complaints etc.	https://www.youtube.com/watch?v=lCBF659RMtg

Evaluation Procedure

The ILOs of the course will be assessed through the following components with the given weightages:

Continuous Assignments on four language skills: 40%
End Semester Examination (a three-hour written examination): 60%

The pass mark is 40% (D+).

Other examination rules, regulations and practices observed in the Faculty of Applied Sciences will apply to this programme as well.

Year I Semester II

Subject: General English II

Code: -EGP-1201

Lesson No.	Topic(s)	Content	Activity Resources
01	Identifying directions.	Directions relating to movements, position in space, manner, frequency and duration	https://www.youtube.com/watch?v=AJJfA_c2cwE
02	Introduction to listening strategies	Listening activities	
03	Using signposting	Using signposting technique to guide a listener.	https://www.youtube.com/watch?v=c-PT03KUbt0
04	Read general texts	Identifying the main topic/idea and supporting details of formal /informal texts.	https://www.youtube.com/watch?v=2cB2SOv42uQ
05	Subject and Verb agreement / Determiners – some, any, many, a lot	Using subject and verb agreement for the cohesion within a spoken text.	https://www.grammarbook.com/grammar/subjectVerbAgree.asp https://www.youtube.com/watch?v=2rH3zGr0u1g
06	Question Formation	Formulating 'What' questions. Handling apologies, deal with complaints and congratulations. (Both face-to-face and over the phone.)	https://www.youtube.com/watch?v=Pu1zdTrcCT4 https://www.youtube.com/watch?v=WphIXqTp_es
07	Grammar	The Tenses of verbs	

		Present Tenses-Simple present/Present Continuous/Present Perfect/Present Perfect Continuous.	
08	Using indirect speech	Reporting utterances made by others such as orders, requests, complaints, questions and general statements.	
09	Grammar	Past Tenses- Simple Past/Past continuous/Past Perfect/Past perfect continuous Future Tenses-Simple Future/ Future continuous/Future perfect/Future perfect continuous	
10	Conversations and dialogues. Flash fictions. Check your English sentence for accuracy using 'Ludwig'.	Expressing future plans/immediate and future needs/Describing one's skills and abilities to an audience, Introducing a guest to a small/large group. Watch the Flash fiction "for sale: baby shoes never worn". Discuss.	https://ludwig.guru/s/suggestion+given+by+reviewers https://www.youtube.com/watch?v=r_4CO7t_6y8 Activity: Make a Flash fiction using your smart phone and upload to the LMS.
11	Role play, Impromptu speeches, picture description and debates on general topics	Asking for and granting permission, expressing sympathy/agreement/disagreement, satisfaction/dissatisfaction, offering advice and making suggestions /threats/warnings /encouragements. Give directions and offer assistance. (e.g. Can I help you?) Responding to and producing basic turn-taking mechanisms to maintain a conversation. or/and Making a short presentation on a research/review topic and relating an anecdote/personal story about an experience.	Example topics for debates: Education should be privatized in Sri Lanka. Family planning should not be encouraged in Sri Lanka.

Evaluation Procedure:
The ILOs of the course will be assessed through the following components with the given weightages.

Continuous Assignments on four language skills:	40%
End Semester Examination (a three-hour written examination):	60%

The pass mark is 40% (D+).

Other examination rules, regulations and practices observed in the Faculty of Applied Sciences will apply to this programme as well.

Academic English

Academic English programme, consisting of two parts as Academic English I and Academic English II, is conducted in the second academic year as a non-credited non-GPA compulsory component for the B.Sc. degree programmes in the Faculty of Applied Sciences. These two parts are evaluated separately.

Academic English uses an established **formal tone**. Students are expected to master the **technical vocabulary specific to their course of studies**. General English aims to achieve a high standard of everyday English communication skills while Academic English curriculum is designed for students to excel in their academic activities.

This Academic English curriculum introduces students to academic study skills in their chosen field of study. Different resources will be used for the process of teaching and learning in the five Departments considering the specific needs of each degree programme.

The duration for teaching Academic English Curriculum is two semesters in the second academic year which consists of 30 weeks. Two hours are allocated per week to complete the lessons outlined in the curriculum.

Teaching Methodology:Portfolio submissions, Lectures, Brainstorming sessions, Case-based learning, Concept maps, Expert speaker, Game-based learning, Interviews, Problem-based learning, Project-based learning, Readings, Role-play, Scenario comparison, Simulation, Discussion sessions, Quizzes, Assignments, Debates, Presentations, and Examinations.

Intended Learning Outcomes (ILOs)

The students should be able to

1. Acquire the listening skills: listening for general/specific details and listening for detailed comprehension
2. Understand the organization of a lecture through semantic markers and signposting language
3. Infer important meanings in a spoken texts and take down notes effectively
4. Identify and differentiate between citations and reference
5. Understand why cite and what plagiarism is
6. Learn and apply 2 techniques of avoiding plagiarism: paraphrasing and quoting
7. Recognize different purposes and means of reading various texts
8. Understand what reading for academic purpose is
9. Learn and practice reading techniques of skimming, scanning and detailed reading for reading for academic purposes.
10. Understand what academic style encompasses and its characteristics
11. Identify and use academic vocabulary and grammar for academic style

12. Transform language written in non-academic language into academic language
13. Understand what paragraph writing is and its fundamental features
14. Identify main idea/topic sentence of paragraphs
15. Successfully structure a paragraph, ensuring cohesion
16. Acquire new vocabulary identified from an assigned text
17. Identify the structural components and style of language used in reports
18. Development communication skills including verbal and non-verbal skills.
19. Acquire the tools, experience and the confidence needed to present ideas.

Year II Semester I

Subject: Academic English I
Code: -EAP-2101

Lesson No.	Topic(s)	Content
01	Listening	Writing notes using different note-taking methods like Cornell methods or mind maps
02	Vocabulary	Acquiring new vocabulary from academic texts / Contextual meaning
03	Technical writing	Making agendas, Conducting meetings
04	Writing effective paragraphs	Identifying the topic sentence, identifying the components and the structure of an effective paragraph
05	Report writing	Identifying the structure and the components of reports
06	Complex grammatical structures and the functions of complex punctuations.	Identifying intra-textual cohesion and the functions of basic discourse marker in complex academic texts Narrative /biographical /descriptive prose/ short newspaper articles/formal official letters
07	Making presentation	Preparing slides, visuals, images, needed for a PowerPoint Presentations
08	Academic writing	Maintaining conventions of academic style when writing journal articles and reviews
09	Classification diagrammatical information.	Variety of organizational patterns such as cause/effect, compare /contrast, problem-solution.

10	Writing texts using sequence markers.	Writing a short text of 2-3 paragraphs describing a procedure using a correct sequence markers.
11	Speaking skill	Identifying the importance of effective communication including non-verbal communication

Evaluation Procedure:

The ILOs of the course will be assessed through the following components with the given weightages.

Continuous Assignments on four language skills: 40%
End Semester Examination (a three-hour written examination): 60%
The pass mark is 40% (D+).
Other examination rules, regulations and practices observed in the Faculty of Applied Sciences will apply to this programme as well.

Year II Semester II

Subject: Academic English II
Code: -EAP-2201

Lesson No.	Topic(s)	Content
01	Reading skills	Using reading techniques such as skimming and scanning to understand comprehension passages
02	Vocabulary	Introducing vocabulary related to technical subjects
03	Transferring information	Writing a paragraph to explain information in a simple table, graph, flow chart or diagram
04	Grammar	Using conditional sentences Zero conditional/First Conditional/Second conditional/Third conditional in academic contexts.
05	Interests / conflicts of interest / hidden agenda in texts or academic content	Ambiguity in long and complex texts. Identifying factual details and inferred meanings in complex texts expressing interest and inquiry. Identifying and explaining assumptions, point of view, personal attitudes, biases and emotions in complex texts (e.g. editorials in academic journals, students' essays, letters to the editor).

06	Citation and referencing	Changing a text into academic style while retaining the meaning Technique to avoid plagiarism
07	Academic essay writing	Writing an academic essay using a variety of complex structures. Describing a complex process or phenomenon in any familiar subject. Describe and compare either two procedures. (e.g. Science experiments). Reading and critically evaluating long, complex academic texts in textbooks, magazines or professional journals.
08	Technical writing-II	Writing minutes of a meeting
09	Paraphrasing for research purposes	Paraphrase without plagiarizing an original text.
10	Interpreting data	Verbal interpretation of research findings Choose a researcher in your area of interest and read their journal articles.
11	Listening	Following a 20-30-minute mini lecture and summarize the points.

Evaluation Procedure:

The ILOs of the course will be assessed through the following components with the given weightages.

Continuous Assignments on four language skills: 40%

End Semester Examination (a three-hour written examination): 60%

The pass mark is 40% (D+).

Other examination rules, regulations and practices observed in the Faculty of Applied Sciences will apply to this programme as well.

Recommended reading material:

- Cheryl Benz, Myra M. Medina, Linda Robinson Fellag, John D. Avery, Cynthia Schuemann1st Edition © 2006 College Reading 1, 2, 3, 4
- CHOLIJ, TOWARDS ACADEMIC ENGLISH
- Craswell, G. 2004. *Writing for Academic Success*. Sage Publications.
- Donald Hall, Sven Birkerts (1997)Writing Well, Longman Publishing Group
- HELGESEN ACTIVE LISTENING 1 : INTRO SKILLS : STUDENTS BOOK
- Hewings, M. (1999) Advanced English Grammar, Cambridge University Press
- Jansz, O. (Ed.) (2oo4) Exploration: A course in reading, thinking and communication, Foundation Boobs

- Karen E.Walsh, Eileen Cotter, Gabriella Nuttall, Li-Lee Tunceren, Sharon Cavusgil1st Edition © 2006 College Writing 1, 2,3, 4
- McCARTHY, ACADEMIC VOCABULARY IN USE (SOUTH ASIAN EDITION) Cambridge University Press
- Murray, N. 2012. *Writing Essays in English Language and Linguistics* , Cambridge University Press.
- Nagasundaram. P. (2012) ESSENTIAJ GRAMMAR, CRC Press
- Nagasundaram, P. COMMUNICATE IN ENGLISH, Students' Manual One & Two (Prepared for Sabaragamuwa University Students)
- Swan, M. (2005) Practical English Usage, Oxford University Press
- Wijesinha, R. A Handbook of English Grammar, Foundation Books
- Gunawardana. L. (1984) Introductory English for Science and Technology, Book One, Open University of Sri Lanka
- Gunawardana. L. (1984) Introductory English for Science and Technology, Book Two, Open University of Sri Lanka

Useful links for learning prescribed General English curriculum online

- http://www.tesol-direct.com/tesol-resources/english-grammar-guide/verbs/
- https://www.youtube.com/watch?v=gssOjXmjQsk
- https://www.owl.english.purdue.edu/
- http://www2.warwick.ac.uk/fac/soc/al/learning_english
- http://www.englishpage.com

Links to other websites where you can read more about the language point, or do further practice:

Nouns	http://www.tolearnenglish.com/exer...
Pronouns	http://www.englishmedialab.com/Quizz... http://www.tolearnenglish.com/cgi2/m...
Adjectives	http://www.englishmedialab.com/Quiz... http://www.ihbristol.com/free-en... http://www.tolearnenglish.com/exerci...
Verbs	http://www.impact-english.com/memb... http://www.englishexercises.net/yyv... http://www.english-room.com/wasw...
Adverbs	https://owl.english.purdue.edu/exerci... https://owl.english.purdue.edu/exerc...
Determiners	http://www.learn-english-today.com/les... http://www.learnenglishfeelgood.com/mixe... http://www.tolearnenglish.com/exercis...
Linking Words	http://web2.uvcs.uvic.ca/elc/studyzo... http://www.esltower.com/GRAMMA...
Prepositions	http://www.englisch-hilfen.de/en/exerc... http://www.englisch-hilfen.de/en/ex... http://www.englisch-hilfen.de/en/exercises/s...

Business English

Business English is the type of English used in business contexts, such as international trade, commerce, finance, insurance, banking, and many other office settings. It entails expectations of clarity, particular vocabulary, and grammatical structures. When using English for business contexts, it is vitally important to be as clear as possible and leave nothing for different interpretations. This is different from literature, for example, where a lot is left up to the interpretation of the reader. A sound grasp of Business English enables the student to more effectively and fluently communicate in English during day-to-day workplace scenarios such as presentations, negotiations, meetings, small talk, socializing, writing reports and C.V writing etc.

This Business English curriculum is common to all the Departments except in certain areas that use specific learning materials from different degree programmes**.** The Business English programme is conducted in the third year first semester (15 weeks) as a non-credited non-GPA compulsory component for the B.Sc. degree programmes in the Faculty of Applied Sciences. Two hours are allocated per week to complete the lessons outlined in the curriculum.

Teaching Methodology: Portfolio submissions, Lectures, Brainstorming sessions, Case-based learning, Concept maps, Expert speaker, Game-based learning, Interviews, Problem-based learning, Project-based learning, Readings, Role-play, Scenario comparison, Simulation, Discussion sessions, Quizzes, Assignments, Debates, Presentations, and Examinations.

Intended Learning Outcomes (ILOs)

Reading component

The students should be able to:

1. Read and understand selected sections of company annual reports
2. Interpret charts and graphs
3. Read and understand articles from business publications such as Business Today and LMD and identify contemporary issues related to business
4. Find specific information from a business email thread about a related issue
5. Identify the main points discussed in a business meeting by reading its minutes
6. Use low-level inference skills such as guessing meanings of words from context.
7. Compare company profiles and highlight key similarities and differences between two companies
8. Understand business jargon

Writing component

The students should be able to:

9. Compose mission and vision statements of companies doing different types of business.
10. Construct a coherent report describing data illustrated through graphs and charts .
11. Compose an email in response to an ongoing discussion thread within a business organisation.
12. Write the minutes for a business meeting
13. Create a mini company profile of a business organization
14. Distinguish between formal and informal register and write a formal letter from an employee to the CEO of a business organization
15. Compose at least three different job descriptions (JDs) for new employees as a human resource (HR) management task
16. Write a post-project report on a CEFR event funded by a business organization

Listening component

The students should be able to:

17. Listen to prerecorded phone/voice mail messages and make notes on main ideas (gist listening)
18. Listen to a business presentation and take away its key message(s)
19. Identify main ideas, supporting details, statements and examples in a group interaction (*e.g., meeting, discussion*).
20. Watch a documentary about a successful business venture and understand its milestones
21. Understand underlying issues of a business organization by listening to two employees speaking to each other (Listening for specific information)
22. Listen and understand a talk on entrepreneurship. (monologue)

Speaking component

The students should be able to:

23. Respond to introductions by other people and handle courtesy formulas in business contexts (greet someone familiar/unfamiliar).
24. Ask for an explanation/clarification in workplace (for example, to colleagues)
25. Participate actively in small (dummy) business meetings
26. Give opinions and make suggestions in an informal workplace discussion among colleagues (about an ongoing issue in the company)
27. Use appropriate stress and intonation to verbally respond to requests and complaints in business contexts

28. Prepare and deliver a short presentation on a company specific issue outlining some solutions before a (dummy) board of directors
29. Give a briefing to a group of new recruits as a human resource (HR) management task
30. Use basic turn taking mechanisms to maintain a conversation. including non-verbal cues and back channeling devices in a range of business contexts.

Year III Semester I

Subject: Business English
Code: -EBP-3101

Lesson No	Topic(s)	Content
01	Letter writing and CV writing	Formal and informal letters. Letter writing techniques. Formats of different letters. Writing a CV and a covering letter using appropriate vocabulary.
02	Filling in forms	Fill out a leave application, bank voucher, money order form, writing a cheque. Fill out online applications.
03	Business meetings and presentations.	Meetings, negotiations Presentation skills. Preparing slides for business presentations Slide layout Registers in English, Jargons, taboo language, slang words, different accents.
04	Continuous Assessment	
05	Electronic media in business communication	Listening to a TV/Radio news item and respond to questions about it. Media communication./Reporting Identifying speakers' purpose in directive requests, reminders, orders, pleas, warnings, threats, suggestions and recommendations.
06	Speeches	Making a short welcome address and giving a vote of thanks.
07	Continuous Assessment	.
08	speaking	Presenting one's opinion on a topic and defend it, Presenting an argument using appropriate rhetoric.

		Presenting a student's issue at a meeting (A 'case presentation'). Making predictions about the content, consequences and outcomes of extended spoken discourse. Interpret some statistics found in the Central Bank Annual Report.
09	Listening and Writing	Reducing and synthesizing complex and extensive business information from multiple sources into a variety of written formats. (e.g. point-form notes, minutes, outlines, summaries, reports, charts, tables and graphs.) Listening to a presentation and completing a chart, table or a diagram.
10	Handling questions	Inviting questions /discussing options at the end of a seminar/business meeting.
12	Online learning	Using Zoom, Teams, Google classrooms for learning online.
13	Creating profiles	Creating a Facebook profile Introducing digital tools to improve business writing (i.e Microsoft Editor, Grammarly , Microsoft Word Grammar correction, Mobile and online dictionaries etc.;)
14	Learning different accents/ dialects	Transcribing songs/movie parts/ speeches/news from Sinhala/Tamil to English.

Evaluation Procedure:

The ILOs of the course will be assessed through the following components with the given weightages.

Continuous Assignments on four language skills: 40%
End Semester Examination (a three-hour written examination): 60%
The pass mark is 40% (D+).
Other examination rules, regulations and practices observed in the Faculty of Applied Sciences will apply to this programme as well.

Recommended reading list:

- Practical English Usage by Michael Swan
- Essential Business Vocabulary Builder by Paul Emmerson
- Essential Business Grammar Builder by Paul Emmerson
- Cambridge Business English Dictionary by Cambridge University Press
- HBR Guide to Persuasive Presentations by Nancy Duarte
- Presentations in English by Erica Williams
- Speak Business English Like an American: Learn the Idioms & Expressions You Need to Succeed On The Job! by Amy Gillet

- 505 Business English Idioms and Phrasal Verbs by Clare Whitmell
- How to Write Effective Business English: Excel at E-mail, Social Media and All Your Professional Communications by Fiona Talbot
- Business Writing Essentials: How To Write Letters, Reports and Emails by Clare Whitmell
- Market Leader by David Cotton, Simon Kent, and David Falvey
- Intelligent Business: Pre-Intermediate Coursebook by Irene Barall

STUDENT AWARDS

Professor Indraratne Balasooriya Memorial Gold Medal ***(Awarded by Mrs. Chinta Balasooriya)***
This will be awarded to a student who obtained the highest FGPA with a second class upper division pass or above in the final degree examination at the first attempt in the BSc Honours degree programme in Food Science and Technology.

Professor W.S. Fernando Chemical Technology Gold Medal ***(Awarded by Prof. W.S. Fernando)***
This will be awarded for the best performance in Chemical Technology, to the student who obtained the highest FGPA mark with a second class upper division pass or above for the BSc Honours Degree in Chemical Technology.

D.S. Rupasinghe Memorial Gold Medal ***(Awarded by Prof. M.S. Rupasinghe and the family)***
This will be awarded for the best performance in Environmental Science and Natural Resources Management, to the student who obtained the highest FGPA mark with a second class upper division pass or above for the BSc Honours degree in Environmental Sciences and Natural Resource Management.

Mr. and Mrs. M.B.S. Palipane Memorial Gold Medal ***(Awarded by Prof. K.B. Palipane)***
This will be awarded for the best performance in Food Engineering in the BSc Honours degree programme in Food Science and Technology, to the student who obtained the highest FGPA mark with a second class upper division pass or above in the final degree examination

Professor K.K.D.S. Ranaweera Gold Medal ***(Awarded by GTS Active (Pvt.) Ltd.)***
Awarded to the student the best performance in the final year research project in the BSc Honours Degree Programme in Food Science and Technology.

Professor Jan Wright Gold Medal ***(Awarded by Ms. T.P. Liyanage)***
Awarded to the student with the best performance in the BSc Honours Degree in Physical Education

Professor Mahinda S Rupashinghe Gold Medal ***(Awarded by Dr. S. Joniton)***
Awarded to the student with the best performance in the BSc Honours Degree in Sport Sciences and Management

Thambippillai Thambiratnam (J.P.U.M) – Attorney-at-Law Memorial Gold Medal ***(Awarded by Prof. S. Vasanthapriyan)***
Awarded to the student with the best performance in Computing & Information Systems

Best Undergraduate Researcher of Computing Gold Medal ***(Awarded by the Academic Staffs of Department of Computing & Information Systems)***
Awarded to the student who has the highest number of research publications, patents received during the undergraduate studies and having the minimum overall GPA of 3.3.

EXAMINATION CRITERIA

General

A student who satisfies the following conditions will be awarded a degree of BSc Honours in (Information Systems/Software Engineering/Food Science and Technology/Environmental Sciences and Natural Resource Management/Applied Physics/Chemical Technology/Computer Science and Technology/Sport Sciences and Management /Physical Education) or BSc in (Environmental Sciences and Natural Resource Management/Physical Sciences).

- Be registered at the University as a candidate for the relevant degree program.
- Have completed the program of studies for each Semester to the satisfaction of the Senate.
- A satisfactory completion of the program of studies will include at least 80% attendance for tutorials and practical assignments, etc.

Every registered student who wishes to sit the examination should submit an application in the appropriate form within the stipulated period. Each eligible student will be issued an admission card/form to sit the relevant examination.

Every candidate should sit the examination in respect of all the relevant subjects studied during the semester.

A candidate will be given a question paper for each subject at the examination conducted at the end of the semester, which is called the End Semester Examination.

The End Semester Examination of each subject will carry a minimum of 60% of the final marks. An appropriate proportion of marks not exceeding 40% will be assigned to Mid Semester Examination and/or Assignments and/or Quizzes that are conducted throughout the semester (i.e. continuous assessment). Finally, the subject is evaluated at the end of the semester based on all above-mentioned evaluations, totalling up to 100 marks. However, depending on the course unit, the form of evaluation could be varied and will be informed prior to commencement of the course.

Grades and Grade Points

A letter grade shall be awarded to each course. The cut-off marks for each grade and the corresponding grade points are given below.

Grade	Marks	Grade Point
A+	≥ 90	4.00
A	80-89	4.00
A-	75-79	3.70
B+	70-74	3.30
B	65-69	3.00
B-	60-64	2.70
C+	55-59	2.30
C	50-54	2.00
C-	45-49	1.70
D+	40-44	1.30
D	30-39	1.00
E	≤ 29	0.00

Students can repeat the examination of a subject only twice for upgrading the grade of a course.

All E grades should be improved at the first available opportunity.

The maximum grade given for a repeated examination shall be C.

A student who obtains any grade less than a C has the option to repeat the exam of a subject and upgrade to a maximum of C.

In granting a grade at a successful repeat examination, all previous less satisfactory grades will be eliminated and a "pass grade" of "C" will be awarded at the successful attempt, irrespective of the marks scored by the candidate.

Grade Point Average

The GPA of the year will be computed as the sum of the products of the credits assigned per year and the grade point granted for each subject divided by the total number of credits assigned per year.

$$\textbf{\textit{Grade Point Avarage (GPA)}} = \frac{\sum_{i=1}^{n} \textbf{\textit{GP}}(i).\textbf{\textit{CP}}(i)}{\textbf{\textit{N}}}$$

$\boldsymbol{n}$ = *Number of Subjects assigned per year*

$\boldsymbol{GP(i)}$ = *Grade Point of* i^{th} *Subject*
$\boldsymbol{CP(i)}$ = *Credit Points of* i^{th} *Subject*
$\boldsymbol{N}$ = *Number of Credits assigned per year*

Example:

Subject	*Credit Points assigned (CP)*	*Grade*	*GradePoint (GP)*	*(CP)*(GP)*
I	*2*	A^+	*4.00*	*8.00*
II	*1*	B^-	*2.70*	*2.70*
III	*2*	A^+	*4.00*	*8.00*
IV	*2*	*C*	*2.00*	*4.00*
V	*1*	A^+	*4.00*	*4.00*
VI	*2*	B^+	*3.30*	*6.60*
VII	*3*	*B*	*3.00*	*9.00*
VIII	*3*	*A*	*4.00*	*12.00*
IX	*3*	*A*	*4.00*	*12.00*
	19			***65.30***

$$\sum_{i=1}^{n} \boldsymbol{GP(i).CP(i) = 65.30}$$

$$GPA = \frac{65.3}{19}$$
$$= \mathbf{3.43}$$

Final GPA (FGPA)

The Final GPA (FGPA) of the four year degree program will be calculated considering the GPA of the year 1, year 2, year 3 and year 4, which will be weighted by 0.2, 0.2, 0.3 and 0.3 respectively, as well as the total number of credits earned in each year.

$$\text{FGPA} = \sum_{j=1}^{4} (a_j \times P_j)$$

$\boldsymbol{a_j}$= 0.2, 0.2, 0.3 and 0.3 for j = 1st year, 2nd year, 3rd year and 4th year respectively.

$\boldsymbol{P_j}$= GPA in year j

For the three year degree programs, FGPA will be calculated considering the GPA of the year 1, year 2 and year 3, which will be weighted by 0.3,0.3 and 0.4 respectively, as well as the total number of credits earned in each year.

$$\text{FGPA} = \sum_{j=1}^{3} (a_j \times P_j)$$

$\boldsymbol{a_j}$= 0.3, 0.3 and 0.4 for j = 1st year, 2nd year and 3rd year respectively.
$\boldsymbol{P_j}$ = GPA in year j

The FGPA will be rounded to the second decimal place, and the FGPA for the degree program will be calculated at the completion of all requirements for the degree.

Pass

A candidate must obtain at least the minimum grade (D) for all courses in each semester securing FGPA ≥ 2 at the end of the degree program to complete the degree and to be eligible to award of a degree certificate.

Award of Classes

Classes will be awarded on successful completion of the degree program, entirely on the Final GPA (FGPA) of the student, on the following basis:

FGPA	CLASS AWARDED
4.00 - 3.70	FIRST CLASS
3.69 - 3.30	SECOND CLASS (UPPER DIVISION)
3.29 - 2.70	SECOND CLASS (LOWER DIVISION)
2.69 - 2.00	PASS

EXAMINATION PROCEDURES, OFFENCES AND PUNISHMENTS

Rules & Regulations governing the holding of Examinations

Candidates should be at the examination hall 15 minutes before the commencement of the relevant examination. They should enter the examination hall only when informed to do so by the supervisor.

After entering the examination hall the candidates should be seated at the desk/table bearing their Index No.

Candidates are permitted to bring useful items such as pens, pencils, erasers, ink, rulers, geometrical instruments, coloured pencils etc. to the examination hall. No candidate is allowed to bring in any written paper or notes or any other items, including electronic devices and items, which may be misused at the examination.

Candidates are not allowed to enter the examination hall 30 minutes after the commencement of an examination and they will not be allowed to leave the examination hall before the lapse of 30 minutes from the commencement of the examination and during the last 15 minutes of the examination

Every candidate must bring the Examination Entry Form, Student Record Book and the Student Identity Card to the examination hall. While the Student Record Book and the Identity card should carry the student's photograph and signature, it should also be certified either by the Registrar or an officer authorized by the Registrar. If the names appearing in the Student Record Book/ Identity card and those in the Examination Entry form differs, the candidate has to submit an affidavit to the Registrar. In the event of such certification not being available, the candidate has to submit either the National Identity Card or a recent photograph certified by an authorized officer.

When requested by the Supervisor of the examination, candidates must surrender all documents in their possession.

No candidate should ask another for anything, exchange anything, engage in conversation, copy from another or help or encourage another candidate to copy.

Candidates should write their answers in the answer sheets or answer books issued on the particular date of the examination.

Writing paper such as answer sheets, graph paper, drawing paper, ledger and journal sheets required by the candidates will be issued to them at the examination center. Candidates are advised not to tear, bend crumple or destroy any paper or answer sheet given to them. Writing paper issued only by the supervisor should be used at the examination. Log tables should be used carefully and left on the table after use. All stationery supplied to the candidates, both used and unused, should be left on the desks when candidates leave the examination hall.

Before answering the question paper, candidates should write their Index No. and the name of the examination in the relevant place in the answer script. The Index No. Should also be written in all other sheets used for answering questions. No candidate should write his/her name or place any identification mark on the answer script. It should also be noted that using the Index No. of another is a breach of examination rules.

All paper used for rough work should be crossed with a line and annexed to the answer script. Rough work should not be done on the Examination Entry Form, timetable or question paper.

All candidates must maintain strict silence both inside and outside the examination hall and not disturb the supervisor, invigilators and other candidates.

Except for a practical or field note book or assignment written by himself/ herself, no candidate is allowed to submit any other document written partly or wholly by someone else, with the answer script.

Impersonation of any kind is strictly prohibited.

The supervisor or the invigilators have the authority to call for a written statement from a candidate regarding any incident that takes place in the examination hall. Candidates should not refuse to make such a statement or sign such a statement.

Answer scripts should be personally handed over to the Supervisor or an Invigilator. Answer scripts should not be handed over to anyone else for whatever reason. All candidates should remain seated until all answer scripts are collected.

Candidates must make sure that they don't have in their possession any written/printed document, note or device which can be misused at the examination. They must also ensure that they do not indulge in acts, which can give rise to their being suspected of misconduct at the examination.

Submitting Medical Certificates for Absence at the Examination

Internal candidates who absent themselves for the whole or part of an examination due to ill health should report to the Medical Officer of the University about it either before the commencement of the examination or during the examination time.

Candidates who fail to do so for unavoidable reasons must submit a medical certificate from a District Medical Officer or a Medical Officer attached to a government hospital, within 14 days of the commencement of the relevant examination or part of the examination. Medical certificates issued by private medical officers; Ayurvedic physicians or Homeopaths are not accepted.

Examination Malpractices

- Possession of unauthorized documents.
- Copying
- Cheating
- Removal of examination stationery from the examination hall.
- Inappropriate behaviour
- Impersonation
- Gaining or attempting to gain unlawful access to the contents of a question paper.
- Aiding or abetting someone to cheat or receiving assistance from someone to cheat.
- Using undue influence on supervisors, invigilators and other examination officials.
- Any other action considered as an examination malpractice by the University Senate.

Procedure for Investigating Examination Malpractices

The supervisor should report any examination malpractice to the Asst. Registrar (Examinations) who will investigate into the matter and submit a report to the sub-committee appointed by the Senate.

On the recommendations submitted by the sub- committee, the Senate will impose appropriate punishment on the offenders.

Punishment for Examination Malpractices

Possession of unauthorized documents
Penalty: Banning examination candidacy for a period of two years or imposing alternative punishment considered appropriate by the Senate.

Copying

Penalty:

Invalidating examination candidacy for a period of 3 years or imposing alternative punishment considered appropriate by the Senate.

Cheating

Penalty:

Cancellation of examination candidacy, debarring candidate from sitting for University examinations for a specific period or imposing any other punishment considered appropriate by the Senate.

Removing examination stationery belonging to the University

Penalty:

Cancellation of examination candidacy and debarring candidate from sitting for university examinations for a period specified by the Senate.

Inappropriate conduct

Penalty:

Cancellation of examination candidacy, debarring candidate from sitting for university examinations for a period not exceeding 05 years and imposing any other punishment considered appropriate by the Senate.

Impersonation

Penalty:

Annulment of candidacy for a period not less than 05 years and not exceeding 10 years and the imposition of any other punishment considered appropriate by the Senate.

Gaining illegal access or attempting to gain such access to the contents of a question paper

Penalty:

Cancellation of examination candidacy and imposing any other punishment considered appropriate by the Senate.

Aiding and abetting examination malpractices and receiving assistance to commit such malpractices

Penalty:

Cancellation of examination candidacy and imposing any other punishment considered suitable by the senate.

Attempting to unduly influence examination supervisors and other officials

Penalty:

Any punishment prescribed by the Senate.

Being guilty of an examination malpractice for the second time

Penalty:

Cancellation of registration as a student of the University.

Compulsory punishments

In addition to the punishments listed above, the following will also be imposed on the recommendation of the Senate:

- Withholding a class for the degree.
- Limiting the maximum marks obtainable to 40% when re-sitting cancelled question papers.

- Either cancelling or withholding scholarships and bursaries.
- Withdraw residential facilities.
- Withholding invitation to graduation ceremony
- Delaying graduation and the release of degree results by one year.

The senate will decide on the punishments to be imposed for any examination malpractice not mentioned above.

Code of Discipline for Students

Section I - General Students Discipline

Acts of Indiscipline and Insubordination

1. The conduct of every student should at all times be exemplary throughout his/her period of Studentship.
2. Every Student should apply himself to his academic work in such manner as to satisfy the University. No student may absent himself from lectures or practical work for a period exceeding three weeks in one academic year unless he has obtained special permission or has a valid reason for such absence.
3. No student must commit any of the acts of indiscipline and insubordination listed below:
    a. Behaving in such a manner as to bring into disrepute or endanger the good name of the University: to obstruct the proper functioning of the educational, examination, or administrative activities of the University, to prevent or obstruct a member of the academic or non-academic staff, or an employee of the University from carrying out his duties: to ridicule or humiliate such person.
    b. Failure or inability to produce the students' record book, which will be issued to students, when called upon to do so by the Vice-Chancellor or the Registrar, or failure to identify himself/herself.
    c. Causing damage to University property, removing University property from the University premises, appropriating it to himself/herself or to another, defacing, dirtying, or defiling the buildings, walls or roads of the University by scratching, writing, drawing, or pasting posters upon them.
4. Causing, or aiding, abetting, encouraging, or sanctioning others to cause injury or harm to the self-respect or dignity of other students, staff officials, employees, or lawful visitors to the University, or causing loss, ridicule, danger, mental or physical pain to such person or persons.
5. Establishing, organizing, conducting or assisting in any activity an organization or society within the University, apart from those registered in terms of Clauses 112,114,115,116,117 and 118 of part III of the Universities Act No. 165 of 1978 as amended by the Universities (Amendment) Act. No. 7 of 1985.
6. Behaving is such a manner as to disturb or disrupt, or to gain admittance without permission, or to cause discomfort or harm to participants in any

meeting, seminar, festival, procession, exhibition, cultural or social event, which may have been organized with prior approval from the Vice-Chancellor by any society or organization which has been registered under the provisions laid out in Section (05) above.

7. Behaving in such a manner as to disturb or disrupt, or to gain admittance without permission, or to cause discomfort or harm to participants in, any meeting, seminar, festival, procession, exhibition, variety entertainment, play, film show, or religious, cultural or social event, which may have been organized with prior approval from the Vice-Chancellor of the University, or by the University administration, or by the academic or non-academic staff, or by an external organization.
8. Organizing, staging, encouraging, sanctioning, or participating in any meeting, seminar, festival, procession, exhibition, variety entertainment, play or film show held within the University premises or in its environs without the prior approval of the Vice-Chancellor of the University.
9. Holding meetings, picketing demonstrating, participating in processions, or fetes publishing, drawing, writing, putting up or distributing handbills, notices, or posters, or encouraging, sanctioning, or assisting others to commit such action, whether in favour of a University teacher, or an official, or an employee of the University, or in favour of some cause outside the University.
10. Ragging in any form. (N.B. any person found ragging is liable to be expelled from the University without any inquiry being held.)
11. Collecting, or encouraging to collect, or sanctioning the collection of money or any other item from students or employees or visitors of the University, or the retention or disbursement of such funds or items by any person, whether an Office bearer of a registered society or not unless it be with the full written consent of the ice-Chancellor.
12. Writing, printing, publishing, distributing, exhibiting, or pasting, either within the University or in its vicinity, any poster, notice, pamphlet, or other writings slanderous to any individual or detrimental to the reputation of the University, to discipline, or to peace.
13. Publishing, pasting, exhibiting, writing, or drawing, any notice or poster, in any place other than those authorized for such display, even if such action is in connection with the activities of a society registered with the University in terms of Clause 115 of Part of the Universities Act No 16 of 1978, as amended by the Universities (Amendment) Act No 7 of 1985, and even if such notice or poster has been approved by the Vice-Chancellor, the relevant teacher, or the Chief Students Counselor.
14. Publishing, broadcasting, telecasting, or releasing to the mass media, whether by the student on his own responsibility, or on behalf or another student or group of students, or on behalf of a society, any statement, article or notice, detrimental to the reputation of the University or insulting or humiliating the University authorities, or any official or employee of the University, or any other person connected with the University.
15. Consumption, distribution, sale or storage of drugs within or bringing such drugs in to the University, or being under the influence of liquor or drugs

within the University, or encouraging, assisting or sanctioning such action by any other person.

16. Consumption, distribution, sale or storage of liquor anywhere within the premises other than those permitted by the authorities.
17. Bringing into, or keeping, or storing within the University any weapon, explosives, or dangerous items, or encouraging or assisting such action.
18. Non-provision or the avoidance of provision of information needed by or requested by the University, or the provision of false or distorted information.
19. Abuse or misuse of University buildings, grounds, equipment or the property belonging to the University, or their use for unsuitable, unsanctioned, or improper purposes, or non-observation of the rules for their use.
20. Remaining within the University premises during times when the University is closed to students. (Such times may be subject to periodic changes.)
21. Any act for which the student could be convicted by a lawfully constituted court of law for an offence against the laws of the Republic of Sri Lanka.

Section II – Punishments

1. Any student found guilty of any offence specified as an act of indiscipline or insubordination in Section I above or of attempting to subvert the provision of this section (Section 11 - Punishments) may be subjected to one or more of the punishments listed below, as deemed sufficient by the Vice Chancellor, acting in accordance with the findings and recommendation of the Disciplinary Committee.
    a. A caution or a severe warning.
    b. A fine, not exceeding Rs.500/=
    c. Recovery of any loss sustained by the University. Suspension from classes, examinations, and from the use of all University facilities for a specified period.
    d. Suspension from sitting examinations of the University for an unspecified period.
    e. Cancellation, postponement, or suspension of the release of examination results for an indefinite period
    f. Regarded as having relinquished the course and/ or the studentship of University.
    g. Expulsion from the University. (The imposition of any one or more of the above punishments may be suspended. Note that the punishment for ragging will be expulsion from the University)
2. The Vice-Chancellor may impose one or more of the punishments listed in Section II, No. 01 (i) to (vii) above without holding any preliminary inquiry, and without obtaining the sanction of any other person, and so as to take immediate effect, if he has reason to believethattheactionorbehaviourofanystudentcouldleadtoabreakdownof discipline of the University or render difficulty in the normal running of the University, or lead to a breach of the peace.

3. Any student dissatisfied by the imposition upon him of one or more of the punishments listed in section 11, No.01 (i) to (vii), may appeal against the punishments to the Vice Chancellor within 14 days of being notified of the same.
4. The decision of the Vice-Chancellor in consultation with the Council shall be final.
5. Apart from the imposition of the punishments listed in Section 11, No.01 (i) to (viii), if a student has been found guilty of any offence referred to in section 1, the University reserves for itself the right to review and re-evaluate the conduct of such a student during his/her period in the University, before conferring upon him/her any degree, diploma or certificate.

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