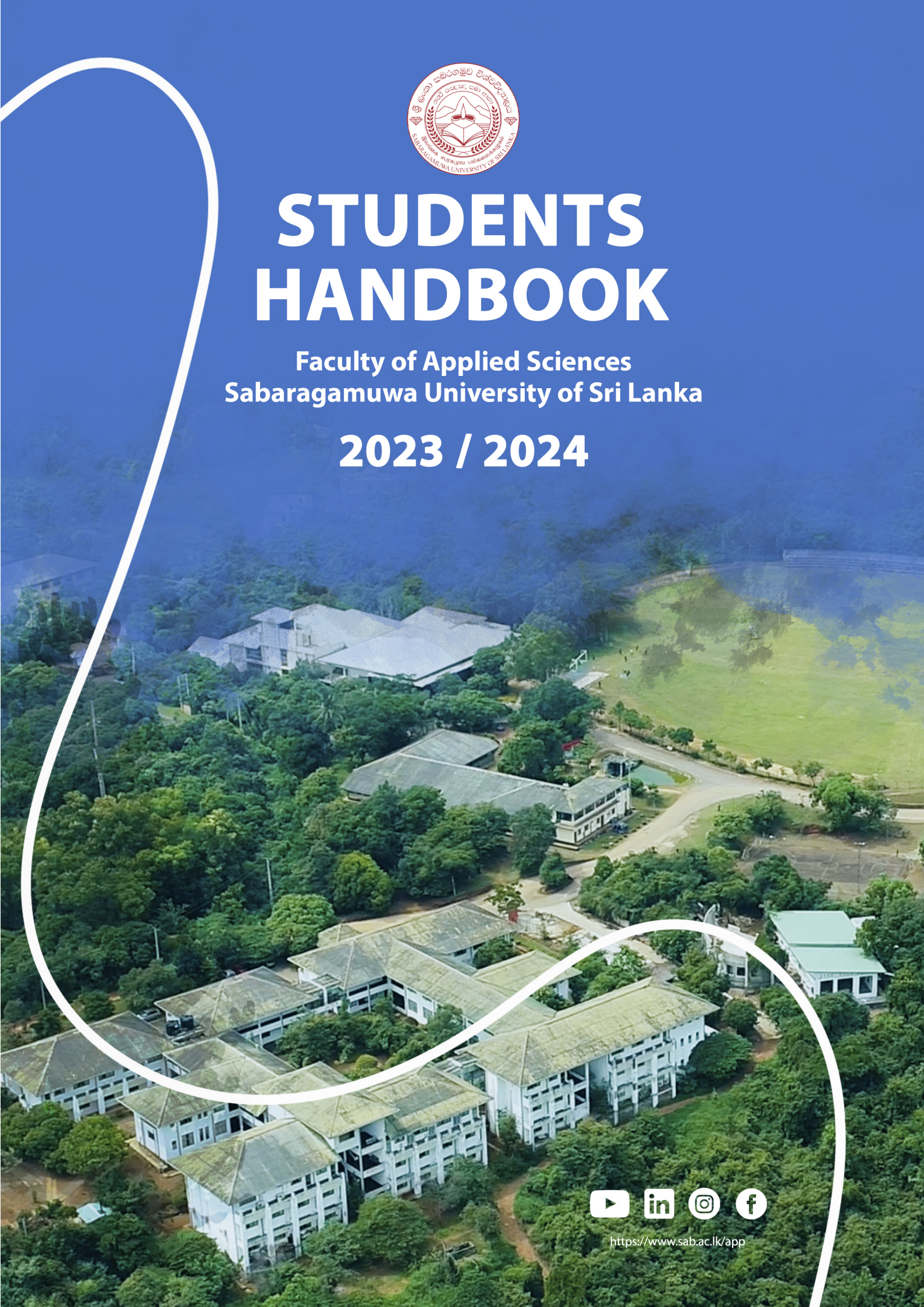
STUDENTS HANDBOOK

Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

2023 / 2024



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Disclaimer:
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, Computing, 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. Centre for Computer Studies (CCS), Staff Development Centre (SDC), Career Guidance Unit (CGU), Centre for Indigenous Knowledge and Community Studies (CIKCS), Centre for Research and Knowledge Dissemination (CRKD), Centre for Open and Distance Learning (CODL), Centre for Gender Equity and Equality (CGEE), Centre for Quality Assurance (CQA), University Business Linkage Cell (UBLC) 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 centre of excellence in higher learning to produce dynamic human capital in creating value for society".

The mission of the University is "to create a conducive environment for producing competent graduates with social values by ascertaining and disseminating knowledge, developing skills, promoting innovation, enhancing university-industry collaboration and social responsibility".

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 (FAGS) 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 (FAPS) 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, through its four 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 (FOG) offers a B.Sc. Hons. Degree program in Surveying Sciences, through its two departments: the Department of Surveying and Geodesy and the Department of Remote Sensing and Geographic Information Systems (GIS).

The Faculty of Management Studies (FMS) 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 (FSSL) offers B.A. degree programs in Social Sciences and Languages through its six departments: the Department of Social Sciences, the Department of Languages, the Department of Economics and Statistics, the Department of English Language Teaching, the Department of Information Technology, and the Department of Geography and Environmental Management.

The Faculty of Technology (FOT) offers Bachelor of Bio Systems Technology Hons. Degree and Bachelor of Engineering Technology Hons. Degree through its two departments: the department of Bio Systems Technology and the Department of Engineering Technology.

The Faculty of Medicine (FOM) offers the Degree of Bachelor of Medicine and Bachelor of Surgery (MBBS). 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 Computing (FOC) offers a Bachelor of Science in Computing and Information Systems, a Bachelor of Science in Software Engineering, and a Bachelor of Science in Data Science. It consists of the Department of Computing and Information Systems, the Department of Software Engineering, and the Department of Data Science.

The Faculty of Graduate Studies (FGS) 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. FGS also offers Postgraduate Diploma Programs in Business Administration, English and Education.

University Logo and the Flag

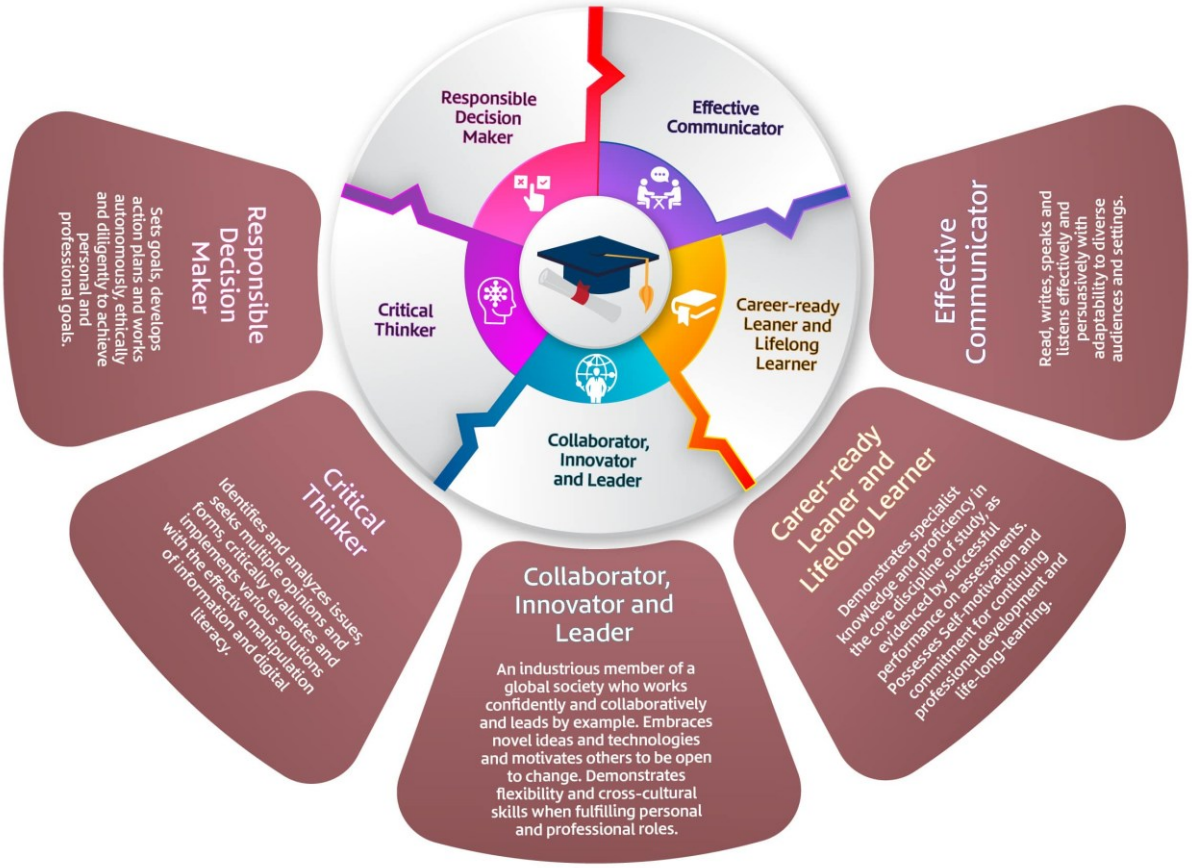
The University logo comprises a traditional oil lamp, rays of light, books, the Samanala (peak wilderness) mountain, gems, and sheaves of paddy, symbolizing the region and the people that it serves and the ideas for which they stand. The traditional oil lamp and the rays of light denote the imparting 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.

Graduate Profile of the University

SUSL
SABARAGAMUWA
UNIVERSITY OF SRI LANKA

GRADUATE PROFILE



OFFICERS AND ADMINISTRATIVE STAFF OF THE UNIVERSITY

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FACULTY OF APPLIED SCIENCES

Information at a Glance

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Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka
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Location

The University is situated about 18 kilometers from the Balangoda town along the Colombo-Badulla main 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, 35 km to Bandarawela)

Telephone

General	: 045-2280014
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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:	Divisional Hospital, Pambahinna
Post Office:	Sabaragamuwa University Sub Post Office
Nearest Police Station:	Samanalawewa Police Station
Nearest 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 ^{0}C
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 (FAPS) 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 FAPS comprises five departments: The Department of Natural Resources (DNR), The Department of Physical Sciences and Technology (DPST), Department of Food Science and Technology (DFST), and The Department of Sport Sciences and Physical Education (DSS & PE). FAPS 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, Sport Sciences and Management and Physical Education for the students who gain direct entry to FAPS 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 Resource Management" and "Physical Sciences and Technology" respectively.

The selection of the students for the B.Sc. Honours degree programs in Sport Sciences and Management and Physical Education is done on the basis of the GCE (Advanced Level) results as well as the performance at a written 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 DNR and DPST 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. FAPS 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 the 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 the 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 of the University 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 on Bursary and Mahapola payment related issues, students are advised to contact the Senior 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. A traditional food court ('Hela Bojun Hala') is also located in the university premises providing traditional food items at affordable rates.

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 FAPS collection in the library has also been gradually improving. FAPS 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 the postal code:

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

All students 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 Pambahinna 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: 045-2280036).

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 Unit (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. Students can contact the counsellors for an appointment (Please visit https://www.sab.ac.lk/fssl/sith-arana-visit-us).

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

Laboratories
Twenty-Two laboratories, four computer centres and a field station are available in FAPS covering the areas of Chemistry, Physics, Food Science and Technology, Natural Resources and Environmental Sciences, Computer Science/Information Systems and Sport Sciences/Physical Education which are equipped to cater to practical sessions of the degree programs.

Chemistry Laboratories: These two laboratories are equipped with the necessary instruments and apparatus and the required chemicals for chemistry practical at undergraduate level.

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

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

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.
Biomechanics and Physiology Laboratories: These two laboratories are equipped with the most relevant apparatus to evaluate athletes' performance and physiological status.

Anatomy Laboratory: This laboratory contains the models depicting the anatomical structures of the body, organs, ligaments, bones, arteries, veins, connective tissues, etc.

Psychology Laboratory: This laboratory is set up to enhance students' psychological knowledge and skills to address optimal performance and well-being of athletes and developmental and social aspects of sports participation. Also, students can work with athletes on motivation, stress management, visualization, effective teamwork, and other psychological factors in athletic performance.

Fitness Laboratory: Students can gain hands-on experience of fitness conducting fitness assessments and testing in this laboratory.

Physiotherapy Laboratory: This laboratory is equipped with the necessary instruments to conduct assessment and treatment of injuries related to sports and exercise.

Computer Centres: There are four computer centres in the faculty, having a sufficient 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 degree programs including the General English, Academic English and Business English components.

Employment Opportunities for Graduates from the Faculty

Graduates of the FAPS 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 FAPS 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 FAPS 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, FAPS has taken several steps to further enhance the quality and relevance of undergraduate education, in order to cater the job market demands.

Academic, Administrative and Academic Supportive Staff of the Faculty

Office of the Dean

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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 FAPS, for appointing committees (excluding members of FAPS) to report on any special subjects, and for recommending suitable persons for appointment as examiners.

The Faculty Board of FAPS 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 FAPS;
- Two members elected by the Lecturer (Probationary) staff of FAPS from among such Lecturers;
- Two members of the permanent staff attached to FAPS and who are imparting instructions;
- Two students elected by the students of FAPS 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 FAPS.

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

Designator & Qualifier	Abbreviation	SLQF Level	Total Credits
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	120

Bachelor of Science in Physical Sciences	BSc (Phy Sc)	5	90-99
Bachelor of Science Honours in Applied Physics	BScHons (App Phy)	6	124-131
Bachelor of Science Honours in Chemical Technology	BScHons (Chem Tech)	6	124-131
Bachelor of Science Honours in Computer Science and Technology	BScHons (Com Sc & Tech)	6	125-132
Bachelor of Science Honours in Physical Education	BScHons (Phy Ed)	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, the nationally consistent framework for all higher education qualifications offered in Sri Lanka, One Credit is considered equivalent to 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 is considered equivalent to a minimum of 100 notional hours. The distribution of the notional hours for each course in the Degree Program is indicated in the Course Synopsis.

FACULTY OF APPLIED SCIENCES
SABARAGAMUWA UNIVERSITY OF SRI LANKA

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

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

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

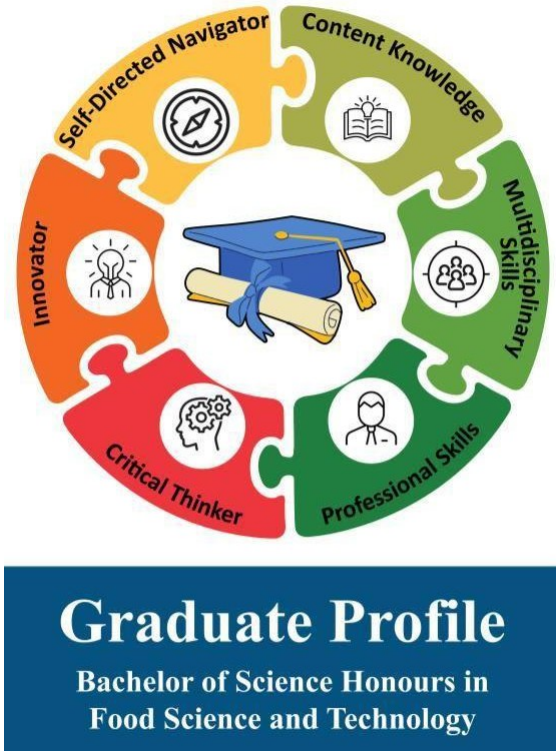
DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

Degree Program

Bachelor of Science Honours in Food Science and Technology

[BScHons (Food Sc & Tech)]

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.

Abbreviation of the degree program	Year of study	Semester of study	Course number (in 2 digits)	Credits allocated (in parenthesis)	Name of the course
FST	**1**	**1**	**0 1**	**(2)**	**Introduction to Food Science and Technology**

Summary of the Courses

Course Code	Course Name	Compulsory/ Optional
Courses offered in Year I, Semester I		
FST 1101(1)	Introduction to Food Science and Technology	Compulsory
FST 1102(2)	Food Biology	Compulsory
FST 1103(1)	Laboratory in Food Biology and Aquaculture Practices	Compulsory
FST 1104(2)	General Chemistry	Compulsory
FST 1105(2)	Introduction to Computer Fundamentals	Compulsory
FST 1106(1)	Application of Computer Fundamentals	Compulsory
FST 1107(2)	Mathematics for Food Science	Compulsory
FST 1108(2)	Biotechnology for Food Science	Compulsory
FST 1109(2)	Production of Plant-based Agricultural Raw Materials	Compulsory
FST 1110(1)	Production of Livestock and Aquatic Raw Materials	Compulsory
Total credits for the semester		16
Courses offered in Year I, Semester II		
FST 1201(2)	Fundamentals of Microbiology	Compulsory
FST 1202(2)	Biochemistry I	Compulsory
FST 1203(2)	Organic Chemistry	Compulsory
FST 1204(2)	Fundamentals of Analytical Chemistry	Compulsory
FST 1205(1)	Laboratory in Elementary Chemistry	Compulsory

FST 1206(2)	Postharvest Technology	Compulsory
FST 1207(1)	Laboratory in Postharvest Handling of Food Sources	Compulsory
FST 1208(2)	Management Process	Compulsory
FST 1209(2)	Fundamentals of Statistics	Compulsory
Total credits for the semester		16
Total credits for the Year I		32
Courses offered in Year II, Semester I		
FST 2101(2)	Biochemistry II	Compulsory
FST 2102(2)	Food Chemistry	Compulsory
FST 2103(1)	Laboratory in Biochemistry and Food Chemistry	Compulsory
FST 2104(2)	Food Microbiology	Compulsory
FST 2105(1)	Laboratory in Food Microbiology and Biotechnology	Compulsory
FST 2106(2)	Principles of Human Nutrition	Compulsory
FST 2107(1)	Food Physics and Process Engineering I	Compulsory
FST 2108(2)	Food Preservation	Compulsory
FST 2109(1)	Laboratory in Food Preservation	Compulsory
FST 2110(2)	Statistics for Experimental Design and Forecasting	Compulsory
Total credits for the semester		16
Courses offered in Year II, Semester II		
FST 2201(2)	Food Quality Management	Compulsory
FST 2202(2)	Food Physics and Process Engineering II	Compulsory
FST 2203(1)	Laboratory in Food Physics and Process Engineering	Compulsory
FST 2204(2)	Applied Human Nutrition	Compulsory
FST 2205(1)	Laboratory in Human Nutrition	Compulsory
FST 2206(1)	Food Toxicology	Compulsory
FST 2207(2)	Food Packaging	Compulsory
FST 2208(1)	Food Marketing	Compulsory
FST 2209(2)	Dairy Science	Compulsory
FST 2210(2)	Research Methodology and Scientific Communication	Compulsory
Total credits for the semester		16
Total credits for the Year II		32
Courses offered in Year III, Semester I		
FST 3101(2)	Food Analysis	Compulsory
FST 3102(1)	Laboratory in Food Analysis	Compulsory
FST 3103(2)	Food Safety and Risk Analysis	Compulsory
FST 3104(1)	Food Regulations	Compulsory
FST 3105(2)	Food Product Development	Compulsory
FST 3106(1)	Sensory Evaluation of Foods	Compulsory
FST 3107(1)	Laboratory in Sensory Evaluation of Foods	Compulsory
FST 3108(2)	Dairy Processing Technology	Compulsory
FST 3109(1)	Laboratory in Dairy Science and Processing Technology	Compulsory

FST 3110(2)	Sugar and Confectionery Processing Technology	Compulsory
FST 3111(1)	Fruit and Vegetable Processing Technology	Compulsory
FST 3112(1)	Seminars in Trends and Current Issues in Food Science and Technology	Compulsory
Total credits for the semester		17
Courses offered in Year III, Semester II		
FST 3201(2)	Aquatic Food Processing Technology	Compulsory
FST 3202(2)	Meat and Egg Processing Technology	Compulsory
FST 3203(1)	Laboratory in Aquatic Food, Meat and Egg Processing Technology	Compulsory
FST 3204(2)	Process Technology of Grains	Compulsory
FST 3205(1)	Process Technology of Spice, Root and Tubers	Compulsory
FST 3206(1)	Laboratory in Food Process Technology (Confectionery, Fruits and Vegetables, Grains, Spice, Root & Tubers)	Compulsory
FST 3207(1)	Beverage Processing Technology	Compulsory
FST 3208(1)	Process Technology of Edible Nut and Oil	Compulsory
FST 3209(2)	Statistics in Quality Control	Compulsory
FST 3210(2)	Integrated Project in Food Science and Technology	Compulsory
Students should select courses covering 2 credits from the following optional courses.		
FST 3211(2)	Nanotechnology and its Applications in Food	Optional
FST 3212(1)	Foodomics	Optional
FST 3213(1)	Food and Chronic Diseases	Optional
FST 3214(1)	Instrumental Techniques	Optional
Total credits for the semester		17
Total credits for the Year III		34
Courses offered in Year IV, Semester I		
FST 4101(2)	Process Control, Automation and Facility Design in Food Industry	Compulsory
FST 4102(2)	Environmental Sustainability in Food Industries	Compulsory
FST 4103(1)	Functional Foods and Nutraceuticals	Compulsory
FST 4104(2)	Advanced Food Quality Management	Compulsory
FST 4105(2)	Entrepreneurship	Compulsory
FST 4106(1)	Human Resource Management	Compulsory
FST 4107(2)	In-plant Training in Food Industry	Compulsory
Students should select courses covering 2 credits from the following optional courses.		
FST 4108(1)	Food and Gut Microbiota	Optional
FST 4109(1)	Nutritional Surveillance	Optional
FST 4110(1)	Data Science and Informatics Applications in Food Science	Optional
FST 4111(1)	Trends in Meat Analogues	Optional
FST 4112(1)	Project Management	Optional

Total credits for the semester		14
Courses offered in Year IV, Semester II		
FST 4201(8)	Research Project in Food Science and Technology	Compulsory
Total credits for the semester		8
Total credits for the Year IV		22
Grand Total		120

Summary of Credits Required

	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	16	16	16	17	15	12	08
Credited and Optional courses	-	-	-	-	-	02	02	-
Total credits	32		32		34		22	
Total credits for the degree programme	120							

Detailed Syllabus

YEAR I SEMESTER I
FST 1101(1) Introduction to Food Science and Technology
Overview of food science and technology; Historical development and scope of the food industry; Basic concepts of food components — carbohydrates, proteins, fats, water, vitamins, and minerals; Introduction to food groups and their nutritional significance; Fundamentals of food preservation and processing methods; Role of food safety, hygiene, and quality in the food supply chain; Introduction to food laws and regulations; Emerging trends and career opportunities in food science and technology.
FST 1102(2) Food Biology
Cell and its constituents; Plant physiology; Structure of plant food parts; Basic animal muscle structure, muscle types and composition of typical animal muscle; Morphological characteristics of fish, shrimp, and crabs; Fish species identification; Water quality parameters; Muscle contraction and relaxation, energy metabolism in postmortem glycolysis, rigor-mortis, meat conditioning and ageing; Meat identification and eating quality characteristics.
FST 1103(1) Laboratory in Food Biology and Aquaculture Practices
Osmosis; Absorption spectrum of Chlorophyll; Water potential of potato tubers; Structure of plant food parts; Morphological characteristics of fish, identification of different food fish, shrimp, prawn and crabs species; Different water quality parameters; Meat categorization according to its color; Determination of doneness; Fat recovery percentage of fish and meat; Cooking yield of meat; Textural properties of cooked meat products.
FST 1104(2) General Chemistry
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 1105(2) Introduction to Computer Fundamentals
Introduction to computers and information technology; Computer systems and components; Software and operating systems; Productivity tools for scientific work; Data handling and visualization basics; Computer networks and internet technologies; Digital communication and online collaboration, Emerging technologies in IT; Cybersecurity and digital safety; Ethics, privacy, and responsible use of technology, Introduction to programming concepts.
FST 1106(1) Application of Computer Fundamentals
Computer fundamentals and system operations; Productivity tools for scientific applications (including word processing, presentations, spreadsheets, and data management); Internet usage, email, and online collaboration platforms; Basic data

handling and visualization techniques, Introduction to programming and scripting for scientific tasks.

FST 1107(2) Mathematics for Food Science

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 1108(2) Biotechnology for Food Science

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 1109(2) Production of Plant-based Agricultural Raw Materials

Effect of agronomic practices on produce quality; Fruit quality and agroecological 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 1110(1) Production of Livestock and Aquatic Raw Materials

Introduction and potentials; Livestock and aquaculture related organizations; Different livestock animal species and breeding techniques; Principles of livestock animal management systems; Application of good agricultural practices (GAP); External and internal quality characteristics of chicken eggs; Site selection for livestock farm; GAP for aquatic food raw materials; Different food fish species; Cage culture, Bivalve culture, Shrimp culture, and crab culture; Application of good aquaculture practices.
(Field excursion)

YEAR I SEMESTER II

FST 1201(2) Fundamentals of Microbiology

Introduction to microbial world; History of microbiology; Microbial habitats; Characteristics of different types of microbes including their nutrition; Respiration and reproduction.

FST 1202(2) Biochemistry I
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(2) Organic Chemistry
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 1204(2) 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).
FST 1205(1) Laboratory in Elementary Chemistry
Quantitative inorganic analysis; Preparation of standard solutions; Primary and Secondary standards; Volumetric titrations (acid-base, redox and complexometric titrations); Solubility behavior of organic compounds; Separation and extraction techniques (solvent-solvent extraction, distillation methods, natural product isolation).
FST 1206(2) Postharvest Technology
Introduction to postharvest technology; Postharvest physiology of fruits and vegetables; Ethylene in postharvest technology; Harvesting methods and harvest handling;

Packaging and transportation; Packing house operations, Modified atmosphere and controlled atmosphere packaging; Minimal processing of fruits and vegetables; Future trends in postharvest handling; Postharvest losses and loss assessment; Pre-cooling and storage methods, quality attributes and standard; Common postharvest diseases & physiological disorders of selected fruits and vegetables and their management; Common pests of stored food commodities, their effects and management.
(Field excursion)

FST 1207(1) Laboratory in Postharvest Handling of Food Sources

Determination of harvesting stage by subjective and objective maturity indices; Analysis of physicochemical properties; Exogenous methods for controlling fruit ripening; Different packaging and storage methods; Harvest handling methods; Evaluation of shelf life of agricultural produce; Minimal processing; Common postharvest diseases of selected fruits and vegetables; Insect pests of stored food commodities; Evaluation of postharvest loss of food commodities.
(Field excursion)

FST 1208(2) Management Process

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 1209(2) Fundamentals of Statistics

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.

YEAR II SEMESTER I

FST 2101(2) Biochemistry II

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(2) Food Chemistry
Introduction to food chemistry; Chemical reactions of major food constituents: carbohydrates (decomposition of reducing and non-reducing sugars, starch granule structure and properties, pectic substances, hydrocolloids, and gums), proteins (functional properties and changes during processing), lipids (hydrolysis, oxidation, hydrogenation, trans fatty acid formation, polymorphism), water activity and interaction with food components; Browning reactions in foods; Food additives; Food colorants and pigments, Flavor compounds and flavor encapsulation, Food enzymes, Food adulteration.
FST 2103(1) Laboratory in Biochemistry and Food Chemistry
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(2) Food Microbiology
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 2105(1) Laboratory in Food Microbiology and Biotechnology
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 electrophoresis, gel documentation and analysis.
FST 2106(2) Principles of Human Nutrition
Introduction to nutrition; Dietary guidelines and determinants of food intake; Digestion of food, nutrient absorption and metabolism, Classes of nutrients, their dietary sources, physiological roles and requirements; Concept of energy and nitrogen balance; Rationale for the development of dietary guidelines and nutrition policies; Role of nutrition in growth and health through the life cycle.

FST 2107(1) Food Physics and Process Engineering I
Food processes and unit operations; Units and dimensions; Physical properties of food and agricultural produce; Material and energy balance; Fluid statics; Flow of fluid in food processing; Rheological properties of food; Equilibrium moisture content and water activity; Psychrometry.

FST 2108(2) Food Preservation
Overview of food preservation; Causes of spoilage; Food additives and their functions; Principles of food preservation; Food preservation methods; Thermal preservation; Chemical and high concentration preservation; Non-thermal preservation; Fermentation; Novel food preservation techniques; Hurdle technology.
FST 2109(1) Laboratory in Food Preservation
Identification of food additives and their functions; Drying and dehydration; Osmotic dehydration; Fermentation; Pickling; Caning and bottling; Cordial and nectar production; Novel preservation methods.
FST 2110(2) Statistics for Experimental Design and Forecasting
Estimation: Point and interval estimation for measures of center (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. Simple linear regressions and multiple linear regressions, parameter estimation (OLS) and its properties. 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. Analysis of Categorical and Count Data: Chi-squared test of goodness of fit, Test of independence in contingency tables. Introduce statistical software, Analysis of the real-world data by using statistical software and result interpretation.
YEAR II SEMESTER II
FST 2201(2) Food Quality Management
Concept of Quality & Quality management (quality definitions, dimensions of quality and quality factors in food, Total Quality Management); Eight quality management principles; Quality control & 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; Measurement assurance; ISO 17025 laboratory accreditation; An overview of ISO 9001, ISO 14001 & ISO 22000
FST 2202(2) Food Physics and Process Engineering II
Laws of thermodynamics; Heat transfer in food processing and principles of thermal processing; Steam tables; Food dehydration; Refrigeration, chilling and freezing; Evaporation in liquid food; Extrusion technology; Mechanical separation and mixing processes; Size reduction; Emerging and advanced technologies (Ohmic heating, microwave processing, pulsed electric fields, High pressure processing (HPP); Ultrasonics and cold plasma; 3D food printing and structured food design). (Field Excursion)

FST 2203(1) Laboratory in Food Physics and Process Engineering
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; Drying kinetics; Microwave processing of foods; Food textural properties.
FST 2204(2) Applied Human Nutrition
Health effects of nutrient deficiencies and excesses; Role of diet and nutrition in chronic diseases prevention and management; Nutritional aspects of food processing; Food fortification; Drug and nutrient interactions; Dietary/nutrient supplements.
FST 2205(1) Laboratory in Human Nutrition
Introduction to nutritional assessment; Anthropometric assessment; Dietary assessment: 24-hour diet recall, Food frequency questionnaire, Diet recording; Food consumption behaviour (individuals and community groups), Using information on secondary data/vital statistics to express nutritional and health status.
FST 2206(1) Food Toxicology
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; Plant toxins; Food additives; Pesticides and antibiotic residues; Mycotoxins; Bacterial toxins; Marine toxins; Toxicants formed during food processing.
FST 2207(2) Food Packaging
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 2208(1) Food Marketing
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; Digital Marketing in the Food Industry.
FST 2209(2) Dairy Science
Introduction (milking animals and global milk production trends, 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 (role of milk in

human nutrition, functional and bioactive compounds in milk); Milk constituents (composition, chemistry, and properties of milk fat, milk proteins (caseins, whey proteins, and enzymes), lactose, minerals, and vitamins; Microbiology of milk (general aspects, pathogenic and spoilage microorganisms in milk, biochemical changes in milk due to microbial activity, 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 2210(2) Research Methodology and Scientific Communication

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.

YEAR III SEMESTER I

FST 3101(2) Food Analysis

Introduction to food analysis; Sampling and sample preparation; Proximate 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).

FST 3102(1) Laboratory in Food Analysis

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; Determination of iodine content in salt; Determination of vitamin C content in foods; Determination of pH and titratable acidity; Determination of total phenolic content and antioxidant activity of foods; Analysis of phosphorus content in food samples by UV/Visible spectroscopy; Paper chromatography.

FST 3103(2) Food Safety and Risk Analysis

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).

FST 3104(1) Food Regulations

Introduction to food regulations; Food ingredient labeling; Nutrition labeling; Food law; Food Act; Organization and institutions concerning food standards, Regulations and international businesses; SLSI, ISO, Codex, WTO, Standards and Trade Development Facility (STDF), FAO, WHO, International Plant Protection Convention (IPPC), World Organization for Animal Health (OIE), International Property Right and International Trade (IPR); General Agreement on Tariff and Trade (GAAT); Agreement on Technical Barriers to Trade (TBT); Sanitary and Phytosanitary Agreement (SPS), Food safety regulatory mechanism of South Asian countries, EU, ASEAN; Export inspection and certification.

FST 3105(2) Food Product Development

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 3106(1) Sensory Evaluation of Foods

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.

FST 3107(1) Laboratory in Sensory Evaluation of Foods

Planning of sensory tests; Basic recognitions tests and threshold levels; Product-oriented test methods; Consumer-oriented test methods; Sensory panel and sensory data; Data analysis and interpretation.

FST 3108(2) Dairy Processing Technology

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; Cheese technology; Butter and dairy spreads; Ghee and anhydrous milk fat; 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 excursions)

FST 3109(1) Laboratory in Dairy Science and Processing Technology
Qualitative examination of raw milk (organoleptic properties of raw milk/sensory evaluation; 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 physicochemical, microbiological and textural properties of market samples of yoghurt; Production of cultured milk products (yoghurt, curd); Production of Semi-Hard Cheese and Mozzarella Cheese; Identification and sensory evaluation of cheese types; Production of butter, cultured buttermilk and ghee; Evaluation of techno-functional properties of milk powder; Production of ice cream.
FST 3110(2) Sugar and Confectionery Processing Technology
Sugar manufacturing process (sugar cane harvesting and quality assessment, juice extraction and purification, evaporation, crystallization, centrifugation, drying, and packaging); Sweeteners in confectionery (nutritive and non-nutritive sweeteners and their functional roles in confectionery products); Technical aspects of industrial sugar confectionery manufacturing; Types of confectionery products, processing technology, and characteristics (hard-boiled sweets; caramel, toffee, fudge; gums and jellies; aerated confectionery; extruded confectionery); Chocolate confectionery (role of ingredients and processing steps, compound chocolate and coatings); Quality and dietary considerations (confectionery in the human diet: health implications and sugar reduction strategies, packaging materials and shelf life considerations, quality control and safety regulations in confectionery manufacturing). (Field excursion)
FST 3111(1) Fruit and Vegetable Processing Technology
Selecting fruits and vegetables for processing; Processing technology of jam, jelly, marmalade, preserve and candy; Fruit juice processing; Fermented fruits and vegetable products; Canning; Freezing technology; Drying and dehydration; Novel technologies in fruit and vegetables processing; Novel foods; Quality control and quality assurance; Utilization of by-products in fruits and vegetables processing industry. (Field excursion)
FST 3112(1) Seminars in Trends and Current Issues in Food Science and Technology
Students will be required to complete an individual literature survey based on a selected topic and assessed on a review paper, oral/poster presentation and an abstract.
YEAR III SEMESTER II
FST 3201(2) Aquatic Food Processing Technology
Overview of fish processing in Sri Lanka and its potentials; Fish marketing system; Postharvest handling of fish; Fish inspection at the landing place and fisheries harbors operations; Fish processing plant layout and its general operations; Different fresh fish products; Hurdle technology for fish processing; MSC certification of fish products; Traditional fish processing methods; Fish canning; High pressure freezing; By-products and waste utilization of fish processing; Prawn/shrimp and crab processing;

Shellfish processing; Edible seaweeds processing and toxicological aspects of aquatic food.
(Field excursions)

FST 3202(2) Meat and Egg Processing Technology

Overview of meat processing in Sri Lanka and its potentials; Meat marketing system; Significant impact of disease outbreak on meat processing; Processing of high-quality fresh meat; Animal welfare and GAP application; Slaughterhouse/ construction and layout of meat processing plant; Ante-mortem and post-mortem inspection, stunning techniques, halal and kosher slaughtering, butchering, and by-product utilization of slaughterhouse; Broiler processing; GMP/GHP and HACCP certification of processed meat products; Hurdle technology; Slaughterhouse waste management, value addition; Different butcher cuts; Processing technique of cured meat products; Table egg processing techniques and its applications; Nutritional and health benefits of table eggs; Application of different food quality standards for meat and egg products.
(Field excursions)

FST 3203(1) Laboratory in Aquatic Food, Meat and Egg Processing Technology

Personal sanitation/GHP application, GMP and maintenance of different meat processing equipment; Identification of different processed meat and fish products and studying their organoleptic properties; Processing of broiler chicken, barbecue meat, sausage, ham and form products, slaughterhouse by-product utilization: Fresh fish cuts, traditional fish products (ambulthiyal, Maldives fish, jaadi, smoked fish, and dry fish); Fish meal; Cold storage and pasteurization of table eggs.

FST 3204(2) Process Technology of Grains

Grain morphology and microscopic structure; Chemical composition and functional properties of cereal grains and pulses; Characteristics and behavior of cereal starches; Processing technologies of cereal grains (wheat, rice); Rice milling and rice-based product development; Wheat milling and flour quality evaluation; Bakery technology: product types and baking; Quality parameters and shelf-life of bakery products; Composite flour technology and gluten-free applications; Traditional and underutilized cereal grains of Sri Lanka; Pulse processing and incorporation into cereal-based products.
(Field excursion)

FST 3205(1) Process Technology of Spice, Root and Tubers

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. Introduction to root & tuber crops; Post-harvest handling of root & tuber crops; Toxic compounds and antinutritional factors present in root & tuber crops; General introduction & processing technologies of Cassava, Sweet Potato, Potato, Yams, Edible Aroids; Current researches and research potential on root & tuber crops.
(Field excursion)

FST 3206(1) Laboratory in Food Process Technology (Confectionery, Fruits and Vegetables, Grains, Spice, Root & Tubers)
Confectionery technology: Sugar crystallization; Identification and sensory analysis of sugar confectionery products; Production and quality evaluation of confectionery: hard boiled candy, marshmallows, gelatin and gummy candy, traditional Sri Lankan sweets; Value-added products from fruit and vegetable processing waste; Processing of cassava and other roots; Processing of Ceylon cinnamon; Extraction of spice essential oils, spice value addition; Product development from soy; Grain: Microscopic observation of grain structure and starch, Gluten content determination, Water and oil absorption capacity, Composite flour mixes and observing dough development, Basic baking trials (pastry and soft baked product); Advanced flour quality testing, Farinograph, Alveograph. (Field excursion)
FST 3207(1) Beverage Processing Technology
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 & quality assurance of alcoholic and non-alcoholic beverages; Trends and issues of beverage processing. (Field excursions)
FST 3208(1) Process Technology of Edible Nut and Oil
Overview of edible nuts and oil industry; Classification and major types of edible nuts and oilseeds; Pre-processing, cleaning, grading, and storage of nuts and oilseeds; Processing technologies for edible nuts (roasting, blanching, slicing, grinding) and oil extraction methods (mechanical pressing, solvent extraction, cold pressing); Refining and modification processes of edible oils; Physical, chemical, and nutritional properties of raw and processed products; Quality attributes, safety standards, and quality assurance practices; By-product utilization and waste management in nut and oil processing; Trends, innovations, and challenges in edible nut and oil processing. (Field excursions)
FST 3209(2) Statistics in Quality Control
Introduction to modern quality management and improvement, Statistical process control, Definitions and concepts of quality and quality control, Importance of quality in manufacturing and service sectors, Role of statistics in quality management. Control charts: Control charts for attributes (p-chart, np-chart, c-chart, and u-chart), Control chart for variables (X-bar & R chart and X-bar & S chart), Interpretation of patterns and rules for detecting out-of-control processes. Process capability analysis; Concepts of natural tolerance and specification limits, Cp and Cpk indices; Acceptance Sampling: principles of acceptance sampling, Types: single, double, and multiple sampling plans; Operating Characteristic (OC) curves; Producer's risk and consumer's risk; Average Outgoing Quality (AOQ) and Average Total Inspection (ATI); Quality standards: ISO 9000 (QMS), ISO 14000 (EMS), TQM and Six Sigma; Introduction to operations research; Linear Programming (LP), Transportation and assignment problems; Introduction to time Series data in industrial processes: Time series analysis and forecasting; Components of

time series data, Smoothing methods, Common industrial time series challenges; Introduction to statistical software for quality control and time series analysis and forecasting; Analysis of real-world data using statistical software and interpretation of results (Minitab, Excel, R).
FST 3210(2) Integrated Project in Food Science and Technology
The course consists of supervised individual project work. The focus of the project should be on food product development/value addition. Students must submit a project proposal followed by an oral presentation prior to the commencement of the project and a comprehensive report upon completion, adhering to the provided guidelines. The project will be assessed through the written report, the displayed product/outcome, and a viva voce examination conducted by an Examination Committee appointed by the department.
Optional Courses: Students should select courses covering 2 credits from the following optional courses.
FST 3211(2) Nanotechnology and its Applications in Food
Basic concepts of nanotechnology (nanoscale definitions, surface-to-volume effects, property changes at the nanoscale); Instrumentation and characterization techniques for nanomaterials (SEM, TEM, AFM, XRD, UV-Visible spectroscopy, synchrotron X-ray imaging and applications); Nanotechnology applications in food: nano-enabled food packaging and wrapping, smart packaging and nano-sensors, nano-emulsions and nanofluids, food-contact nanocomposites, hygienic and antimicrobial coatings, biodegradable nano-coatings, nano-fertilizers, nano-biofortification, food safety and quality impacts, case studies on metal oxide nanoparticles, chitosan, and clay-based materials.
FST 3212(1) Foodomics
Introduction to Foodomics: definition, scope, and applications; Omics technologies in food science: genomics, transcriptomics, proteomics, metabolomics; Metabolomics in food quality, safety, and traceability; Nutrigenomics and nutrigenetics: personalized nutrition and gene–diet interactions; Analytical techniques used in Foodomics (e.g., LC-MS, GC-MS, NMR, PCR); Data analysis and bioinformatics in Foodomics: challenges and tools; Current and emerging trends: precision nutrition, AI in food research, digital food profiling.
FST 3213(1) Food and Chronic Diseases
Relationship of diet, nutrition and health; Role of diet in the development and management of non-communicable diseases (cardiovascular disease, diabetes, obesity, cancer); Concept of personalized nutrition; Principles of nutrition communication and advocacy.
FST 3214 (1) Instrumental Techniques
Introduction to advanced instrumental analysis and sampling methods specific to food applications; Principles and food-related applications of electroanalytical techniques

such as potentiometry; Spectroscopic methods including UV-Visible photometry and electron spin resonance spectroscopy for analyzing food components; Fundamentals of chromatographic techniques such as thin-layer chromatography (TLC), high-performance liquid chromatography (HPLC), and gas chromatography (GC) for separation and detection of food constituents; Introduction to electron microscopy for microstructural evaluation of food materials; Safety protocols in instrumental food analysis laboratories; Basic understanding of electronic circuitry relevant to analytical instruments used in food quality and safety assessment.

YEAR IV SEMESTER I

FST 4101(2) Process Control, Automation and Facility Design in Food Industry

Introduction to process control automation; Conceptual framework of an automated system; Process control loops; Computer-based control systems; Robotics and Automation; Emerging and future trends in automation. 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.
(Field excursion)

FST 4102(2) Environmental Sustainability in Food Industries

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 4103(1) Functional Foods and Nutraceuticals

Definitions, evolution, and scope of functional foods and nutraceuticals; Functional foods in relation to contemporary health concerns; Role of functional foods in the prevention and management of chronic diseases (e.g., cardiovascular disease, diabetes, obesity, cancer); Functional foods of plant, animal and microbial origin; Bioactive compounds; Cooking and processing techniques that preserve or enhance functional properties (e.g., steaming, fermentation, sprouting, minimal processing, encapsulation); Health claims, labeling, and global regulatory frameworks; Product development strategies for functional foods; Current and emerging trends in functional foods (e.g., personalized nutrition, microbiome-targeted foods, plant-based innovations).

FST 4104(2) Advanced Food Quality Management

HACCP (Introduction, prerequisite programmes, 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 (Ex: FSSC, BRC, IFS, SQF).

FST 4105(2) Entrepreneurship

Introduction to entrepreneurship; Entrepreneurial mindset development; Opportunity recognition; Creativity and innovation; Business models; Marketing strategies for SMEs; Strategic planning for SMEs; Business plan development; Managing intellectual property rights; Managing the exit of SMEs; Social responsibility and ethics of entrepreneur small businesses; Compulsory assignment: 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.

FST 4106(1) Human Resource Management

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 4107(2) In-plant Training in Food Industry

Students will undergo a five-week industrial placement in a food-related work environment, aimed at providing practical exposure to real-world industrial operations. During this period, they are expected to actively observe and participate in routine activities under the joint supervision of industry professional and departmental staff. Full engagement in assigned duties and attendance at all scheduled evaluations are mandatory. Upon completion of the in-plant training, students are required to submit a comprehensive final report and face a viva-voce examination accompanied by a poster summarizing their training experience.

Optional Courses: Students should select courses covering 2 credits from the following optional courses.

FST 4108(1) Food and Gut Microbiota

Introduction to the human gut microbiota: composition, diversity, and development; Factors influencing the gut microbiota: diet, environment, age, and antibiotics; Role of gut microbiota in digestion, immunity, and metabolic health; Dietary components modulating gut microbiota (prebiotics, probiotics, synbiotics, dietary fiber, polyphenols); Fermented foods and their microbiota: traditional and industrial products; Gut dysbiosis and its association with chronic diseases (e.g., obesity, diabetes, IBD, allergies); Mechanisms of microbiota-host interaction: SCFAs, gut-brain axis, immune signaling; Emerging trends: postbiotics, personalized nutrition, fecal microbiota transplant; Evaluation methods of gut microbiota: culture-based, DNA-based, and metabolomics approaches.

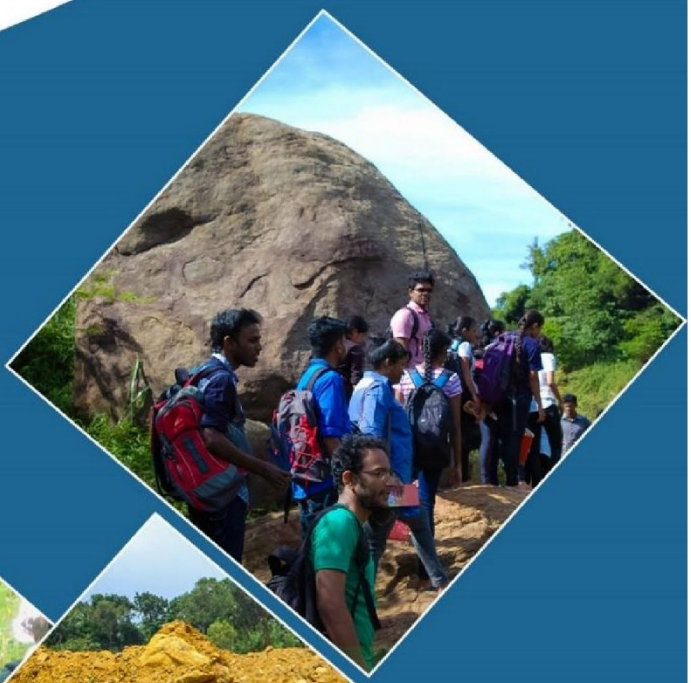
FST 4109(1) Nutritional Surveillance
Introduction to nutrition surveillance; Nutrition surveillance systems; Methods of nutrition surveillance; Usefulness of nutrition surveillance information; Nutrition programme planning and management.
FST 4110(1) Data Science and Informatics Applications in Food Science
Evolution of industry; Challenges and risks in digital transformation; Industry 4.0: Characteristics of industry 4.0, design principles, key technologies; Smart factories in the food industry; Internet of Things (IoT) for food industry; Big data and analytics in food informatics; Artificial Intelligence (AI) and Machine Learning (ML) for food industry; Cloud Computing for food industry; Cybersecurity for food industry; Blockchain for food safety and traceability.
FST 4111(1) Trends in Meat Analogues
Definition of meat analogue; Basic ingredients; Processing conditions, packaging and shelf-life; Basic types of meat analogues; Physicochemical, organoleptic and functional properties; Quality assurance; Health benefits; Labelling; Advantages, drawbacks and future potentials; Impact of meat analogues on true meat products.
FST 4112(1) Project Management
Introduction to Project Management (characteristics of successful project, project life cycle, roles of project personnel); Project planning and scheduling (Project charter and scope, SMART objectives, Work Breakdown Structure (WBS), overview of project management techniques, time planning and scheduling); Resource, time, and cost management (resource identification, time and cost estimation techniques, budget planning and tracking, manage changes and risks); Teamwork, communication & leadership (team roles and dynamics, leadership styles in project settings, conflict resolution and negotiation, meeting management and reporting); Monitoring, evaluation, and project closure (key performance indicators (KPIs), tools to monitoring progress, final report writing and presentations, post-project evaluation).
YEAR IV SEMESTER II
FST 4201(8) Research Project in Food Science and Technology
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.
2. An optional course will only be offered upon the registration of a minimum of 25% of students in the particular batch.
3. It is compulsory for the students to complete the Level I of the English Proficiency Course in order to obtain BScHons (Food Sc & Tech). The other two levels of the course are optional.
4. Students are also required to actively contribute in the following programs/activities organized by the Department:
    - ProFood ProPack 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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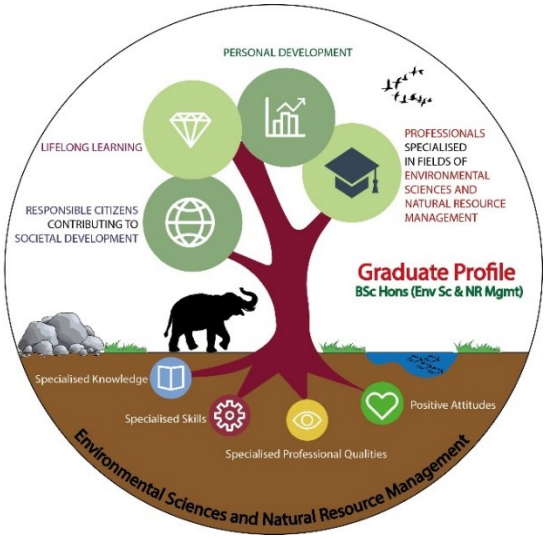
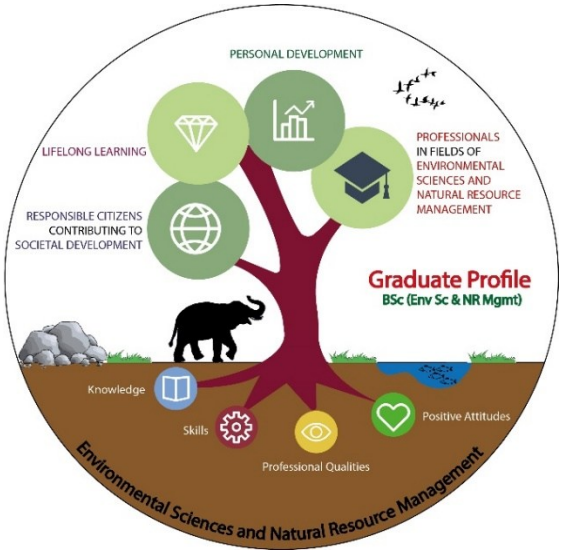
DEPARTMENT OF NATURAL RESOURCES

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

Degree Programmes are designed to cater to the current needs in the following fields;

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

Summary of the Courses

Table 1: Courses offered in the Semester I of the First Year			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
ESNRM 11101	Concepts of Environmental Science	1	C
ESNRM 11202	Cellular and Organismic Biology	2	C
ESNRM 11203	Evolution and the Diversity of Life	2	C
ESNRM 11104	Biology Laboratory	1	C
ESNRM 11205	General Chemistry	2	C
ESNRM 11106	Chemistry Laboratory	1	C
ESNRM 11207	Mathematics	2	C
ESNRM 11208	Physics	2	C
ESNRM 11109	Introduction to Computing and Digital Skills*	1	C
	Total No. of Credits	**14**	

Table 2: Courses offered in the Semester II of the First Year			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
ESNRM 12201	Earth System and Natural Resources	2	C
ESNRM 12202	Earth Materials and Processes	2	C
ESNRM 12203	Concepts of Ecology	2	C
ESNRM 12204	Microbiology for Natural Resource Studies*	2	C
ESNRM 12205	Fundamentals of Hydrology	2	C
ESNRM 12206	Fundamentals of Analytical Chemistry	2	C
ESNRM 12207	Fundamentals of Statistics*	2	C
ESNRM 12208	Applied ICT and Emerging Technologies	2	C
	Total No. of Credits	**16**	

Table 3: Courses offered in the Semester I of the Second Year			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
ESNRM 21201	Limnology*	2	C
ESNRM 21202	Biodiversity*	2	C
ESNRM 21203	Genetics, Biotechnology and Biosafety *	2	C
ESNRM 21204	Mineralogy and Petrology	2	C
ESNRM 21205	Fundamentals of Soil Science	2	C

ESNRM 21206	Statistics for Experimental Design and Forecasting	2	C
ESNRM 21207	Introduction to Economics	2	C
	Total No. of Credits	**14**	

Table 4: Courses offered in the Semester II of the Second Year			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
ESNRM 22101	Geomorphology and Geology of Sri Lanka	1	C
ESNRM 22102	Earth Science Laboratory	1	C
ESNRM 22203	Analytical Techniques for Environmental Sciences and Natural Resources*	2	C
ESNRM 22204	Field Techniques in Ecology and Biodiversity*	2	C
ESNRM 22205	Forestry	2	C
ESNRM 22106	Forestry Laboratory	1	C
ESNRM 22107	Introduction to Climatology	1	C
ESNRM 22208	Environmental and Natural Resource Economics	2	C
ESNRM 22209	Environmental Toxicology	2	C
ESNRM 22210	Natural Product Chemistry and Extraction Technologies	2	C
	Total No. of Credits	**16**	

Table 5: Courses offered in the Semester I of the Third Year			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
ESNRM 31201	Biogeography	2	C
ESNRM 31202	Industrial Minerals	2	C
ESNRM 31103	Industrial Chemistry and Technology	1	C
ESNRM 31204	Aquatic Resource Management*	2	C
ESNRM 31205	Waste Management	2	C
ESNRM 31206	Biodiversity Conservation and Management*	2	C
ESNRM 31107	Hydrology and Soil Science Laboratory	1	C
ESNRM 31208	Remote Sensing and Geographic Information Systems	2	C
ESNRM 31109	Remote Sensing and Geographic Information Systems Laboratory	1	C
ESNRM 31110	Research Methods and Scientific Communication - I	1	C
Students who follow the BSc(Hons) degree programme should select elective course units covering 02 credits form the 04 course units available from ESNRM 32211 – ESNRM 32214.			
ESNRM 31211	Basic Methods of Surveying Sciences*	2	E
ESNRM 31212	Advanced Petrology	2	E

ESNRM 31213	Ecological Restoration and Nature based Solutions	2	E
ESNRM 31214	Environmental Communication	2	E
	Total No. of Credits (Honours degree programme)	**18**	
Students, who exit at the end of the 3rd year (after completing a 3 year general degree), should complete 04 credits from the compulsory course units of ESNRM 41206 (in this semester as ESNRM 31215), ESNRM 41207 (in this semester as ESNRM 31216), and 02 credits from the elective course units of ESNRM 41202 (in this semester as ESNRM 31217) and ESNRM 41204 (in this semester as ESNRM 31218) within semester I.			
ESNRM 31211	Human Resource Management	2	C
ESNRM 31212	Literature Review and Research Proposal Development	2	C
ESNRM 31213	Energy Resource Management	2	E
ESNRM 31214	Environmental Legislation and Regulation	2	E
	Total No. of Credits (General degree programme)	**22**	

Table 6: Courses offered in the Semester II of the Third Year			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
ESNRM 32201	Resource Efficient and Cleaner Production	2	C
ESNRM 32202	Coastal and Marine Resource Management*	2	C
ESNRM 32203	Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA)	2	C
ESNRM 32204	Study and Management of Natural Hazards	2	C
ESNRM 32205	Soil Degradation and Management	2	C
ESNRM 32206	Statistical Application in Natural Resource Studies*	2	C
ESNRM 32107	Research Methods and Scientific Communication -II	1	C
ESNRM 32108	Community Outreach	1	C
ESNRM 32409	B.Sc. Dissertation in Environmental Sciences and Natural Resource Management	4	C
	Total No. of Credits (General degree programme)	**11**	
Students who exit at the end of the 3rd year (after completing a 3 year general degree), should take ESNRM 32409 as compulsory and, select elective course units covering 06 credits form the 06 course units available (from ESNRM 32201 – ESNRM 32206).			

Students who follow the BSc(Hons) degree programme should take ESNRM 32201 to 32108 as compulsory, and select elective course units covering 02 credits form the 06 course units available (from ESNRM 32210 – ESNRM 32215).			
ESNRM 32210	Lichenology*	2	E
ESNRM 32211	Biogeography and Conservation Planning*	2	E
ESNRM 32212	Environment and Society	2	E
ESNRM 32213	Mineral Exploration	2	E
ESNRM 32214	Bioinformatics	2	E
ESNRM 32215	Innovation and Entrepreneurship	2	E
	Total No. of Credits (Honours degree programme)	**16**	

Table 7: Courses offered in the Semester I of the Fourth Year			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
ESNRM 41201	Environmental Geochemistry	2	C
ESNRM 41202	Energy Resource Management*	2	C
ESNRM 41203	Environmental Governance	2	C
ESNRM 41204	Environmental Legislation and Regulation	2	C
ESNRM 41205	Field Techniques in Earth Science*	2	C
ESNRM 41206	Human Resource Management	2	C
ESNRM 41207	Literature Review and Research Proposal Development	2	C
Students should select elective course units covering 04 credits form the 09 course units available (from ESNRM 41208 – ESNRM 41216).			
ESNRM 41208	Applied Hydrology*	2	E
ESNRM 41209	Gemmology*	2	E
ESNRM 41210	Groundwater Exploration and Management*	2	E
ESNRM 41211	Protected Area Management*	2	E
ESNRM 41212	Ecotourism*	2	E
ESNRM 41213	Forestry for Rural Development*	2	E
ESNRM 41214	Climate Science and Climate Change	2	E
ESNRM 41215	Paleobiodiversity of Sri Lanka	2	E
ESNRM 41216	Machine Learning for Natural Resource Studies*	2	E
	Total No. of Credits	**18**	

Table 8: Courses offered in the Semester II of the Fourth Year			
Course Code	**Course Title**	**No of Credits**	**Compulsory (C) or Elective (E)**
ESNRM 42801	BSc Dissertation in Environmental Sciences and Natural Resource Management	8	C
	Total No. of Credits	**8**	

Summary of Credits Required

BSc. in Environmental Sciences and Natural Resource Management			
	Semester I	Semester II	Total
Year I	14	16	30
Year II	14	16	30
Year III	22	11	33
	Total		93

BSc(Hons) in Environmental Sciences and Natural Resource Management			
	Semester I	Semester II	Total
Year I	14	16	30
Year II	14	16	30
Year III	18	16	34
Year IV	18	8	26
	Total		120

Detailed Syllabus

Year I Semester I	
ESNRM 11101	Concepts of Environmental Science
History of environmentalism, Definition of Environmental Science, Environment, development, technology and society (human wellbeing, environmental health, environmental remediation and the concept of Sustainable Development), Key global environmental issues; triple planetary crisis, Introduction to environment conservation; citizen science as a sustainability tool, Importance of Sustainable Development Goals.	

ESNRM 11202	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 and Bioenergetics, Protein synthesis, Enzymes, Respiration, Nerve transmission, Homeostasis, Excretion and Osmoregulation, Reproduction, Plant growth and development, Photosynthesis.	

ESNRM 11203	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 11104	Biology Laboratory
Development of observation, illustration and microscopy skills in Biology, Understanding the cell, Understanding animal and plant tissues, The diversity of lower organisms (Protozoa and Protista), The Diversity of fungi, plants, and animals.	

ESNRM 11205	General Chemistry
Atomic structure and chemical bonding, Lewis structures, Hybridization, Size and energy factors in Chemistry, Electrochemical cell, Nernst equation and applications of electrode potential data, Oxidation-reduction reactions, Balancing chemical equations and half-reactions, Basic concepts in thermodynamics and Chemical kinetics, Phase equilibria and solutions, IUPAC nomenclature of organic compounds, Stereochemistry of organic compounds, Confomational analysis, Geometrical and optical isomerism, Chirality, Concepts of acid-base;pH, Acid base trends in organic compounds.	

ESNRM 11106	Chemistry Laboratory
Quantitative inorganic analysis; Preparation of standard solutions, Primary and secondary standards, Volumetric titrations (acid -base, redox and complexometric titrations), Solubility behavior of organic compounds, Seperation techniques, Solvent-solvent extraction, Simple distillation, Fractional distillation, Steam distillation, Extraction technologies; isolation of natural products.	

ESNRM 11207	Mathematics
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.	

ESNRM 11208	Physics
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 11109	Introduction to Computing and Digital Skills*
Introduction to Computers and Information Technology, Computer Hardware and Software Components, Basics of Operating Systems and File Management, Word Processing Tools, Presentation Tools, Spreadsheet Tools (Data entry, formulas, visualization).	

Year I Semester II	
ESNRM 12201	Earth System and Natural Resources
The Earth system and its spheres, Definition, 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.	

ESNRM 12202	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 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 behavioral ecology, Ecological applications, Human ecology, Conservation ecology and habitat restoration, Introduction to global change ecology.	

ESNRM 12204	Microbiology for Natural Resource Studies*
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 12205	Fundamentals of Hydrology
The Hydrological Cycle; processes and storages, Hydrological Parameters; precipitation, evapotranspiration, runoff, infiltration, permeability, Sources and measurement of streamflow, Uniform and steady-state flow concepts, Hydrographs and hydrologic routing techniques, Watershed/basin studies and water balance analysis, Social hydrology and its implications, Principles and applications of rainwater harvesting.	

ESNRM 12206	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 12207	Fundamentals of Statistics*
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.	

ESNRM 12208	Applied ICT and Emerging Technologies*
Internet and Web Technologies, Digital Communication and Online Collaboration Tools, Cybersecurity Fundamentals, Privacy and Digital Ethics, Emerging Technologies (e.g., AI, IoT), Introduction to Programming (basic logic and hands-on), IT Applications in Environmental and Resource Management, IT in Society and Professional Environments.	

Year II Semester I	
ESNRM 21201	Limnology*
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 bio indicators, Human influence on aquatic systems and their consequences, Eutrophication management and pollution control, Limnology field and laboratory. Field excursion to gain hands-on practical experience of limnology-related field techniques.	

ESNRM 21202	Biodiversity*
Introduction to biodiversity, Levels of biodiversity, Values of biodiversity, Measuring biodiversity, Introduction to biodiversity assessment, Ecosystem processes and services, Biodiversity of Sri Lanka, Human impact on biodiversity, Introduction to biodiversity conservation.	

ESNRM 21203	Genetics, Biotechnology and Biosafety *
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 physico-chemical properties of economic minerals, Basic Petrology (Igneous, Sedimentary and Metamorphic rocks).	

ESNRM 21205	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.

Field excursion to the Samanalawewa Reservoir Wet Blanketing area and Soil borrow pits.

ESNRM 21206	Statistics for Experimental Design and Forecasting

Estimation: Point and Interval Estimation for measures of center (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. Simple linear regressions and multiple linear regressions, parameter estimation (OLS) and its properties. 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. Analysis of Categorical and Count Data: Chi-squared test of goodness of fit, Test of independence in contingency tables. Introduce statistical software, Analysis of the real world data, by using statistical software and result interpretation.

ESNRM 21207	Introduction to Economics

Introduction to Microeconomic Concepts, Demand and supply theory, Production and Cost Theory, Theory of consumer behaviour, Introduction to Factor Markets and Resource Allocation, Introduction to Market Structures and Firm Behavior, Introduction to macroeconomics, Macroeconomic Issues (Defining, Measuring and consequences), Macroeconomic policies, Circular flow of income, National income accounting, School of thought of Economics (views in brief).

Year II Semester II	
ESNRM 22101	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 22102	Earth Science Laboratory
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 physic-chemical 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 22203	Analytical Techniques for Environmental Sciences and Natural Resources*
Instrumental methods in advanced environmental analysis (Atomic Absorption Spectrophotometer-AAS, microwave digester, Gas-Chromatograph-Mass Spectrophotometer-GC-MS, High-Performance Liquid Chromatography-HPLC, Fourier Transform Infrared-FTIR gas analyzer); 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 22204	Field Techniques in Ecology and Biodiversity*
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 behavior study techniques; Advanced field techniques and software in biodiversity studies. Field excursion to gain hands-on practical experience of biodiversity related field techniques.	

ESNRM 22205	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, Biomass and carbon sequestration, Principles in wood science and timber technology.	

ESNRM 22106	Forestry Laboratory
Measurements of age, bark thickness, diameter, height and volume of trees, Tree and stand basal area calculations, Determination of slope, elevation and altitude of a forested land; Determination of stand volume using single tree volume tables.	

ESNRM 22107	Introduction to Climatology
Fundamental concepts of climate science; atmospheric processes and regional climate variations. The composition and structure of the atmosphere, processes, and phenomena that define weather and climate. The main meteorological data measures and applications, Introduction to climate change, its causes, and its impacts on different dimensions. Includes self-learning modules linked with an online course delivered though DigiCampus platform (https://digicampus.fi/?lang=en).	

ESNRM 22208	Environmental and Natural Resource Economics
Rationale for Environmental Economics and Natural Resource Economics, Historical perspectives and Environmental Summits, Market Failure and Externalities, Public goods, Property rights and economic efficiency, Sustainable Development, Classification of Natural Resources, The Role of Environmental Valuation in Economics, Welfare Changes, Theory and Techniques of the Valuation of Non-market Goods and Services, Environmental Project Evaluation, Techniques in Environmental Impact Assessment, Introduction to ecosystem market place, Economics of ecosystems and biodiversity, Environmental Policies, Contemporary Issues.	

ESNRM 22209	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 (Kow), solid-water distribution coefficient (Kid)), 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 (LD50, LC50), 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 22210	Natural Product Chemistry and Extraction Technologies
Primary and secondary metabolism, Common plant, microbial, and marine sources of natural products. Introduction to biosynthetic patways: Fatty acid, polyketides, terpenoides,and steroides, aromatic compounds and alkaloides etc. Natural products extraction technologies.	

Year III Semester I
Students, who exit at the end of the 3rd year (after completing a 3 year general degree), should complete 04 credits from the compulsory course units of ESNRM 41206 (in this semester as ESNRM 31215), ESNRM 41207 (in this semester as ESNRM 31216), and 02 credits from the elective course units of ESNRM 41202 (in this semester as ESNRM 31217) and ESNRM 41204 (in this semester as ESNRM 31218) within semester I. Students, those who follow the BSc(Hons) degree programme should select elective course units covering 02 credits form the 04 course units available (from ESNRM 31211 – ESNRM 31214). ** 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 31201	Biogeography
Introduction to biogeography, Key concepts and processes in biogeography (Evolution, Vicariance, Speciation, Radiation, Dispersal, Colonization, Endemism, Cosmopolitanism, Extinction, Refugia, Range/Distribution, Areas and centers of endemism, Provincialism, Regionalization), 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 31102	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 31103	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, 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 31204	Aquatic Resource Management*
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, Aquatic Plants as a resource. **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. Field excursion to gain hands-on practical experience of Aquaculture practices.	

ESNRM 31205	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 plastic, 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.	

ESNRM 31206	Biodiversity Conservation and Management*
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 31107	Hydrology and Soil Science Laboratory
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	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 31209	Remote Sensing and Geographic Information Systems Laboratory
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, Geo referencing and Map generation, Identification of vulnerable areas.	
ESNRM 31110	Research Methods and Scientific Communication - I
Concept of portfolio preparation with personality and career development, Preparing an electronic portfolio, preparation for further higher educational opportunities, set future academic plan.	

ESNRM 31211	Basic Methods of Surveying Sciences*
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 31212	Advanced Petrology
Igneous Petrology: Origin of magmas; Classification of Igneous Rocks; Igneous Rock Suites and Tectonic Environments, Sedimentary Petrology: Weathering, Transport and	

Deposition; Classification of Sedimentary Rocks; Provenance, Metamorphic Petrology: Metamorphic Processes; Metamorphic Phase Diagrams; Tectonics and Metamorphism; Hand specimen identification and classification of igneous, sedimentary, and metamorphic rocks; Thin section petrography: texture and mineral identification.

ESNRM 31213	Ecosystem Restoration and Nature based Solutions
Recapture on concepts of Restoration Ecology (ecological succession, disturbance regimes, resilience, community assembly frameworks, etc.), Ecological Restoration in Terrestrial (soil recovery; erosion control; invasive species; native species reintroduction), Freshwater (hydrology and sediment transport; riparian buffer zones; aquatic habitat enhancement), and Coastal/Marine (shoreline stabilization; blue carbon ecosystems and economies) Ecosystems, Restoration Techniques and Technologies (Terrestrial, Freshwater and Coastal/Marine), Use of advanced technology (remote sensing/GIS, eDNA, and drones for planning and monitoring), Forest Landscape Restoration (FLR) (Introduction, Principles, Practices, and Global Initiatives, Landscape-scale thinking, multiple ecological, social, and economic benefits, stakeholder engagement; a case study (Thanthirimale) and a field exercise (Belihuloya) on FLR, Legal and Policy framework, Introduction to Nature-based Solutions NbS (definition, history and scope), Lessons from NbS across Asia, Introduction to the IUCN Global Standard for NbS and the Online Self-Assessment Tool, Case studies and assessment using the IUCN tool. Field excursion to obtain hands on experiences on Ecosystem Restoration and Nature based Solutions related applications in the field.	

ESNRM 31214	Environmental Communication
Introduction to Environmental Communication: scope, significance, historical development and its relevance in modern society, Human-Nature Interaction and Cultural Dimensions, The role of communication in shaping environmental awareness and behavior, Theories, Models, and Media Formats of Environmental Communication: theoretical foundations, ecological communication models, and a variety of programme formats such as documentaries, public service announcements (PSAs), news features, and public service broadcasting, Designing Environmental Campaigns and Engaging Stakeholders: examining ethical and legal considerations, stakeholder roles (including governments, NGOs, and the media), and strategies for effective campaign planning and public engagement, Digital Media and Audience Engagement: use of social media and digital platforms, digital storytelling techniques, and tools for measuring the impact of media in environmental contexts, Practical Project and Community Engagement: practical exposure in participatory communication approaches, collaborating on campaign development, and presenting their work through peer-reviewed sessions that simulate real-world application.	

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 elective 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 follow the BSc(Hons) degree programme should select elective course units covering two credits from the five course units available from ESNRM 32210 – ESNRM 32215.

** 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	Coastal and Marine Resource Management*
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 32203	Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA)
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 32204	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. Field excursion to obtain hands on experiences on Management of Natural Hazards related applications in the field.	

ESNRM 32205	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 32206	Statistical Application in Natural Resource Studies*
Special sampling methods related to natural resources studies: Review of basic sampling methods (SRS, stratified, systematic, cluster), Limitations of standard sampling in practical scenarios, Multistage sampling design and estimation. Introduction to Multivariate Statistics; Principal Component Analysis (PCA), Discriminant Analysis, Cluster Analysis, Canonical Correlation Analysis. Special Regression Models; Differences between linear and nonlinear models, Logistic Regression (Multinomial and Ordinal Logistic Regression), Introduction to Operations Research; Linear Programming (LP), Transportation and Assignment Problems. Introduction to time Series data in Natural Sciences: Time series analysis and Forecasting; Components of time series data, Smoothing methods, Characteristics and Challenges. Introduction to Statistical Software for analyze Real World Applications: Analysis of real world data using statistical software and interpretation of results (Minitab, SPSS and R).	

ESNRM 32107	Research Methods and Scientific Communication -II
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 32108	Community Outreach
Capacity development of undergraduates that use information, tools and skills to plan a community outreach activity through a mini project in the form of a group work that will produce a clearly defined output. Soft skill development for leadership, team work and communication and empathy towards communities and enthusiasm to contribute to the environmental sector.	

ESNRM 32409	Research Project in Environmental Sciences and Natural Resource Management
The research project will be evaluated, based on the efficiency of student's field/ industrial/ laboratory work, written project report, and an oral presentation.	

ESNRM 32210	Lichenology*
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 and Field excursion. Field excursion to obtain hands on experiences on Lichenology related applications in the field.	

ESNRM 32211	Biogeography and Conservation Planning*
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. 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
Ores and ore deposits, Tectonics and mineralization, Geological, geophysical and geochemical methods in mineral exploration, Reserve evaluation, Drilling, Bore hole logging.	

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.	

ESNRM 32215	Innovation and Entrepreneurship
Introduction to Entrepreneurship, Entrepreneurial Mindset Development, Opportunity Recognition, Creativity and Innovation, Business Model, Marketing Strategies for SMEs, Strategic Planning for SMEs, Business Plan Development, Managing the exit of SMEs, Social responsibility and Ethics of entrepreneur small businesses, A practical assignment to develop an innovation and apply the learnings such as marketing gstrategies, strategic planning and business plan development.	

Year IV Semester I
Students should select elective course units covering four credits from the 10 course units available from ESNRM 41208 – ESNRM 41209. ** 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 41201	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, Trace elements related health problems.	

ESNRM 41202	Energy Resource Management*
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). Field excursion to obtain hands on experiences on Energy Resource Management related applications in the field.	

ESNRM 41203	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, UNFCCC, 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 in the local context.	

ESNRM 41204	Environmental Legislation and Regulation
Foundations of Environmental Law, Sri Lanka's Legal Framework: Constitutional provisions, National Environmental Act, Forest Ordinance, Fauna and Flora Protection Ordinance, Coast Conservation Act, Laws and acts pertaining to Pollution & Natural Resource Management, Laws, policies and adaptation strategies on Climate Change and Emerging Issues, Enforcement and Judicial Remedies, Multi-lateral Environmental Agreements in Environment and Natural Resource Management, Contemporary Debates; Corporate ESG (Environmental, Social, and Governance) compliance, Legal accountability.	

ESNRM 41205	Field Techniques in Earth Science*
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 41206	Human Resource Management
Organizations and management, understanding human behavior at work, developing communication skills, Conflict management and resolution, Stress management techniques, Leadership, managing teams, Managing change, discipline, and adaptability.	

ESNRM 41207	Literature Review and Research Proposal Development
Research capacity development of students: Discuss a potential research project with a supervisor; plan a research project, review relevant literature, develop methods and establish links with relevant organizations, Individual Project proposals with a substantial literature review and a detailed methodology should be submitted.	

ESNRM 41208	Applied Hydrology*
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. Field excursion to obtain hands on experiences on Hydrology related applications in the field.	

ESNRM 41209	Gemmology*
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 41210	Groundwater Exploration and Management*
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 41211	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 41212	Ecotourism*
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. Field excursion to obtain hands on experiences on Ecotourism related applications in the field.	

ESNRM 41213	Forestry for Rural Development*
Introduction and defining agroforestry systems, Agroforestry in degraded plantation lands, Ecological, economic and social impacts of agroforestry practices, The concept and practice of Analogue Forestry and case studies, ; State-managed to community-based forestry practices, Forestry for sustainable development of rural livelihood, Preparation of forest inventories and management plans; Field excursion. Field excursion to obtain hands on experiences on Forestry related applications in the field.	

ESNRM 41214	Climate Science and Climate Change
The global climate system components, and their interactions; radiative, dynamic, thermodynamic, chemical, and feedback processes affecting the climate system, The Carbon Cycle, Atmospheric Optical Phenomena, The properties of water and measurement of water vapor, General Circulation of the atmosphere, Climate change, Global warming, Extreme events, Climate sensitivity and radiative forcing, Modelling, detection, and attribution of recent and future climate change, Impacts: Ecosystems and Climate Change, Mitigation: Carbon footprint, Climate neutral energy systems, Sustainability transition, Big issues: International Climate negotiations, Nationally Determined Contributions (NDCs) and National Policies, Case studies and practical applications of climate knowledge on ecosystems, food systems and human wellbeing.	

ESNRM 41215	Paleobiodiversity of Sri Lanka*
Fossilisation, Stratigraphy and geological context, Introduction to Palaeobiodiversity, Geological History and Fossil Records of Sri Lanka, Palaeobotany of Sri Lanka, Palaeozoology of Sri Lanka, Human Evolution and Interactions with Prehistoric Biodiversity, Plant and Animal Domestication, Introduction to Palaeobiogeography, Palaeoclimatic reconstruction from fossils and sediments, Quaternary climate shifts and refugia theory, Palaeobiogeographic significance of Sri Lanka within South Asia, Island evolution and endemism. Applications of palaeobiodiversity in ecosystem restoration, biodiversity conservation and geoconservation planning. Threats to fossil heritage (mining, erosion, urbanization).	

Field Visit to fossil sites and museums (Aruwakkalu, Tabbowa, Kitulgala Beli Lena, Ratnapura Museum for Stratigraphic profiling, fossil identification, palaeo environment interpretation).

ESNRM 41216	Machine Learning for Natural Resource Studies*
Supervised Algorithms: K-mean, Agglomerative algorithm; Unsupervised Algorithms: Decision Tree, Support Vector Machine, Neural Network, Introduction to Deep Neural Network. 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).	

Rules and Regulations

1. Students should earn a total of 93 and 120 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.

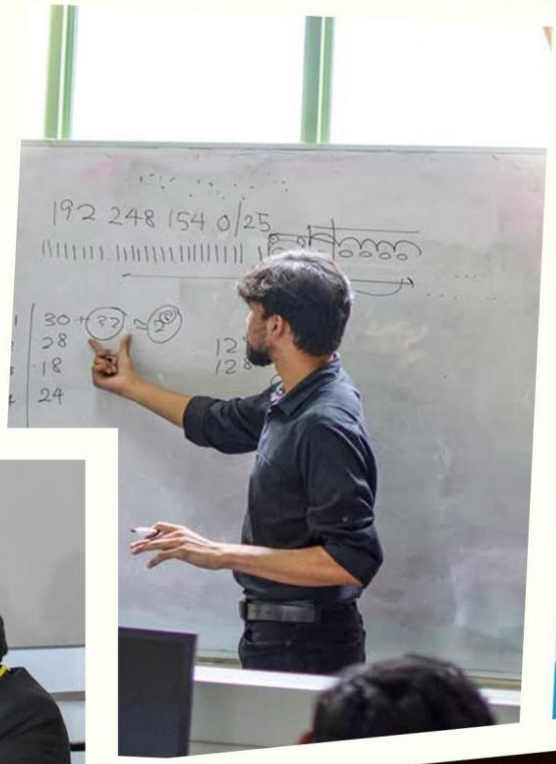
2. It is compulsory for the students to complete the Level I of the English Proficiency Course in order to obtain BScHons (Env Sc & NR Mgmt) and BSc (Env Sc & NR Mgmt). The other two levels of the course are optional.

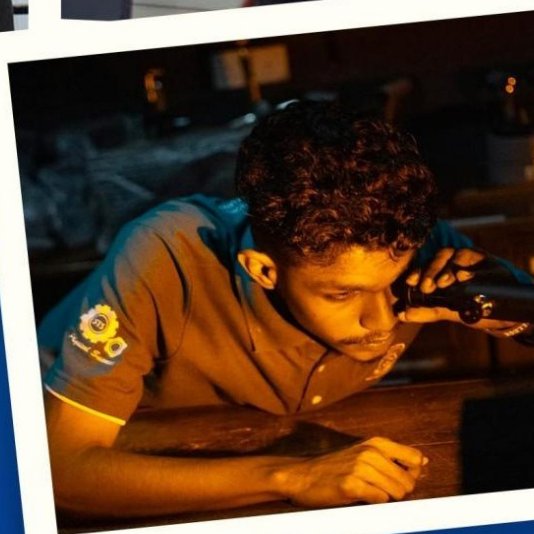
3. Students are also required to actively contribute to the educational, community outreach, aesthetic and cultural programmes/activities/ field excursions organized by the Faculty, Department, and Student Society of Natural Resource Studies (SNRS).

4. Students must clearly acknowledge the source of information (when using someone else's ideas or work) and use of Generative AI tools for all the work submitted, such as reports, assignments, computer programs, oral presentations, dissertations, research articles, etc.

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

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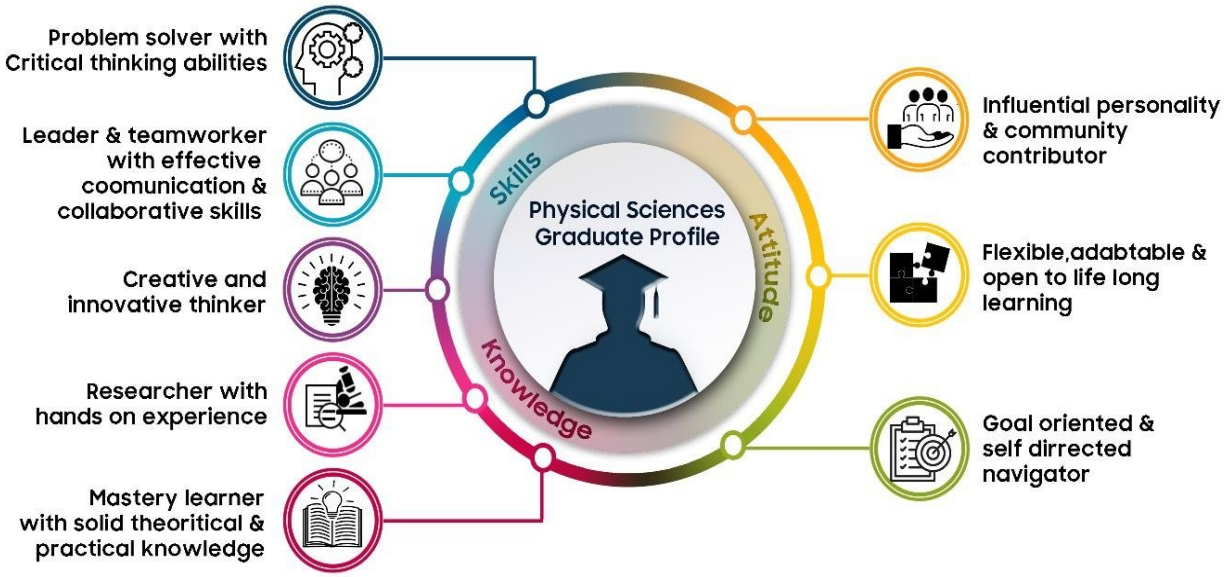
DEPARTMENT OF PHYSICAL SCIENCES AND TECHNOLOGY

Degree Programs

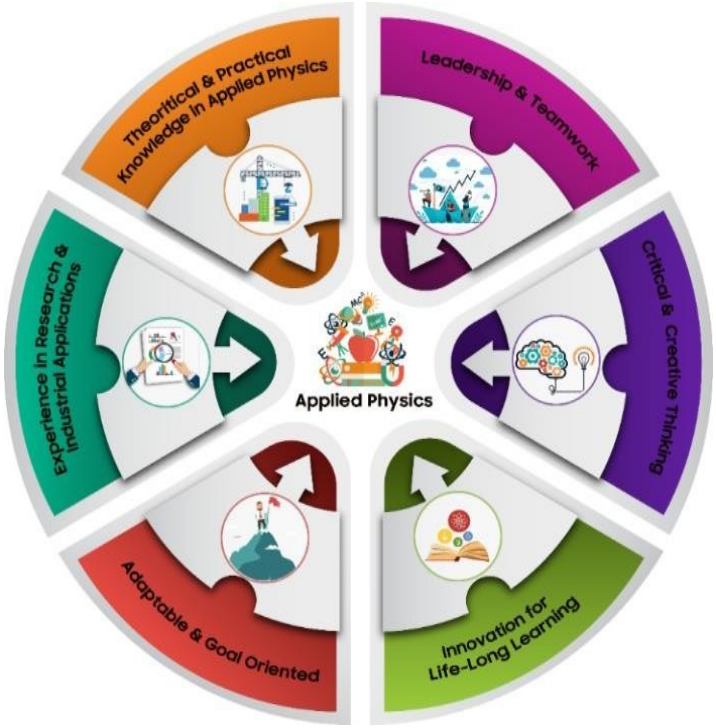
- Bachelor of Science in Physical Sciences [BSc (Phy Sc)]
- Bachelor of Science Honors in Applied Physics [BScHons (App Phy)]
- Bachelor of Science Honors in Chemical Technology [BScHons (Chem Tech)]
- Bachelor of Science Honors in Computer Science and Technology [BScHons (Com Sc & Tech)]

Anticipated Graduate Profiles

Bachelor of Science in Physical Sciences

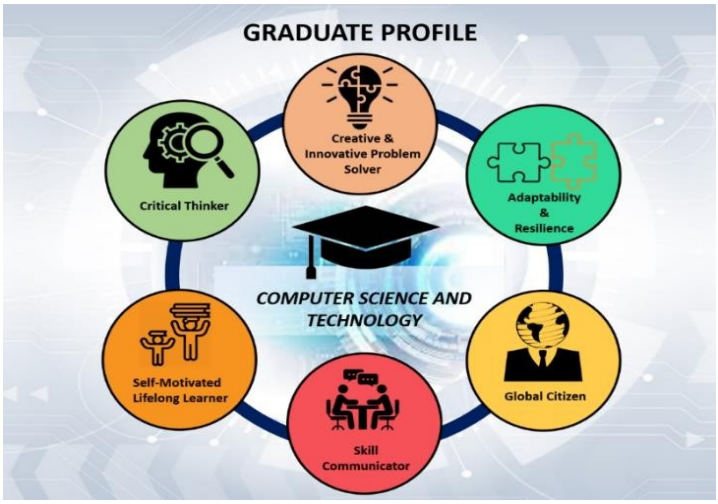


Bachelor of Science Honors in Applied Physics



Bachelor of Science Honors in Chemical Technology

Bachelor of Science Honors 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 Sciences & Technology	1	2	2	01

Abbreviations

C1:	Physics + Chemistry + Computer Science combination
C2:	Physics + Computer Science combination
C3:	Physics + Chemistry combination
Mj.Phy:	Major in Physics
Mi.Chem:	Major in Chemical Technology
Mj.Com:	Major in Computer Science and Technology
Hon.App.Phy:	Honours in Applied Physics
Hon.Chem:	Honours in Chemical Technology
Hon.Com:	Honours in Computer Science and Technology
C:	Compulsory and credited
NC:	Compulsory and non-credited
E:	Elective
Cre:	Number of Credits

Summary of the Courses

Table 1: Courses offered in the Semester I of the First Year Minimum Credit Requirements - C1:18, C2:15, C3:15					
Code	Course name	Cre	Combinations		
			C1	C2	C3
PST 11201	Mechanics and Properties of Matter	2	C	C	C
PST 11202	Introduction to Electricity and Magnetism	2	C	C	C
PST 11103	Physics Laboratory 1-I	1	C	C	C
PST 11204	General Chemistry	2	C		C
PST 11205	Fundamentals of Organic Chemistry	2	C		C
PST 11106	Inorganic Chemistry Laboratory I	1	C		C
PST 11207	Computer (fundamentals) I	2			C
PST 11108	Computer (fundamentals) Laboratory I	1			C
PST 11209	Structured Programming	2	C	C	
PST 11210	Computer Systems Organization and Applications	2	C	C	
PST 11111	C Programming Laboratory	1	C	C	
PST 11112	Web Design Laboratory	1	C	C	
PST 11213	Basic Chemistry for Computing I	2		C	
PST 11214	Calculus and Differential Equations	2	C	C	C
Total (Without Electives)			18	15	15

Table 2: Courses offered in the Semester II of the First Year Minimum Credit Requirements - C1:18, C2:15, C3:15					
Code	Course name	Cre	Combinations		
			C1	C2	C3
PST 12201	Physics of Heat and Waves	2	C	C	C
PST 12102	Semi-Conductor Physics	1	C	C	C
PST 12103	AC Theory & Circuits	1	C	C	C
PST 12104	Physics Laboratory 1-II	1	C	C	C
PST 12205	Fundamentals of Physical Chemistry	2	C		C
PST 12206	Fundamentals of Analytical Chemistry	2	C		C
PST 12107	Organic Chemistry Laboratory I	1	C		C
PST 12208	Computer (fundamentals) II	2			C
PST 12109	Computer (fundamentals) Laboratory II	1			C
PST 12210	Data Communication and Computer Networks	2	C	C	
PST 12211	Database Management Systems	2	C	C	
PST 12112	Object Oriented Programming Laboratory	1	C	C	
PST 12113	Programming using Database Management Systems	1	C	C	
PST 12214	Basic Chemistry for Computing II	2		C	
PST 12215	Fundamentals of Statistics	2	C	C	C
Total (Without Electives)			18	15	15

Table 3: Courses offered in the Semester I of the Second Year Minimum Credit Requirements - C1:19, C2:17, C3:17					
Code	Course name	Cre	Combinations		
			C1	C2	C3
PST 21201	Electronics	2	C	C	C
PST 21202	Geometrical and Physical Optics	2	C	C	C
PST 21103	Physics Laboratory 2-I	1	C	C	C
PST 21204	Organic Chemistry	2	C		C
PST 21205	Industrial Chemistry and Technology I (Organic)	2	C		C
PST 21106	Organic Chemistry Laboratory II	1	C		C
PST 21207	Data Structures & Algorithms	2	C	C	
PST 21208	Computer Architecture and Assembly Language	2	C	C	
PST 21109	Web Development Laboratory	1	C	C	
PST 21110	Physical Chemistry Laboratory [Elective (Compulsory for B.Sc. Hons Chem Tech)]	1			
PST 21111	Mobile Application Development (Practical) [Elective (Compulsory for B.Sc. Hons Computer Sciences)]	1			
PST 21212	Artificial Intelligence and Expert Systems [Elective (Compulsory for B.Sc. Hons Computer Sciences)]	2			
PST 21213	Mathematical Methods I	2	C	C	C
PST 21214	Statistics for Experimental Design and Forecasting	2	C	C	C
Total (Without Electives)			19	14	14

Table 4: Courses offered in the Semester II of the Second Year Minimum Credit Requirements - C1:16, C2:17, C3:17					
Code	Course name	Cre	Combinations		
			C1	C2	C3
PST 22201	Physics of Electromagnetic Radiation and Introduction to Laser	2	C	C	C
PST 22202	Quantum Physics, Atomic & Nuclear Physics	2	C	C	C
PST 22103	Physics Laboratory 2-II	1	C	C	C
PST 22204	Chemistry of Elements	2	C		C
PST 22205	Physical Chemistry	2	C		C
PST 22106	Inorganic Chemistry Laboratory II	1	C		C
PST 22207	Software Engineering	2	C	C	
PST 22108	C# Programming Laboratory	1	C	C	
PST 22209	Operating Systems and Compiler Design	2	C	C	
PST 22210	Mathematical Methods II [Elective (Compulsory for B.Sc. Hons App Phy and B.Sc. Hons Computer Sciences)]	2		C	
PST 22111	Introduction to Astrophysics and Cosmology I [Elective (Compulsory for B.Sc. Hons App Phy)]	1			

PST 22112	Industrial Metrology	1	E	E	E
PST 22113	Analytical Chemistry Laboratory [Elective (Compulsory for B.Sc. Hons Chem Tech)]	1			
PST 22214	Biology for Physical Sciences [Elective (Compulsory for B.Sc. Hons Chem Tech)]	2			
PST 22215	Molecular Spectroscopy [Elective (Compulsory for B.Sc. Hons Chem Tech)]	2			
PST 22116	Leadership and Communication [Elective (Compulsory for B.Sc. Hons Computer Sciences)]	1			
PST 22217	Computer System Security [Elective (Compulsory for B.Sc. Hons Computer Sciences)]	2			
PST 22218	Management Information Systems	2	E	E	E
PST 22219	Cloud Computing	2	E	E	E
PST 22220	Human Computer Interactions	2	E	E	E
Total (Without Electives)			15	12	10

General Degree Course

B. Sc. Degree in physical sciences

Table 5: Courses offered in the Semester I of the Third Year Minimum Credit Requirements – Mj.Phy:20, Mj.Chem:18, Mj.Com:18					
Code	Course name	Cre	Combinations		
PST 31201	Solid State Physics	2	C		
PST 31202	Nuclear Physics & Applications	2	C		
PST 31203	Quantum Mechanics	2	C		
PST 31104	Material Physics	1	C		
PST 31105	Special Relativity	1	C		
PST 31206	Optical Fiber & Telecommunication	2	C		
PST 31107	Computational Physics	1	C		
PST 31108	Physics Laboratory 3-I	1	C		
PST 31209	Introduction to Astrophysics and Cosmology II	2	C		
PST 31110	Classical Mechanics	1	C		
PST 31211	Nano systems and Quantum Engineering	2	C	C	
PST 31212	Biochemistry I	2		C	
PST 31213	Electroanalytical Techniques	2		C	
PST 31214	Industrial Chemistry and Technology II (Inorganic)	2		C	
PST 31215	Environmental Chemistry	2		C	
PST 31116	Coordination Chemistry	1		C	
PST 31117	Laboratory Quality Control and Assurance	1		C	
PST 31118	Laboratory for Nanomaterial Synthesis, Functional Characterization, and Energy/Sensing Device Fabrication	1		C	
PST 31119	Industrial Chemistry Laboratory	1		C	
PST 31220	Computational Chemistry	2		C	

PST 31221	Object Oriented Analysis and Design	2			C
PST 31122	Programming in Python	1			C
PST 31223	Generative Artificial Intelligence	2			C
PST 31124	Full-Stack Development Laboratory	1			C
PST 31225	System Integration and Architecture	2			C
PST 31226	Data Mining and Applications	2			C
PST 31027	Research Methodology and Scientific Communication	0	NC	NC	NC
PST 31228	Numerical Methods	2	C	E	C
PST 31229	Mathematical Programming	2	E	E	E
PST 31230	Multimedia and Hypermedia Systems Development	2	E	E	E
PST 31231	Software Project Management	2			E
PST 31232	Software Quality Assurances	2			E
PST 31133	Social and Professional Issues in Computing	1			E
PST 31234	Economics	2	E	E	E
PST 31035	Industrial Visit	0	NC	NC	NC
Total (Without Electives)			19	16	12

Table 6: Courses offered in the Semester II of the Third Year
Minimum Credit Requirements – Mj.Phy: 08, Mj.Chem: 08, Mj.Com: 08

Code	Course name	Cre	Combinations		
PST 32801	Research: B.Sc. Thesis in Physical Sciences (Major in Applied Physics)/ Industrial Exposure: Report in Physical Sciences (Major in Applied Physics)	8	C		
PST 32802	Research: B.Sc. Thesis in Physical Sciences (Major in Chemical Technology)/ Industrial Exposure: Report in Physical Sciences (Major in Chemical Technology)	8		C	
PST 32803	Research: B.Sc. Thesis in Physical Sciences (Major in Computer Science & Technology)/ Industrial Exposure: Report in Physical Sciences (Major in Computer Science & Technology)	8			C
Total (Without Electives)			8	8	8

Honors Degree Programs

B.Sc. Honors degree in applied physics/ chemical technology/ computer science & technology

Table 7: Courses offered in the Semester I of the Third Year Minimum Credit Requirements – Hon.App.Phy:20, Hon.Chem:18, Hon.Com:18					
Code	Course name	Cre	Combinations		
PST 31201	Solid State Physics	2	C		
PST 31202	Nuclear Physics & Applications	2	C		
PST 31203	Quantum Mechanics	2	C		
PST 31104	Material Physics	1	C		
PST 31105	Special Relativity	1	C		
PST 31206	Optical Fiber & Telecommunication	2	C		
PST 31107	Computational Physics	1	C		
PST 31108	Physics Laboratory 3-I	1	C		
PST 31209	Introduction to Astrophysics and Cosmology II	2	C		
PST 31110	Classical Mechanics	1	C		
PST 31211	Nano systems and Quantum Engineering	2	C	C	
PST 31212	Biochemistry I	2		C	
PST 31213	Electroanalytical Techniques	2		C	
PST 31214	Industrial Chemistry and Technology II (Inorganic)	2		C	
PST 31215	Environmental Chemistry	2		C	
PST 31116	Coordination Chemistry	1		C	
PST 31117	Laboratory Quality Control and Assurance	1		C	
PST 31118	Laboratory for Nanomaterial Synthesis, Functional Characterization, and Energy/Sensing Device Fabrication	1		C	
PST 31119	Industrial Chemistry Laboratory	1		C	
PST 31220	Computational Chemistry	2		C	
PST 31221	Object Oriented Analysis and Design	2			C
PST 31122	Programming in Python	1			C
PST 31223	Generative Artificial Intelligence	2			C
PST 31124	Full-Stack Development Laboratory	1			C
PST 31225	System Integration and Architecture	2			C
PST 31226	Data Mining and Applications	2			C
PST 31027	Research Methodology and Scientific Communication	0	NC	NC	NC
PST 31228	Numerical Methods	2	C	E	C
PST 31229	Mathematical Programming	2	E	E	E
PST 31230	Multimedia and Hypermedia Systems Development	2	E	E	E
PST 31231	Software Project Management	2			E
PST 31232	Software Quality Assurances	2			E
PST 31133	Social and Professional Issues in Computing	1			E

PST 31234	Economics	2	E	E	E
PST 31035	Industrial Visit	0	NC	NC	NC
Total (Without Electives)			19	16	12

Table 8: Courses offered in the Semester II of the Third Year Minimum Credit Requirements – Hon.App.Phy: 15, Hon.Chem: 16, Hon.Com: 15					
Code	Course name	Cre	Combinations		
PST 32201	Statistical Physics	2	C		
PST 32102	Interaction of Radiation with Matter	1	C		
PST 32203	Atmospheric Physics	2	C		
PST 32104	Advanced Electronics	1	C		
PST 32105	Solid State Devices	1	C		
PST 32206	Stellar Astrophysics	2	C		
PST 32107	Photovoltaic Solar Cells and Technology	1	C		
PST 32108	Plasma Physics	1	C		
PST 32109	Physics Laboratory 3-II	1	C		
PST 32210	Medicinal Chemistry	2		C	
PST 32211	Polymer Chemistry & Technology	2		C	
PST 32212	Surface and Colloid Chemistry	2		C	
PST 32213	Biochemistry II	2		C	
PST 32114	Advanced Organic Chemistry	1		C	
PST 32215	Structures and Properties of Solids	2		C	
PST 32116	Advanced Inorganic Chemistry Laboratory	1		C	
PST 32117	Biochemistry Laboratory	1		C	
PST 32218	Deep Learning	2			C
PST 32219	Digital Image Processing and Computer Vision	2			C
PST 32220	Computer Graphics and Visualization	2			C
PST 32221	Project in Computer Science and Technology (Mini Project)	2			C
PST 32122	Visual Computing Laboratory	1			C
PST 32223	Advanced Database Management System	2			C
PST 32224	Atomic and Molecular Spectroscopy	2	E		
PST 32225	Graph Theory	2	E		E
PST 32226	Resource Efficient and Cleaner Production	2	E	E	
PST 32227	Organometallic Chemistry	2		E	
PST 32128	Artificial Intelligence in Chemical Technology	1		E	
PST 32129	Bioinformatics	1			E
PST 32130	Software Automation	1			E
PST 32231	Statistics in Quality Control	2	E	E	E
PST 32232	Business Process Modelling	2	E	E	E
Total (Without Electives)			12	13	11

Table 9: Courses offered in the Semester I of the Fourth Year					
Minimum Credit Requirements – Hon.App.Phy: 14, Hon.Chem: 15, Hon.Com: 14					
Code	Course name	Cre	Combinations		
PST 41201	Remote Sensing & GIS	2	C		
PST 41202	Geophysics	2	C		
PST 41203	Medical and Biophysics	2	C		
PST 41104	Data Acquisition and Signal Processing Methods	1	C		E
PST 41205	Astrophysics-Instrumentation and Data Analysis Techniques	2	C		
PST 41006	Literature Search Seminar in Applied Physics	0	NC		
PST 41007	Independent Research / Project in Applied Physics	0	NC		
PST 41208	Natural Products Chemistry	2		C	
PST 41109	Bioinorganic Chemistry	1		C	
PST 41210	Instrumental Analysis	2		C	
PST 41211	Applied Molecular Modelling	2		C	
PST 41212	Biotechnology	2		C	
PST 41213	Advanced Solid-State Chemistry	2		C	
PST 41014	Literature Search Seminar in Chemical Technology	0		NC	
PST 41015	Independent Research / Project in Chemical Technology	0		NC	
PST 41216	Entrepreneurship	2			C
PST 41217	Advanced Computer Networks	2			C
PST 41218	Web Technologies	2			C
PST 41219	Robotics and Automation	2	E		E
PST 41220	Industrial Management	2	E	E	
PST 41221	Advanced Electrochemical Power Conversion and Storage Technologies	2	E	E	
PST 41222	Instrumentation and Control	2	E		
PST 41223	Applied Optics and Imaging Systems	2	E		
PST 41224	Organic Electronics	2		E	
PST 41225	Internet of Things (IoT)	2			E
PST 41226	Big Data Analysis	2			E
PST 41227	High Performance Computing	2			E
PST 41228	Quantum Computing	2			E
PST 41229	Augmented and Virtual Reality	2			E
PST 41030	Research: B.Sc. Thesis in Applied Physics/ Industrial Exposure: Report in Applied Physics	0	NC		
PST 41031	Research: B.Sc. Thesis in Chemical Technology/ Industrial Exposure: Report in Chemical Technology	0		NC	
PST 41032	Research: B.Sc. Thesis in Computer Science & Technology	0			NC
Total (Without Electives)			09	11	06

Table 10: Courses offered in the Semester II of the Fourth Year Minimum Credit Requirements – Hon.App.Phy: 11, Hon.Chem: 11, Hon.Com: 14					
Code	Course name	Cre	Combinations		
PST 42801	Research: B.Sc. Thesis in Applied Physics/ Industrial Exposure: Report in Applied Physics	8	C		
PST 42102	Literature Search Seminar in Applied Physics	1	C		
PST 42203	Independent Research / Project in Applied Physics	2	C		
PST 42804	Research: B.Sc. Thesis in Chemical Technology/ Industrial Exposure: Report in Chemical Technology	8		C	
PST 42105	Literature Search Seminar in Chemical Technology	1		C	
PST 42206	Independent Research / Project in Chemical Technology	2		C	
PST 42807	Research: B.Sc. Thesis in Computer Science & Technology*	8			C
PST 42608	Industrial Training: Report in Computer Science and Technology	6			C
Total (Without Electives)			11	11	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 Required

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

General Degree Program majoring in Physics

		Subject Combination		
		C1	C2	C3
Year I	*Semester I*	18	15	15
	Semester II	18	15	15
	Total credits for Year I	36	30	30
Year II	*Semester I*	19	17	17
	Semester II	16	17	17
	Total credits for Year II	35	34	34
Year III	*Semester I*	20	20	20
	Semester II	8	8	8
	Total credits for Year III	28	28	28
Total credits for the degree programme		**99**	**92**	**92**

General Degree Program majoring in Chemical Technology

		Subject Combination	
		C1	C3
Year I	*Semester I*	18	15
	Semester II	18	15
	Total credits for Year I	36	30
Year II	*Semester I*	19	17
	Semester II	16	17
	Total credits for Year II	35	34
Year III	*Semester I*	18	18
	Semester II	8	8
	Total credits for Year III	26	26
Total credits for the degree programme		**97**	**90**

General Degree Program majoring in Computer Science and Technology

		Subject Combination	
		C1	C2
Year I	*Semester I*	18	15
	Semester II	18	15
	Total credits for Year I	36	30
Year II	*Semester I*	19	17
	Semester II	16	17
	Total credits for Year II	35	34
Year III	*Semester I*	18	18
	Semester II	8	8
	Total credits for Year III	26	26
Total credits for the degree programme		**97**	**90**

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

		Subject Combination		
		C1	C2	C3
Year I	*Semester I*	18	15	15
	Semester II	18	15	15
	Total credits for Year I	36	30	30
Year II	*Semester I*	19	17	17
	Semester II	16	17	17
	Total credits for Year II	35	34	34
Year III	*Semester I*	20	20	20
	Semester II	15	15	15
	Total credits for Year III	35	35	35
Year IV	*Semester I*	14	14	14
	Semester II	11	11	11
	Total credits for Year IV	25	25	25
Total credits for the degree programme		**131**	**124**	**124**

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

		Subject Combination	
		C1	C3
Year I	*Semester I*	18	15
	Semester II	18	15
	Total credits for Year I	36	30
Year II	*Semester I*	19	17
	Semester II	16	17
	Total credits for Year II	35	34
Year III	*Semester I*	18	18
	Semester II	16	16
	Total credits for Year III	34	34
Year IV	*Semester I*	15	15
	Semester II	11	11
	Total credits for Year IV	26	26
Total credits for the degree programme		**131**	**124**

The minimum numbers of credits required for BSc Honors in Computer Science and Technology in each year:

		Subject Combination	
		C1	C2
Year I	*Semester I*	18	15
	Semester II	18	15
	Total credits for Year I	36	30
Year II	*Semester I*	19	17
	Semester II	16	17
	Total credits for Year II	35	34
Year III	*Semester I*	18	18
	Semester II	15	15
	Total credits for Year III	33	33
Year IV	*Semester I*	14	14
	Semester II	14	14
	Total credits for Year IV	28	28
Total credits for the degree programme		**132**	**125**

Detailed Syllabus

N.B.

T - Theory

P - Practical

F - Field visits 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, Linear Momentum and Collisions, Center of Mass and Moment of Inertia, Circular Motion: Equations of Motion, Torque, Angular Momentum, Energy, Law of Gravitation, Elasticity and ViscositySurface 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 Types 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, Magnetism.				

PST 11204	General Chemistry	T		
Review of Classical Atomic Theory: Atoms and Subatomic Particles and Molecules, Orbital, Pauli Exclusion Principle, De Broglie Relationship, Atomic Spectra, Chemical Bonds: Covalent Bonds, Intra- and Inter-Molecular 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, Concepts of Acid-Base, Redox Reactions, Balancing Chemical Equations, Half-Reactions.				

PST 11205	Fundamentals of Organic Chemistry	T		
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, 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's 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.				

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 11207	Computer (fundamentals) I	T		
Introduction to Structured Programming: Introduction to Compilers and Interpreters, Pseudo Code, Simple Flow Charts, 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, Test Plan, Test Cases, Unit Testing, File Handling.				

PST 11108	Computer (fundamentals) Laboratory 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, Unit Testing, Debugging, Problem Isolation Practical.

PST 11209	Structured Programming	T		
Introduction to Structured Programming: Introduction to Compilers and Interpreters, Pseudo Code, Simple Flow Charts, 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, Test Plan, Test Cases, Unit Testing, File Handling.				

PST 11210	Computer Systems Organization and Applications	T	P	
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, Network Topologies 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. Computer Assemble Practical, AI-Related Applications.				

PST 11111	C Programming Laboratory		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, 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, Unit Testing, Debugging, and Problem Isolation Practical.

PST 11112	Web Design Laboratory		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, Regular Expressions (Regexp), HTML Form Processing: HTML Form Basics, GET Method, POST Method, Client Side form Validation (Using JavaScript).				

PST 11213	Basic Chemistry for Computing I	T		
Units, Measurements & Calculations: SI Units, Significant Figures; Atomic Structure & Isotopes: Structure of Atoms, Isotopes (e.g., Carbon-14 in Dating Tech, Medical Isotopes);The Periodic Table & Trends: Basic Layout, Groups/Periods, Key Elements for Tech (Silicon, Rare Earth Metals);Chemical Bonding & Lewis Structures: Ionic, Covalent, and Metallic Bonds; Drawing Lewis Structures; Hybridization & Intermolecular Forces: Simple View of Hybrid Orbitals; Hydrogen Bonding, Dipole Forces, Relevance to Water and Solvents; The Mole Concept & Molar Mass: Avogadro's Number, Molar Mass, Empirical Vs. Molecular Formulas; Chemical Reactions & Stoichiometry: Types of Chemical Reactions, Balancing Equations, Basic Reaction Calculations. Acids, Bases & Ph: Ph Scale, Neutralization, Applications to Water Chemistry, Cleaning Agents, and Tech Waste Management; Basic Thermodynamics: Heat vs Temperature, Energy in Chemical Processes, Simple Introduction to Gibbs Free Energy; Basic Kinetics: Reaction Rates, Temperature and Catalyst Effects; Relate to Corrosion Prevention and Manufacturing Processes; Electrochemistry & Redox: Basic Redox Concepts; Batteries, Corrosion, Galvanic/Voltaic Cells; Links to Energy Storage in Technology.				

PST 11214	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, Exact Differential Equations, Equations Reducible to the Exact Form, Bernoulli's Equation, Second Order Linear Differential Equations, Homogeneous Differential Equations with Constant Coefficients, Fundamental Solutions, Non Homogeneous Equations, Applications of Second Order Differential Equations.				

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), Introduction to Solar cells.

PST 12103	AC Theory & Circuits	T		

Alternating Currents; Sinusoidal Waveform; Introduction to and Types of Capacitors, Electronic Colour Coding for Resistors, Capacitors; Thevenin's Theorem & its Application to Complicated DC Circuits; Delta & Star Transformations of Resistor Networks; Analysis of Resistors, Capacitors & Inductors in A.C. using Trigonometry and Phasor Diagram; Transients with DC Source in RC & RL Circuits; Energy Stored in Inductor; LC Oscillations; Damped Oscillations (LCR Circuits); Analysis of LCR A.C. Circuits using Trigonometric Analysis and Phasor Diagram; Resonance in LCR Circuits, Complex Number Representation of Voltage and Current of Resistors, Capacitors & Inductors in A.C.; Complex Number Analysis of RL, RC and LCR A.C. Circuits; 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		

States of Matter: The Perfect Gas and Associated Laws, Real Gases and their Behaviour, Thermodynamics and State Variables: Basic Concepts of Work, Heat and Energy, Zeroth, First, Second & Third Laws of Thermodynamics, Thermo-Chemistry, Chemical Potential

and Mass Action Law, Basic Concept in Reaction Kinetics, Integrated Rate Laws of Zeroth, First and Second Order Reactions, Factors Affecting the Rate of Reaction, Pseudo State and Pseudo Steady State Approximation (PSSA), Fundamentals of Electrochemistry: Nernst Equation, Electrochemical Cells, Faraday's Law of Electrolysis, Strong and Weak Electrolytes, Kohlrausch'S Law of Independent Migration of Ions, Determination of Ionic Concentrations.

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; Aldehydes and Ketones, Phenols, Carboxylic Acid and their Derivatives: Amides, Esters, Ammonium Salts, Amines, Carbohydrate Analysis.				

PST 12208	Computer (fundamentals) II	T		
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, Network Topologies 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). Computer Assemble Practical, AI-Related Applications.				

PST 12109	Computer (fundamentals) Laboratory II		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. Scientific Programming with Python.				

PST 12210	Data Communication and Computer Networks	T		
Fundamental Concepts of Data Communications: Application, Physical, Data Link and Network/Transport layer, Principals 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), Network Security and Administration, Internet Standards and Services, Framing, Error Detection and Correction, Channel Allocation, Routing, Transport Protocols, Applications (SMTP, HTTP, NNTP). Understanding the Networking Concepts using Packet Tracer.				

PST 12211	Database Management Systems	T		
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 Tuning and Indexing.				

PST 12112	Object Oriented Programming Laboratory		P	
Introduction to OOP Concepts: Abstraction, Encapsulation, Inheritance and Polymorphism. Class, Object, Interfaces, Packages, Methods, Constructors and Destructors, Objects Creation, and Method Invocation. Encapsulation: Class Member Visibility (Private, Public, Protected, Default), Static Members, Abstraction: Abstract Classes and Abstract Methods. Inheritance and Polymorphism: Subclasses, Inheritance and Class Hierarchies, Dynamic Binding. 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, Arrays and Strings, Compiling and Executing Java Program, Exceptions Handling, Advanced Java Practical Such as Building GUI Apps, Handling Events, Handling Files, Handling Databases, Collections, Threads, Etc. Memory Management, Using API Libraries in Object Oriented Programming, Applications of OO Concepts to Solve Real Life Problems.				

PST 12113	Programming using Database Management Systems		P	
SQL: Data Definition, Query Formulation, Constraints, Integrity, Selections, Projections, Select-Project-Join, Aggregates and Group-By, Subqueries; Transactions, Stored Procedures, Backup and Recovery, User Privileges, Connecting Databases Using Programming Languages.				

PST 12214	Basic Chemistry for Computing II	T		
Introduction to Organic Chemistry: Bonding, Hybridization, Functional Groups, Properties and Reactivity of Organic compounds , IUPAC Nomenclature Of Organic Compounds, Introduction to Polymers: Classification and Properties, Basic Concepts in Biochemistry: Enzymes, Nucleic Acids Biomolecules (Carbohydrates, Proteins), Introduction to Cheminformatics Molecular Visualization Tools and Molecular Modelling, Introduction to Bioinformatics Biological Databases: PDB, GenBank, UniProt.				

PST 12215	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, 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.				

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; Bipolar Transistors: Operation, Configuration, Characteristics, Testing, Biasing Methods, Load Line Analysis, Switching Network, Re 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 21109	Web Development Laboratory		P	
Introduction to PHP: PHP Basics, Data Types, Flow Control, String Manipulation, Use of Array, Functions: Introductions to Functions, 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, Project Work.				

PST 21110	Physical Chemistry Laboratory		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 21111	Mobile Application Development		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, Security, & Marketplace Deployment, Hands on Experience in Mobile Application Development.				

PST 21212	Artificial Intelligence and 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, Knowledge Base and Bank, Rule Knowledge, Inference Engine, Transit Fare Rule, Rule Interpreter, Inference Tree, Develop Models and Simple Applications Using AI; Prolog-An Overview of Prolog, Arithmetic Operations, Lists, Recursion and Structures.				

PST 21213	Mathematical Methods I	T		
Complex Numbers: Introduction, Real and Imaginary Numbers, The Algebra of Complex numbers, Complex Number Operation, Polar Form of the Complex Number, Roots of Complex Numbers, Functions of Complex Variables, Complex Equations and Solutions.				

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. System of Linear Equations and Matrices, Cramer's Rule, Eigen Values and Eigen Vectors, Similar Matrices and Diagonalization.

PST 21214	Statistics for Experimental Design and Forecasting	T	P	
Estimation: Point and Interval Estimation for Measures of Center (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. Simple Linear Regressions and Multiple Linear Regressions, Parameter Estimation (OLS) and its Properties. 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. Analysis of Categorical and Count Data: Chi-Squared Test of Goodness of Fit, Test of Independence in Contingency Tables. Introduce Statistical Software, Analysis of the Real-World Data by using Statistical Software and Result Interpretation.				

Year II Semester II				
PST 22201	Physics of Electromagnetic Radiation and Introduction to 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 II		P	
Gravimetric Analysis, Determination of Anions and Cations by Gravimetry, 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 22207	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, Agile Software Development, Project Work.				

PST 22108	C# Programming Laboratory		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 22209	Operating Systems and Compiler Design	T		

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. Structure of the Compiler: Lexical Analysis, Syntax Analysis, Semantic Analysis, Optimizing, Code Generation.

PST 22210	Mathematical Methods II	T		

Vectors and Scalars, Vector Algebra, Linearly Dependent and Independent Vectors, Vector Fields, Dot and Cross Product, Reciprocal Sets of Vectors, Vector Differentiation, Gradient, Divergence, Vector Integration, Fourier Series: Periodic Functions, Arbitrary Period, Even/Odd Functions, Half-Range Expansion, Convergence, Operations on Fourier Series, Fourier Transforms: Fourier Integral Theorem, Cosine and Sine Transforms, Fourier Transforms of Derivatives and Simple Functions, Laplace Transforms: Inverse, Linearity, Derivatives and Integrals, Shifting Theorems, Unit Step Functions, Differentiation and Integration of Transforms.

PST 22111	Introduction to Astrophysics and Cosmology I	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 22112	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 Equipment:
Standard Equipment and Industrial Measurement Equipment 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 22113	Analytical Chemistry Laboratory		P	
Measurements and Errors in Analytical Data, Liquid-Liquid Extraction, Applications in Basic Chromatographic Techniques, Colorimetry/UV-Visible Spectroscopy, Conductometric and Ph Titrations, Use of Different Wet Chemical and Instrumental Techniques for Water Quality Determination.				

PST 22214	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 22215	Molecular Spectroscopy	T		
Rotational Spectroscopy: Moments of Inertia of Diatomic Molecules, Rigid Rotator and Non-Rigid Rotator Models, Anharmonicity, Selection Rules, Microwave Spectra of Diatomic Molecules, Effect of Isotopic Substitution, Rotational-Vibrational Spectra. Vibrational Spectroscopy: Molecular Vibrations, Interpretation of IR Spectra of Organic Molecules, Raman Spectra. UV- Visible, ^{1}H-NMR, ^{13}C-NMR Spectra and their Application in Structure Elucidation of Organic Molecules. Mass Spectrometry: Instrumentation, Isotopic Abundance, Fragmentation Mechanisms and Structure Elucidation.				

PST 22116	Leadership and Communication	T		F
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 and Phone Etiquettes.				

PST 22217	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. Digital Forensics, Authentications, Access Control.				

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	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 22220	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. Hands-On Experience of UI/UX Designing, Project Work.				

*One day training workshop on Leadership, Professional and Skill Development at an institution outside the University.

General Degree Course Units
Bachelor of Science in Physical Sciences

Year III Semester I				
Majoring in Applied Physics				
PST 31201	Solid State Physics	T		
Introduction to Crystalline & Non-Crystalline Solids, Space Lattice and Translation Vector, Symmetry Operations, Bravais Lattice and Crystal Systems, Lattice Directions, Planes and Miller Index, Represent of Planes with Known Miller-Indices, Miller–Bravais Index, Inter-				

Planar Spacing; Quasicrystals, **Atomic Packing:** Close- and Loose-Packed Structures, Atomic Packing Factor, **Voids in Crystals:** Tetrahedral & Octahedral, X-Ray Diffraction, Bragg's and Von Laue Law, **X-Ray Diffraction Methods:** Laue's, Rotary Crystal & Powder Methods, **Factors Effect on X–Ray Diffraction:** Atomic Scattering and Geometrical Structure Factor, Applications of Factors on Crystals; **Lattice Vibra tions:** Mono-Atomic & Diatomic Lattice, **Mono-Atomic Vibrations:** Phase & Group Velocities, **Diatomic Vibrations:** Optical & Acoustical Modes, Different Types of Phonons, **Various Theories of Lattice Specific Heat:** Classical Theory & Einstein's Theory.

PST 31202	Nuclear Physics & 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 Dependent 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		

Introduction to Crystalline and Amorphous Solids; Space-Lattice and Primitive Cells; Bravais Lattices and Essential Symmetries; Common Crystal Structures: BCC, FCC & HCP; Inter-Planar Spacing; Point Defects: Density of Defects in Vacancy, Interstitial, Frenkel & Substitutional; Colour or F-Centres and Polarons; Line Imperfection: Importance of the Concept Of Dislocations, Edge Dislocation & Screw Dislocation, Burgers Vector and Burgers Circuit; Surface Defects: Grain Boundaries, Tilt Boundaries, Twin Boundaries & Stacking faults; Reciprocal Lattice: Introduction, Construction of Two–dimensional Reciprocal Lattice, Reciprocal Lattice of Crystal Structures (sc, fcc, bcc), Ewald's Sphere & its Applications to Crystals, Brillouin Zone in Reciprocal Lattice; Superconductivity: Sources of Superconductivity, Meissner Effect, Type I & Type II Superconductors, Super

Electrons, Cooper Pair, Normal Tunneling and Josephson Effect, Isotope Effect & High-T_C Superconductivity.

PST 31105	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	Computational Physics	T		
Introduction to Python, How to Install Python, How to Install a Text Editor (Pycharm, Jupiter Notebook, Etc.), How to Install Required Libraries and Making the Python Environment; **Algebra, Calculus and Statistics:** Solving Algebraic Expressions (Summation, Subtraction, Division, Ratio, Percentages, Etc.), Solving Calculus Functions (Differentiation, Integration) and Solving Statistical Problems; **Data Visualization Methods:** Linear Graphs, Bar Charts, Pie Charts, Histograms (Multiplot, Error Bars, Graph Title, Axis Labels, Legend, Data Point (Style, Size, Color), Etc. to Be Executed); **Real Data Manipulations:** Importing Real Data Files (.Csv And Other Types), Doing Calculations for Data in Read Files, Exporting Calculated Outputs as a .CSV or Excel File, Visualization of Data in a .Csv or Other Type of a File; **3-D Objects And Animations:** Making 3-D Plots (Sphere, Cube, Cylinder, Pyramid, Etc.), Making Simple Animation for Physical Scenarios (Linear And Circular Movement of an Object, Projectile Motion of an object).				

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

PST 31209	Introduction to Astrophysics and Cosmology II	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 to 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 31110	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 31211	Nano System and Quantum Engineering	T		
Foundations of the Nanoworld, Historical Context, Understanding the Atom, Length Scales &; Dimensionality, Defining the Nanoscale, Nanomaterials &; Natural Principles, Classification of Nanoscale Objects, Core Properties at the Nanoscale, Nature's Nanotechnology, Nanotech in Everyday Life, Tools for the Invisible World, Microscopy Techniques, Nanofabrication Methods, Societal Impact &; Quantum Horizons, Economics of Nanotechnology, Ethics, Safety, and Limitations, Quantum Frontiers Primer, Future Trajectory. Atomic Engineering &; Nanoscale Forces, Advanced Bonding in Nanomaterials, Nanoscale Forces, Crystal Engineering, Nanomaterial Synthesis &; Stabilization, Nanomaterial Synthesis &; Stabilization, Nanoparticle Design, Synthesis Mechanisms, Colloidal Stability, Quantum Dots &; Metal Nanoparticles, Carbon Nano systems, Carbon Allotropes, Synthesis &; Processing (CVD growth of graphene/CNTs, Vein graphite → GO/rGO(chemical exfoliation)), Quantum Applications, Advanced Characterization, Core Techniques (XRD (crystallite size/strain), Raman (defect mapping), FTIR (surface chemistry), TGA (thermal stability), particle size analyzers (DLS), Surface Science Tools XPS/UPS, Chemical states &; work function analysis, AES Elemental mapping with nm resolution, Synchrotron, techniques XAS, XMCD for electronic structure, Quantum-Linked Characterization STM/AFM for single-atom manipulation, Cryo-EM for biomolecular nanostructures, Nanofabrication &; Quantum Integration, Fabrication Philosophies, Quantum-Scale Fabrication, Hybrid Approaches, Quantum-Enabled Applications, Electronics &; Photonics, Sustainable Technologies, Biomedical Innovations, Industrial Impact.				

PST 31027	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 31228	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 31229	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 31230	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 ProcessingTools.				

PST 31234	Economics	T		
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 .				

PST 31035	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.

Majoring in Chemical Technology				
PST 31211	Nano Systems and Quantum Engineering	T		
Foundations of the Nanoworld, Historical Context, Understanding the Atom, Length Scales &; Dimensionality, Defining the Nanoscale, Nanomaterials &; Natural Principles, Classification of Nanoscale Objects, Core Properties at the Nanoscale, Nature's Nanotechnology, Nanotech in Everyday Life, Tools for the Invisible World, Microscopy Techniques, Nanofabrication Methods, Societal Impact &; Quantum Horizons, Economics of Nanotechnology, Ethics, Safety, and Limitations, Quantum Frontiers Primer, Future Trajectory. Atomic Engineering &; Nanoscale Forces, Advanced Bonding in Nanomaterials, Nanoscale Forces, Crystal Engineering, Nanomaterial Synthesis &; Stabilization, Nanomaterial Synthesis &; Stabilization, Nanoparticle Design, Synthesis Mechanisms, Colloidal Stability, Quantum Dots &; Metal Nanoparticles, Carbon Nano systems, Carbon Allotropes, Synthesis &; Processing (CVD growth of graphene/CNTs, Vein graphite → GO/rGO(chemical exfoliation)), Quantum Applications, Advanced Characterization, Core Techniques (XRD (crystallite size/strain), Raman (defect mapping), FTIR (surface chemistry), TGA (thermal stability), particle size analyzers (DLS), Surface Science Tools XPS/UPS, Chemical states &; work function analysis, AES Elemental mapping with nm resolution, Synchrotron, techniques XAS, XMCD for electronic structure, Quantum-Linked Characterization STM/AFM for single-atom manipulation, Cryo-EM for biomolecular nanostructures, Nanofabrication &; Quantum Integration, Fabrication Philosophies, Quantum-Scale Fabrication, Hybrid Approaches, Quantum-Enabled Applications, Electronics &; Photonics, Sustainable Technologies, Biomedical Innovations, Industrial Impact.				

PST 31212	Biochemistry I	T		
The Structure, Functional Roles Biochemical Properties of Proteins, Carbohydrates, Lipids and Nucleic Acids. Methods of Isolation, Characterization Quantitative Determination of Macromolecules, **Vitamins Coenzymes:** Structure and Functions, **Enzyme Biochemistry:** Kinetics Inhibition.				

PST 31213	Electroanalytical Techniques	T		
Thermodynamics and Kinetics of Electrochemical Reactions, Three Electrode System, Liquid Junction Potential, **Electroanalytical Methods:** Potentiometry, Voltammetry, Pulsed Techniques, Amperometry, Coulometry, Electro-Gravimetry, Electrophoresis. Rotating Disk Electrode (RDE) and Rotating Ring Disk Electrode (RRDE) Techniques, Stripping Analysis, Applications of Electroanalytical Techniques.				

PST 31214	Industrial Chemistry and Technology II (Inorganic)	T		
Industrial Inorganic Chemistry, Mineral Based Industries of Sri Lanka, Glass, Silica, Clay, Ceramics, Mineral Sands, Cements, Fertilizers (Apatite, Dolomite Etc.) Chemistry of Gems, Chlor- Alkali Industry, Metal Extraction Metallurgy, Steel and Cast Iron.				

PST 31215	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 Pollutant; **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, Concepts of Green Chemistry.				

PST 31116	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 31117	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, CRM, PT Testing, QA Plans, Data Auditing and Accreditation, GQI (Global Quality Index).				

PST 31118	Laboratory for Nanomaterial Synthesis, Functional Characterization, and Energy/Sensing Device Fabrication		P	
Hands-On Experience is Gained Towards the Preparation and Characterization of Solid-State Thin Film, Standard Organic Light-Emitting Diode (OLED) Organic Solar Cells (OSCs). Hydrothermal Synthesis of Nanomaterials, Controlled Synthesis of $Cu(OH)_2$ and CuO Nanowires, Butterfly Pea (***Clitoria Ternatea***) Extract as a Green Colorimetric Sensor for Selective Bisulphate ions Detection of in Aqueous Media., Understanding Dye Fabric Compatibility, Catalyst Decomposition of Hydrogen Peroxide Using Transition Metal Catalysts, Synthesis and Characterization of Nanocatalysts for Industrial Application, Fabrication of Dye Synthesized Solar Cells, Preparation of a Basic Organic Light Emitting Diode (OLED).				

PST 31119	Industrial Chemistry Laboratory		P	
Assessment of Coconut Oil Quality, Soap Synthesis through Saponification, Preparation of Eco-Friendly Paints, Preparation of Toothpaste, and Investigation of Their Properties. Determination of the Concentration of Iron (II) in a Sample of Portable Groundwater and Comparison of Two Colorimetric Methods.				

PST 31220	Computational Chemistry	T		
Introduction to Computational Chemistry in Materials, Molecular Visualization and Editing Tools, Cheminformatics and Structure Databases, Molecular Descriptors and Fingerprints, Ligand-Based Drug Design (Introductory), Computational Thermochemistry (Intro Level), Introduction to Machine Learning in Chemistry *(light, concept-level),* Hands-on Practical Sessions, **Use of Online Tools:** SwissADME, Avogadro, UCSF Chimera, RDKit via Google Colab (for basics), Report Writing Based on Simulations and Database Findings, **Simulation Software** to Analyze Chemical Structures, Predict Properties, and Visualize Molecular Interactions.				

PST 31027	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 31228	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 31229	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 31230	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 ProcessingTools.				

PST 31234	Economics	T		
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 .				

PST 31035	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.				

Majoring in Computer Science and Technology				
PST 31221	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. Object-Oriented Modeling with Unified Modelling Language (UML). **Object-Oriented Analysis:** Use Cases, Use Case Diagrams. **Object-Oriented Design:** Class Diagrams, Sequence Diagrams, State Diagrams, Activity Diagrams and Deployment Diagrams. **Design Patterns:** Overview of Design Patterns, Creational Patterns, Structural Patterns, and Behavioral Patterns. Advanced Object-Oriented Concepts.				

PST 31122	Programming in Python		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 Supervised and Unsupervised Models and Simple Applications Using Machine Learning.				

PST 31223	Generative Artificial Intelligence	T		
Introduction to Generative AI, Foundations of Generative Modeling, Overview of Generative Models, Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), Autoregressive and Flow-Based Models, Diffusion Models, Modern NLP and				

Transformer Architectures, Text and Language Generation with LLMs, Multimodal Generative Models, Evaluation Metrics and Ethical Challenges, Generative AI in Practice.

PST 31124	Full-Stack Development Laboratory		P	
Introduction to Full-Stack Development, Version Control with Git and GitHub, Frontend Development Fundamentals, Modern Frontend Frameworks, Backend Development Basics, Database Integration, Authentication and Authorization, Full-Stack Integration, Testing & Debugging, Introduction to DevOps, Docker and Containerization, Deployment and Hosting, Cloud & Monitoring Tools, Project Work.				

PST 31225	System Integration and Architecture	T		
Introduction to System Architecture, Software and System Components, System Design Principles, Architectural Patterns and Styles, API Design and Integration, Middleware and Message Brokers, Microservices Architecture, Service-Oriented Architecture (SOA), Enterprise Application Integration (EAI), Cloud-Based Integration, Data Integration and ETL, Security and Compliance in Integration, Performance and Scalability, Case Studies.				

PST 31226	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 31027	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 31228	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 31229	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 31230	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 31231	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 31232	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 31133	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, Economic Issues in Computing, Philosophical Frameworks.				

PST 31234	Economics	T		
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.				

PST 31035	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.				

Year III Semester II				
Majoring in Applied Physics				
PST 32801	Research: B.Sc. Thesis in Physical Sciences (Major in Applied Physics)/ Industrial Exposure: Report in Physical Sciences (Major in Applied Physics)			TH
Industrial/ Laboratory Studies on a Research Problem Relevant to Physics 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 4th Week of the Research/Project Assignment. the Record Book, which is Provided by the Department, Should be Maintained by the Students. Students are Required to Submit Evaluation/Progress 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 Evaluation Panel Appointed by the Department. A Guideline for the Preparation of Report will be Given Separately.				

Majoring Chemical Technology				
PST 32802	Research: B.Sc. Thesis in Physical Sciences (Major in Chemical Technology)/ Industrial Exposure: Report in Physical Sciences (Major in Chemical Technology)			TH
Industrial/ Laboratory Studies on a Research Problem Relevant to Chemistry 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 4th Week of the Research/Project Assignment. the Record Book, which is Provided by the Department, Should be Maintained by the Students. Students are Required to Submit Evaluation/Progress 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 Evaluation Panel Appointed by the Department. A Guideline for the Preparation of Report will be Given Separately.				

Majoring in Computer Science and Technology				
PST 32803	Research: B.Sc. Thesis in Physical Sciences (Major in Computer Science & Technology)/ Industrial Exposure: Report in Physical Sciences (Major in Computer Science & Technology)			TH
Industrial/ Laboratory Studies on a Research Problem Relevant 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. Students Must Submit Their Project Proposals and Present Them to a Panel Appointed by the Department at the 4th Week of the Research/Project Assignment. the Record Book, which is Provided by the Department, Should be Maintained by the Students. Students are Required to Submit Evaluation/Progress 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 Evaluation Panel Appointed by the Department. A Guideline for the Preparation of Report will be Given Separately.				

Honors Degree Course Units

Year III Semester I				
B.Sc. Honours in Applied Physics				
PST 31201	Solid State Physics	T		
Introduction to Crystalline & Non-Crystaline Solids; Space Lattice and Translation Vector; Symmetry Operations; Bravais Lattice and Crystal Systems; Lattice Directions; Planes and Miller Index; Represent of Planes With Known Miller-Indices; Miller–Bravais Index; Inter-Planar Spacing; Quasicrystals; **Atomic Packing:** Close-and Loose-Packed Structures; Atomic Packing Factor; **Voids in Crystals:** Tetrahedral & Octahedral; X-Ray Diffraction; Bragg's and Von Laue Law; **X-Ray Diffraction Methods:** Laue's, Rotary Crystal & Powder Methods; **Factors Effect on X–Ray Diffraction:** Atomic Scattering and Geometrical Structure Factor; Applications of Factors on Crystals; **Lattice Vibrations:** Mono-Atomic & Diatomic Lattice; **Mono-Atomic Vibrations:** Phase & Group Velocities; **Diatomic Vibrations:** Optical & Acoustical Modes; Different Types of Phonons; **And Various Theories of Lattice Specific Heat**: Classical Theory & Einstein's Theory.				

PST 31202	Nuclear Physics & 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 Dependent 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		

Introduction to Crystalline and Amorphous Solids; Space-Lattice and Primitive Cells; Bravais Lattices And Essential Symmetries; Common Crystal Structures: BCC, FCC & HCP; Inter-Planar Spacing; Point Defects: Density Of Defects in Vacancy, Interstitial, Frenkel & Substitutional; Colour or F-Centres and Polarons; Line Imperfection: Importance of the Concept of Dislocations, Edge Dislocation & Screw Dislocation, Burgers Vector and Burgers Circuit; Surface Defects: Grain Boundaries, Tilt Boundaries, Twin Boundaries & Stacking Faults; Reciprocal Lattice: Introduction, Construction of Two–Dimensional Reciprocal Lattice, Reciprocal Lattice of Crystal Structures (SC, FCC, BCC), Ewald's Sphere & its Applications to Crystals, Brillouin Zone in Reciprocal Lattice; Superconductivity: Sources of Superconductivity, Meissner Effect, Type I & Type II Superconductors, Super Electrons, Cooper Pair, Normal Tunneling and Josephson Effect, Isotope Effect & High-T_C Superconductivity.

PST 31105	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	Computational Physics	T		
Introduction to Python, How to Install Python, How to Install a Text Editor (Pycharm, Jupiter Notebook, Etc.), How to Install Required Libraries and Making the Python Environment; **Algebra, Calculus and Statistics:** Solving Algebraic Expressions (Summation, Subtraction, Division, Ratio, Percentages, Etc.), Solving Calculus Functions (Differentiation, Integration) and Solving Statistical Problems; **Data Visualization Methods:** Linear Graphs, Bar Charts, Pie Charts, Histograms (Multiplot, Error Bars, Graph Title, Axis Labels, Legend, Data Point (Style, Size, Color), Etc. to Be Executed); **Real Data Manipulations:** Importing Real Data Files (.Csv And Other Types), Doing Calculations for Data in Read Files, Exporting Calculated Outputs as a .CSV or Excel File, Visualization of Data in a .Csv or Other Type of a File; **3-D Objects And Animations:** Making 3-D Plots (Sphere, Cube, Cylinder, Pyramid, Etc.), Making Simple Animation for Physical Scenarios (Linear And Circular Movement of an Object, Projectile Motion of an object).			

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

PST 31209	Introduction to Astrophysics and Cosmology II	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 to 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 31110	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.				

PST 31211	Nano System and Quantum Engineering	T		
Foundations of the Nanoworld, Historical Context, Understanding the Atom, Length Scales &; Dimensionality, Defining the Nanoscale, Nanomaterials &; Natural Principles, Classification of Nanoscale Objects, Core Properties at the Nanoscale,				

Nature's Nanotechnology, Nanotech in Everyday Life, Tools for the Invisible World, Microscopy Techniques, Nanofabrication Methods, Societal Impact &; Quantum Horizons, Economics of Nanotechnology, Ethics, Safety, and Limitations, Quantum Frontiers Primer, Future Trajectory. Atomic Engineering &; Nanoscale Forces, Advanced Bonding in Nanomaterials, Nanoscale Forces, Crystal Engineering, Nanomaterial Synthesis &; Stabilization, Nanomaterial Synthesis &; Stabilization, Nanoparticle Design, Synthesis Mechanisms, Colloidal Stability, Quantum Dots &; Metal Nanoparticles, Carbon Nano systems, Carbon Allotropes, Synthesis &; Processing (CVD growth of graphene/CNTs, Vein graphite → GO/rGO(chemical exfoliation)), Quantum Applications, Advanced Characterization, Core Techniques (XRD (crystallite size/strain), Raman (defect mapping), FTIR (surface chemistry), TGA (thermal stability), particle size analyzers (DLS), Surface Science Tools XPS/UPS, Chemical states &; work function analysis, AES Elemental mapping with nm resolution, Synchrotron, techniques XAS, XMCD for electronic structure, Quantum - Linked Characterization STM/AFM for single -atom manipulation, Cryo-EM for biomolecular nanostructures, Nanofabrication &; Quantum Integration, Fabrication Philosophies, Quantum-Scale Fabrication, Hybrid Approaches, Quantum-Enabled Applications, Electronics &; Photonics, Sustainable Technologies, Biomedical Innovations, Industrial Impact.

PST 31027	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 31228	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 31229	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 31230	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 31234	Economics	T		
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.				

PST 31035	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.				

B.Sc. Honors in Chemical Technology				
PST 31211	Nano Systems and Quantum Engineering	T		
Foundations of the Nanoworld, Historical Context, Understanding the Atom, Length Scales &; Dimensionality, Defining the Nanoscale, Nanomaterials &; Natural Principles, Classification of Nanoscale Objects, Core Properties at the Nanoscale, Nature's Nanotechnology, Nanotech in Everyday Life, Tools for the Invisible World, Microscopy Techniques, Nanofabrication Methods, Societal Impact &; Quantum Horizons, Economics of Nanotechnology, Ethics, Safety, and Limitations, Quantum Frontiers Primer, Future Trajectory. Atomic Engineering &; Nanoscale Forces, Advanced Bonding in Nanomaterials, Nanoscale Forces, Crystal Engineering, Nanomaterial Synthesis &; Stabilization, Nanomaterial Synthesis &; Stabilization, Nanoparticle Design, Synthesis Mechanisms, Colloidal Stability, Quantum Dots &; Metal Nanoparticles, Carbon Nano systems, Carbon Allotropes,				

Synthesis &; Processing (CVD growth of graphene/CNTs, Vein graphite → GO/rGO(chemical exfoliation)), Quantum Applications, Advanced Characterization, Core Techniques (XRD (crystallite size/strain), Raman (defect mapping), FTIR (surface chemistry), TGA (thermal stability), particle size analyzers (DLS), Surface Science Tools XPS/UPS, Chemical states &; work function analysis, AES Elemental mapping with nm resolution, Synchrotron, techniques XAS, XMCD for electronic structure, Quantum-Linked Characterization STM/AFM for single-atom manipulation, Cryo-EM for biomolecular nanostructures, Nanofabrication &; Quantum Integration, Fabrication Philosophies, Quantum-Scale Fabrication, Hybrid Approaches, Quantum-Enabled Applications, Electronics &; Photonics, Sustainable Technologies, Biomedical Innovations, Industrial Impact.

PST 31212	Biochemistry I	T		
The Structure, Functional Roles Biochemical Properties of Proteins, Carbohydrates, Lipids and Nucleic Acids. Methods of Isolation, Characterization Quantitative Determination of Macromolecules, **Vitamins Coenzymes:** Structure and Functions, **Enzyme Biochemistry:** Kinetics Inhibition.				

PST 31213	Electroanalytical Techniques	T		
Thermodynamics and Kinetics of Electrochemical Reactions, Three Electrode System, Liquid Junction Potential, **Electroanalytical Methods:** Potentiometry, Voltammetry, Pulsed Techniques, Amperometry, Coulometry, Electro-Gravimetry, Electrophoresis. Rotating Disk Electrode (RDE) and Rotating Ring Disk Electrode (RRDE) Techniques, Stripping Analysis, Applications of Electroanalytical Techniques.				

PST 31214	Industrial Chemistry and Technology II (Inorganic)	T		
Industrial Inorganic Chemistry, Mineral Based Industries of Sri Lanka, Glass, Silica, Clay, Ceramics, Mineral Sands, Cements, Fertilizers (Apatite, Dolomite Etc.) Chemistry of Gems, Chlor- Alkali Industry, Metal Extraction Metallurgy, Steel and Cast Iron.				

PST 31215	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 Pollutant; **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, Concepts of Green Chemistry.				

PST 31116	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 31117	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, CRM, PT Testing, QA Plans, Data Auditing and Accreditation, GQI (Global Quality Index).				

PST 31118	Laboratory for Nanomaterial Synthesis, Functional Characterization, and Energy/Sensing Device Fabrication		P	
Hands-On Experience is Gained Towards the Preparation and Characterization of Solid-State Thin Film, Standard Organic Light-Emitting Diode (OLED) Organic Solar Cells (OSCs). Hydrothermal Synthesis of Nanomaterials, Controlled Synthesis of $Cu(OH)_2$ and CuO Nanowires, Butterfly Pea (***Clitoria Ternatea***) Extract as a Green Colorimetric Sensor for Selective Bisulphate ions Detection of in Aqueous Media., Understanding Dye Fabric Compatibility, Catalyst Decomposition of Hydrogen Peroxide Using Transition Metal Catalysts, Synthesis and Characterization of Nanocatalysts for Industrial Application, Fabrication of Dye Synthesized Solar Cells, Preparation of a Basic Organic Light Emitting Diode (OLED).				

PST 31119	Industrial Chemistry Laboratory		P	
Assessment of Coconut Oil Quality, Soap Synthesis Through Saponification, Preparation of Eco-Friendly Paints, Preparation of Toothpaste, and Investigation of Their Properties. Determination of the Concentration of Iron (Iii) in a Sample of Portable Groundwater and Comparison of Two Colorimetric Methods.				

PST 31220	Computational Chemistry	T		
Introduction to Computational Chemistry in Materials, Molecular Visualization and Editing Tools, Cheminformatics and Structure Databases, Molecular Descriptors and Fingerprints, Ligand-Based Drug Design (Introductory), Computational Thermochemistry (Intro Level), Introduction to Machine Learning in Chemistry *(light, concept-level),* Hands-on Practical Sessions, **Use of Online Tools:** SwissADME, Avogadro, UCSF Chimera, RDKit via Google Colab (for basics), Report Writing Based on Simulations and Database Findings, **Simulation Software** to Analyze Chemical Structures, Predict Properties, and Visualize Molecular Interactions.				

PST 31027	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 31228	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 31229	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 31230	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 31234	Economics	T		
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.				

PST 31035	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.				

B.Sc. Honors in Computer Science and Technology				
PST 31221	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. Object-oriented modeling with Unified Modelling Language (UML). **Object-oriented analysis:** Use cases, Use case diagrams. **Object-oriented design:** Class diagrams, Sequence diagrams, State diagrams, Activity diagrams and Deployment diagrams. **Design Patterns:** Overview of design patterns, Creational patterns, Structural patterns, and Behavioral patterns. Advanced object-oriented concepts.				

PST 31122	Programming in Python		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 Supervised and unsupervised models and simple applications using Machine Learning.				

PST 31223	Generative Artificial Intelligence	T		
Introduction to Generative AI, Foundations of Generative Modeling, Overview of Generative Models, Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), Autoregressive and Flow-based Models, Diffusion Models, Modern NLP and Transformer Architectures, Text and Language Generation with LLMs, Multimodal Generative Models, Evaluation Metrics and Ethical Challenges, Generative AI in Practice.				

PST 31124	Full-Stack Development Laboratory		P	
Introduction to Full-Stack Development, Version Control with Git and GitHub, Frontend Development Fundamentals, Modern Frontend Frameworks, Backend Development Basics, Database Integration, Authentication and Authorization, Full-Stack Integration,				

Testing & Debugging, Introduction to DevOps, Docker and Containerization, Deployment and Hosting, Cloud & Monitoring Tools, Project Work.

PST 31225	System Integration and Architecture	T		
Introduction to System Architecture, Software and System Components, System Design Principles, Architectural Patterns and Styles, API Design and Integration, Middleware and Message Brokers, Microservices Architecture, Service-Oriented Architecture (SOA), Enterprise Application Integration (EAI), Cloud-Based Integration, Data Integration and ETL, Security and Compliance in Integration, Performance and Scalability, Case Studies.				

PST 31226	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 31027	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 31228	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 31229	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 31230	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 31231	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 31232	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 31133	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, economic issues in computing, philosophical frameworks.				

PST 31234	Economics	T		
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.				

PST 31035	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.				

Year III Semester II				
B.Sc. 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 32105	Solid State Devices	T		
Optoelectronic Devices; Introduction to Optoelectronics, Light Emitting Diodes (LEDs) and Organic LEDs (OLEDs), Photodetectors and Solar Cells, Laser Diodes and Semiconductor Lasers, Advanced Solid-State Devices; High Electron Mobility Transistors (HEMTs), Quantum Dot Devices, Microelectronics and Technology; Microelectronic Fabrication Techniques, Integrated Circuits and Systems, Quantum Computing and Nanoelectronics, Nanoelectronics and Future Challenges, Applications of Solid State Devices in Industry; Semiconductors in Industry, Applications in Communication Technologies.				

PST 32206	Stellar 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 Ions, 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 32107	Photovoltaic Solar Cells and Technology	T		

Introduction; **Renewable and Sustainable Energy Sources:** Wind Power, Geothermal Power, Hydro Power, Tidal Power, Solar Power, Wave Power, Biomass Power, Nuclear Power, Municipal Solid Waste (MSW) Power; Photovoltaic Effect (PVE); History; Thin Film Solar Cell Technology; **Synthesis and Preparation of Semiconductor Films:** Physical Vapour Deposition, Chemical Vapour Deposition, Molecular Beam Epitaxy, Sputtering (Magnetron), Chemical Deposition, Electrochemical Deposition, Spray Pyrolysis Deposition & Sol-gel method; **p-n Junction:** Drift & Diffusion current in equilibrium, Forward & Reverse bias in dark & illumination; **Fundamentals of Photovoltaic Conversion:** J-V characteristic, Fill Factor, Voc , Isc , IPCE, Equivalent Circuit of a Solar Cell; **Interfaces:** Homo-, Schottky- & Hetero-Junction; Composite Semiconductor and Quantum Well; **Dye-sensitized Solar Cells:** History, Theoretical Aspect, Dye-sensitized Solid-state & Electrochemical Photovoltaic Solar Cells, Hot Carrier Generation; **Experimental Techniques:** Film thickness and Crystalline Size determination, Roughness Factor, Porosity, Finding the Band Gap (Absorption and Tauc plot) and Band Edge Position (Mott-Schottky plot), Transient Photocurrent, Fluorescence Spectrum, Dark I-V Measurements; **Instrumentation:** Fourier Transform Infrared (FTIR) Spectroscopy, Scanning Electron Microscope (SEM), Transmission Electron Microscopy (TEM) and Scanning Probe Microscopy (SPM).

PST 32108	Plasma Physics	T		

Four State of Matters, What is Plasma, Historical Overview of Plasma Science, Natural Plasma; Lightning, Aurora, Solar Wind Artificial Plasma; Electrical Discharge (DC Glow Discharge, AC Glow Discharge, Pulse Power Discharge, RF Discharge), Laser-Induced Plasma, Arc Discharge, Quasi-Neutrality of Plasma, Cold and Hot Plasma, Introduction to Plasma Parameters; Plasma Temperature (Excitation Temperature, Electron Temperature, Ion Temperature and Gas Temperature), Plasma Frequency, Ion Density, Debye Length, Mean Free Path of Particles, Local Thermal Equilibrium Condition, Methods of Parameter Estimations; Boltzmann Plot Method for Electron Temperature Estimation, Langmuir Probe Method for Temperature Estimation and Ion Density Estimation, Faraday Cup Method For Ion Density in Dynamic Plasma, Types of Plasmas Based on Temperature; Cold & Hot Plasma, Applications of Plasma: Atmospheric Pressure Plasma and Warm Dense Matter.

PST 32109	Physics Laboratory 3 – II		P	

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

PST 32224	Atomic and Molecular Spectroscopy	T		

Atomic Spectra:(15 hours)
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:(15 hours)
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, Anharmonic 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 32225	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 32226	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.

PST 32231	Statistics in Quality Control	T	P	

Introduction to Modern Quality Management and Improvement, Statistical Process Control, Definitions and concepts of Quality and Quality Control, Importance of Quality in Manufacturing and Service Sectors, Role of Statistics in Quality Management. **Control Charts:** Control Charts for Attributes (p-chart, np-chart, c-chart, and u-chart), Control Chart for Variables (X-bar & R chart and X-bar & S chart), Interpretation of Patterns and Rules for Detecting Out-of-Control Processes. Process Capability Analysis; Process Capability Analysis, Concepts of Natural Tolerance and Specification Limits, Cp and Cpk indices. **Acceptance Sampling:** Principles of Acceptance Sampling, **Types:** Single, Double, and Multiple Sampling Plans, Operating Characteristic (OC) Curves, Producer's risk and Consumer's Risk, Average Outgoing Quality (AOQ) and Average Total Inspection (ATI), **Quality Standards:** ISO 9000 (QMS), ISO 14000 (EMS), TQM and Six Sigma. Introduction to Operations Research; Linear Programming (LP), Transportation and Assignment Problems. **Introduction to time Series Data in industrial processes:** Time Series Analysis and Forecasting;

Components of Time Series Data, Smoothing Methods, Common Industrial Time Series Challenges. Introduction to Statistical Software for Quality Control and Time Series Analysis and Forecasting, Analysis of Real-world Data using Statistical Software and Interpretation of Results (Minitab, Excel, R).

PST 32232	Business Process Modelling	T		
Introduction to Business Processes, Fundamentals of Business Process Modelling, Process Identification and Discovery, Business Process Notation and Standards (e.g., BPMN), Modelling Tools and Software, Process Analysis Techniques, Process Design and Redesign, Simulation and Performance Evaluation, Workflow Management Systems, Process Automation and Integration, Business Process Improvement and Reengineering, Governance and Compliance, Case Studies and Applications.				

B.Sc. Honors in Chemical Technology				
PST 32210	Medicinal Chemistry	T		
Introduction to Medicinal Chemistry, Drug Discovery and Development, Physicochemical Properties of Drugs, Biological Significance of Stereochemistry, Stereochemistry in Drug Synthesis, Drug–Receptor Interactions, Structure–Activity Relationships (SAR) and QSAR, Pharmacokinetics and Pharmacodynamics, Prodrugs and Drug Delivery Systems, Major Drug Classes and Mechanisms of Action, Natural Products in Drug Discovery.				

PST 32211	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 32212	Surface and Colloid Chemistry	T		
Surface Chemistry: Surface Tension, Kelvin Equation and its Applications, Interfaces, Surface Activity, Langmuir-Blodgett (LB) Method, Gibbs Equation, Adsorption and Absorption, Physisorption & Chemisorption, Freundlich, Langmuir and BET Isotherms.				

Colloids: Types of Colloids, Methods of Preparation of Colloids, Dialysis, Electrodialysis, Electrophoresis and Electro-osmosis, Isoelectric Point, Electrical Double Layer Theory, Surfactants and their Applications.

PST 32213	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 Cy cle). **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 32114	Advanced Organic Chemistry	T		
Reaction Dynamics (Structure & Bonding, Donor-acceptor Interactions, and Conformational Analysis), Isotope Effects and Molecular Orbital Theory applied to Pericyclic and Photochemical Reactions, Cyclic and Acyclic Stereo Control.				

PST 32215	Structures and Properties of Solids	T		
Crystal Lattice: Seven Crystal Systems, Bravais 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 32116	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.				

PST 32117	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 32226	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.				

PST 32227	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.				

PST 32128	Artificial Intelligence in Chemical Technology	T		
AI-driven Discovery in Chemistry, Foundations of AI in Chemistry (Introduction to AI-Chem Synergy, Python Ecosystem for Chemistry, Chemical Data Wrangling), Molecular Property Prediction (Feature Engineering for Molecules, Machine Learning Models, Advanced Applications), Drug Discovery & Molecular Design (Virtual Screening, Generative Chemistry, ADMET Prediction), Reaction Modeling & Synthesis (Reaction Outcome Prediction, Retrosynthesis Planning, Reaction Condition Optimization), Multiscale Simulations & Dynamics (AI-Accelerated Quantum Chemistry, Molecular Dynamics), Emerging Frontiers (Materials Discovery, Automated Labs, Ethical Considerations).				

PST 32231	Statistics in Quality Control	T		
Introduction to Modern Quality Management and Improvement, Statistical Process Control, Definitions and concepts of quality and Quality Control, Importance of Quality in Manufacturing and Service Sectors, Role of Statistics in Quality Management. **Control Charts:** Control Charts for Attributes (p-chart, np-chart, c-chart, and u-chart), Control Chart for Variables (X-bar & R chart and X-bar & S chart), Interpretation of Patterns and Rules for Detecting Out-of-Control Processes. Process Capability Analysis; Process Capability Analysis, Concepts of Natural Tolerance and Specification Limits, Cp and Cpk Indices. **Acceptance Sampling:** Principles of Acceptance Sampling, **Types:** Single, Double, and Multiple Sampling Plans, Operating Characteristic (OC) Curves, Producer's Risk and Consumer's Risk, Average Outgoing Quality (AOQ) and Average Total Inspection (ATI), **Quality Standards:** ISO 9000 (QMS), ISO 14000 (EMS), TQM and Six Sigma. Introduction to Operations Research; Linear Programming (LP), Transportation and Assignment Problems. **Introduction to Time Series Data in Industrial Processes: Time** Series Analysis and Forecasting;				

Components of Time Series Data, Smoothing Methods, Common Industrial Time Series Challenges. Introduction to Statistical Software for Quality Control and Time Series Analysis and Forecasting, Analysis of Real-World Data using Statistical Software and Interpretation of Results (Minitab, Excel, R).

PST 32232	Business Process Modelling	T		
Introduction to Business Processes, Fundamentals of Business Process Modelling, Process Identification and Discovery, Business Process Notation and Standards (e.g., BPMN), Modelling Tools and Software, Process Analysis Techniques, Process Design and Redesign, Simulation and Performance Evaluation, Workflow Management Systems, Process Automation and Integration, Business Process Improvement and Reengineering, Governance and Compliance, Case Studies and Applications.				

B.Sc. Honors in Computer Science and Technology				
PST 32218	Deep Learning	T		
Introduction to Deep Learning, Neural Network Foundations, Feedforward Neural Networks, Backpropagation and Optimization, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs) and LSTMs, Transfer Learning and Pretrained Models, Generative Models (GANs and VAEs), Deep Reinforcement Learning, Deployment and Serving of Deep Learning Models, Regularization and Generalization Techniques, Explainability and Interpretability, Applications of Deep Learning.				

PST 32219	Digital Image Processing and Computer Vision	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, Basic Filters, Pixel Point Processing, Pixel Group Processing, Frequency Domain Processing(Fourier Transform), Image Analysis, Coding Systems; Error Detection and Correction, Data Compression Schemes. **Feature Detection and Matching:** Interest Point, Corners, Invariant Features, Feature Vectors and Dimensionality, **Multiple Views and Motions**: Stereo Vision, Motion Structures, Optical Flow, Motion Vectors, **Multi-Object Tracking:** Feature Clustering, Regions, Motion Groups, **Object Recognition:** Bag of Features, Multimodal Systems.				

PST 32220	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 32221	Project in Computer Science and Technology (Mini Project)		P	
Independent practical will be conducted on one or more on the given topics.				

PST 32122	Visual Computing Laboratory		P	
Implement Graphics and Digital Image Processing Techniques using MATLAB, Working with Data Mining Tool.				

PST 32223	Advanced Database Management Systems	T		
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 32225	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 32129	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 32130	Software Automation	T	P	
Introduction to Software Automation and Selenium, Setting Up Selenium Environment, Selenium WebDriver Basics, Locating Web Elements, Handling Web Elements (Clicks, Inputs, Dropdowns), Synchronization and Wait Strategies, Automating Web Forms and Navigation, Data-Driven Testing with Selenium, Test Frameworks Integration (JUnit/TestNG), Handling Alerts, Frames, and Windows, Browser Compatibility Testing,				

Reporting and Logging, Continuous Integration with Selenium, Advanced Selenium Features (Grid, Remote WebDriver), Case Studies and Industry Applications.

PST 32231	Statistics in Quality Control	T		
Introduction to Modern Quality Management and Improvement, Statistical Process Control, Definitions and Concepts of Quality and Quality Control, Importance of Quality in Manufacturing and Service Sectors, Role of Statistics in Quality Management. **Control Charts:** Control Charts for Attributes (p-chart, np-chart, c-chart, and u-chart), Control Chart for Variables (X-bar & R chart and X-bar & S chart), Interpretation of Patterns and Rules for Detecting Out-of-Control Processes. Process Capability Analysis; Process Capability Analysis, Concepts of Natural Tolerance and Specification Limits, Cp and Cpk Indices. **Acceptance Sampling:** Principles of Acceptance Sampling, **Types:** Single, Double, and Multiple Sampling Plans, Operating Characteristic (OC) Curves, Producer's Risk and Consumer's Risk, Average Outgoing Quality (AOQ) and Average Total Inspection (ATI), **Quality Standards:** ISO 9000 (QMS), ISO 14000 (EMS), TQM and Six Sigma. Introduction to Operations Research; Linear Programming (LP), Transportation and Assignment Problems. **Introduction to Time Series Data in Industrial Processes:** Time Series Analysis and Forecasting; Components of Time Series Data, Smoothing Methods, Common Industrial Time Series Challenges. Introduction to Statistical Software for Quality Control and Time Series Analysis and Forecasting, Analysis of Real-world Data Using Statistical Software and Interpretation of Results (Minitab, Excel, R)			

PST 32232	Business Process Modelling	T		
Introduction to Business Processes, Fundamentals of Business Process Modelling, Process Identification and Discovery, Business Process Notation and Standards (e.g. BPMN), Modelling Tools and Software, Process Analysis Techniques, Process Design and Redesign, Simulation and Performance Evaluation, Workflow Management Systems, Process Automation and Integration, Business Process Improvement and Reengineering, Governance and Compliance, Case Studies and Applications.				

Year IV Semester I				
B.Sc. Honours Degree in Applied Physics				
PST 41201	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 Georeferencing, Development and use of a GIS, Basic Concepts of Spatial Modelling and Analysis,Data Visualization and Presentation for GIS.				

PST 41202	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 41203	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.) Int roduction 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 41104	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, Microprocessor Applications in the Laboratory, Computer Controlled Electronics; CAMAC Standard, FASTBUS, GPIB Interfaces, examples of Data Acquisition Systems.				

PST 41205	Astrophysics-Instrumentation and Data 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; Reduce the Object Frame into the Magnitudes; Using Various Codes Draw the Light Variation Diagrams; **The Light Curve:** To IdentifyThe LightVariation of the ObjectStar.

PST 41006	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 41007	Independent Research / Project in Applied Physics		P	
Independent practical will be conducted on one or more on the given topics.				

PST 41219	Robotics and Automation	T	P	
Introduction to Robotics and Automation: History and Classification of Robots, Applications in Industry, Medicine, and Service Sectors, **Robot Kinematics and Dynamics:** Forward and Inverse Kinematics, Degrees Of Freedom, Workspace and Jacobians, Robotic Arm Kinematics & Control Simulation, **Sensors and Actuators for Robotics:** Types and integration (IMU, LIDAR, Force-Torque Sensors; Smart Actuators), Interfacing with Microcontrollers, **Robot Control Architectures:** Open-loop vs. Closed-loop control, PID and Adaptive Control, **Embedded Systems for Robotic Control:** Microcontroller Basics (e.g., Arduino, STM32), Real-time Control Systems, **Mobile Robotics & Path Planning:** Localization and Mapping, Trajectory Planning Algorithms, **Robot Programming & Simulation:** ROS Fundamentals, Matlab Simulation Overview, **Automation Systems:** PLCs, SCADA, and Industrial Communication Protocols, **Ethics, Safety & Standards in Robotics:** ISO 10218 (for industrial robots), Robot Risk Assessment, AI Ethics in Automation.				

PST 41220	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 41221	Advanced Electrochemical Power Conversion & Storage Technologies	T		
Principles of Electrochemical Energy Conversion: Thermodynamics, Kinetics, and Transport Phenomena. **Electrochemical Techniques and Applications:** Electrochemical Impedance Spectroscopy, Cyclic Voltammetry, Galvanostatic Intermittent Titration. **Electrochemistry of Advanced Batteries:** Lithium-Ion Batteries and Nanostructured Materials for High-Performance Storage. **Metal-Oxygen Batteries:** Aqueous and Non-Aqueous Systems. **Supercapacitors:** Operating Principles and Emerging Technologies. **Fuel Cell Technologies:** Proton Exchange Membrane Fuel Cells (PEMFC), Alkaline Anion Exchange Membrane Fuel Cells (AAEMFC), Solid Oxide Fuel Cells (SOFC), Advanced				

Electrocatalysts, and Next-Generation Membranes. **Redox Flow Batteries:** Design and Operational Principles for Large-Scale Energy Storage.

PST 41222	Instrumentation and Control	T		
Introduction to Instrumentation Systems: Definition and Scope of Instrumentation, Components: Sensors, Transducers, Actuators, Signal Processors, Static and Dynamic Characteristics: Accuracy, Precision, Linearity, Hysteresis, Bandwidth, and Response Time. **Sensors and Transducers:** Types of Sensors: Resistive, Capacitive, Inductive, Piezoelectric, Optical, Thermal, Ultrasonic, Magnetic, Applications: Temperature, Pressure, Displacement, Force, Flow, and Acceleration Measurements, Selection Criteria and Performance Analysis. **Signal Conditioning and Data Acquisition:** Signal Amplification, Filtering, Isolation, and Impedance Matching, Analog-to-digital (ADC) and Digital-to-analog (DAC) Conversion, Data acquisition systems (DAQ): architecture and interfacing, Noise reduction and grounding Techniques, **Introduction to Control Systems:** Open-loop vs Closed-loop systems, Modeling of Physical Systems: Mechanical, Electrical, and Thermal, Transfer Functions, Block Diagrams, and System Representation, **Time and Frequency Domain Analysis:** System Response: Step, Impulse, Ramp Inputs, Stability, Transient, and Steady-state Analysis, Frequency Response and Bode Plots, **Controllers and Control Strategies:** Feedback and Feed Forward Control, PID Controllers: Tuning Methods (Ziegler-Nichols, Manual), Digital and Analog Control Systems, On-off, Proportional, Integral, Derivative Control Strategies.			

PST 41223	Applied Optics and Imaging System	T		
Fundamentals of Applied Optic: Nature of Light: Plane Waves, Spherical Waves, Snell's Law, Total Internal Reflection, Huygens' Principle, Geometric Optics: Refraction, Reflection, Image Formation, Ray Tracing, Polarization: Linear, Circular, And Elliptical Polarization; Polarizers and Wave Plates, Aberration Theory: Resolution Limits, Lens Design, Common Optical Aberrations, **Physical Optics:** Interference: Young's Double-Slit Experiment, Fringe Visibility, Michelson Interferometer and its Applications, Multiple-Beam Interference and Thin-Film Coatings, Diffraction: Fresnel and Fraunhofer Theories, Diffraction Gratings, Fourier Optics: Image Formation in Frequency Space, **Imaging Systems:** Design Principles of Simple Optical Instruments, Camera Systems: Lenses, Apertures, Depth of Field, Resolution, Microscope and Telescope Design: Magnification, Numerical Aperture, Projection Systems and Optical System Alignment, **Photonic Sensing and Imaging Applications:** Optical Sensor Systems: Basic Principles and Classification, Fiber Optics: Waveguiding, Single-Mode and Multimode Fibers, Coupling Efficiency, Lidar Systems: Principles, Scanning Mechanisms, and Range Resolution, Environmental and Industrial Sensing: Gas Detection, Vibration/Intrusion Sensors, Navigation and Positioning Systems Using Optical Techniques, **System Design and Optimization:** Integration of Optical Components Into Functional Systems, Quantifying System Performance: Calibration,			

Signal-to-Noise Ratio, Linearity, System Topology Design: Modular Design of Sensors and Imaging Systems, Case Studies: Real-World Applications and Commercial Systems.

PST 41030	Research: B.Sc. Thesis in Applied Physics/ Industrial Exposure: Report in Applied Physics			TH
The Research Problem Should be Selected from any Area in Physics. The Research Project will be Stretched Throughout the Year, During the Semesters I and II. It will Include a Project Proposal, a Proposal Presentation, Progress Presentations, a Dissertation, a Poster 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. The Record book, which is Provided by the Department, Should be Maintained by the Students. 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 Begiven Separately.				

B.Sc. Honors in Chemical Technology				
PST 41208	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 C_6C_3 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, and Important Reactions of Alkaloids. **Mixed Biogenesis:** Flavonoids and Stilbenes, Meroterpenoids, **Carbohydrates:** Conformations of Carbohydrates and Conformational Effects. Reactions of Carbohydrates. Synthesis of Modified Carbohydrate Molecules and other Natural Products.				

PST 41109	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 41210	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 41211	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 Software.				

PST 41212	Biotechnology	T		
Brief History and Different Areas of Biotechnology. The Impact of Biotechnology on Society. DNA Structure and Function. DNA as Genetic Material. DNA Replication to Protein Synthesis. DNA Sequencing. Recombinant DNA Preparation. Techniques for Analyzing DNA (PCR, Southern Blotting, Northern Blotting, Western Blotting. Human Genome Project Genetic Engineering and Gene Therapy. DNA Typing (Paternity Testing, Criminal Investigation, Disease Identification) Ethical Issues in Biotechnology and Genetic Engineering.				

PST 41213	Advanced Solid-State Chemistry	T		
Solid State Materials, **Solid Solutions:** Substitutional and Interstitial Solid Solutions, Alloys. Solid State Diffusion. **Solid State Synthesis:** Ceramic Method, Coprecipitation, Sol-Gel Method, Microwave Synthesis, Hydrothermal Synthesis. Crystal Defects, **Characterization of Solid-State Products:** Microscopy, Spectroscopy, Thermal Analysis.				

Metallic Bonding and Band Theory of Solids: Band Structure of Metals, Insulators and Semiconductors.

PST 41014	Literature Search Seminar in Chemical Technology	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 41015	Independent Research / Project in Chemical Technology		P	
Research Methodology; Hypothesis, Theory and Scientific Laws & Models, Peer, Non-Peer 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 41220	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 41221	Advanced Electrochemical Power Conversion & Storage Technologies	T		
Principles of Electrochemical Energy Conversion: Thermodynamics, Kinetics, and Transport Phenomena. **Electrochemical Techniques and Applications**: Electrochemical Impedance Spectroscopy, Cyclic Voltammetry, Galvanostatic Intermittent Titration. **Electrochemistry of Advanced Batteries:** Lithium-Ion Batteries and Nanostructured Materials for High-Performance Storage. **Metal-Oxygen Batteries:** Aqueous and Non-Aqueous Systems. **Supercapacitors:** Operating Principles and Emerging Technologies. **Fuel Cell Technologies:** Proton Exchange Membrane Fuel Cells (PEMFC), Alkaline Anion Exchange Membrane Fuel Cells (AAEMFC), Solid Oxide Fuel Cells (SOFC), Advanced Electrocatalysts, and Next-Generation Membranes. **Redox Flow Batteries:** Design and Operational Principles for Large-Scale Energy Storage.				

PST 41224	Organic electronics	T		
The Fermi-Dirac Distribution, Organic Semiconductors, Optical Properties of Organic Semiconductors, Organic Polymers, Conducting Polymers and Their Applications, Solid-State Batteries, Organic Solar Cells (OSCs), Organic Light-Emitting Devices (OLEDs), Organic Photodetectors (OPs) Based on Organic Semiconductors, Organic Field-Effect Transistors (OFETs) and Application of Organic Electronic Devices.				

PST 41031	Research: B.Sc. Thesis in Chemical Technology/ Industrial Exposure: Report in Chemical Technology			TH
The Research Problem Should be Selected from any Area in Chemistry. The Research Project will be Stretched Throughout the Year, During the Semesters I and II. It will				

Include a Project Proposal, a Proposal Presentation, Progress Presentations, a Dissertation, a Poster 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. The Record book, which is Provided by the Department, Should be Maintained by the Students. 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 Begiven Separately.

B.Sc. Honors in Computer Science and Technology				
PST 41104	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, Microprocessor Applications in the Laboratory, Computer Controlled Electronics; CAMAC Standard, FASTBUS, GPIB Interfaces, Examples of Data Acquisition Systems.				

PST 41216	Entrepreneurship	T		
Introduction to Entrepreneurship, Opportunity Recognition and Idea Generation, Business Model Development, Market Research and Analysis, Business Planning and Strategy, Financing New Ventures, Legal and Ethical Issues in Entrepreneurship, Marketing and Sales Strategies, Operations Management for Startups, Innovation and Technology Management, Scaling and Growth Strategies, Leadership and Team Building, Risk Management and Decision Making, Case Studies.				

PST 41217	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 41218	Web Technologies	T		
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, SOA, RDF-XML, OWL, Sockets.				
PST 41219	Robotics and Automation	T	P	
Introduction to Robotics and Automation: History and Classification of Robots, Applications in Industry, Medicine, and Service Sectors, **Robot Kinematics And Dynamics:** Forward and Inverse Kinematics, Degrees Of Freedom, Workspace and Jacobians, Robotic Arm Kinematics & Control Simulation, **Sensors and Actuators for Robotics:** Types and Integration (IMU, LIDAR, Force-Torque Sensors; Smart Actuators), Interfacing with Microcontrollers, **Robot Control Architectures:** Open-Loop Vs. Closed-Loop Control, PID and Adaptive Control, **Embedded Systems for Robotic Control:** Microcontroller Basics (E.G., Arduino, STM32), Real-Time Control Systems, **Mobile Robotics & Path Planning:** Localization and Mapping, Trajectory Planning Algorithms, **Robot Programming & Simulation:** ROS Fundamentals, Matlab Simulation Overview, **Automation Systems:** Plcs, SCADA, and Industrial Communication Protocols, **Ethics, Safety & Standards In Robotics:** ISO 10218 (For Industrial Robots), Robot Risk Assessment, AI Ethics in Automation.				

PST 41225	Internet of Things (IoT)	T		
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 41226	Big Data Analysis	T		
Introduction to Big Data, Big Data Technologies and Ecosystem, Data Storage and Management, Data Processing Frameworks (Hadoop, Spark), Data Cleaning and Preprocessing, Data Mining Techniques, Distributed Computing Concepts, Real-time Data Analytics, Machine Learning on Big Data, Data Visualization and Reporting, Cloud-based Big Data Solutions, Security and Privacy in Big Data, Case Studies and Applications.				

PST 41227	High Performance Computing	T		
Fundamental Concepts in High Performance Computing, Shared Memory Programming (Open MP), Message Passing Programming (MPI), Parallel Decomposition, Hardware, Compilers and Performance Programming, Performance Measurement and Estimation, High Performance Networking.				

PST 41228	Quantum Computing	T		
Introduction to Quantum Computing, Quantum Mechanics Fundamentals, Quantum Bits and Quantum Gates, Quantum Programming Languages and Tools, Quantum Cryptography, Quantum Machine Learning, Quantum Hardware and Architectures, Quantum Simulation, Applications of Quantum Computing, Challenges and Future Directions, Case Studies.				

PST 41229	Augmented and Virtual Reality	T		
Introduction to AR and VR, Hardware and Devices, 3D Graphics and Rendering, Human-Computer Interaction in AR/VR, Tracking and Registration Techniques, AR/VR Software Development Tools, Spatial Audio and Sensory Feedback, AR/VR Content Creation, User Experience Design, Applications of AR and VR, Performance Optimization and Challenges, Ethics and Safety in AR/VR, Case Studies.				

PST 41032	Research: B.Sc. 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 a Project Proposal, a Proposal Presentation, Progress Presentations, a Dissertation, a Poster 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. The Record book, which is Provided by the Department, Should be Maintained by the Students. 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 Begiven Separately.				

Year IV Semester II				
B.Sc. Honours Degree in Applied Physics				
PST 42801	Research: B.Sc. Thesis in Applied Physics/ Industrial Exposure: Report in Applied Physics			TH
The Research Problem Should be Selected from any Area in Physics. The Research Project will be Stretched Throughout the Year, During the Semesters I and II. It will Include a Project Proposal, a Proposal Presentation, Progress Presentations, a Dissertation, a Poster 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. The Record book, which is Provided by the Department, Should be Maintained by the Students. 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 Begiven 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.				

B.Sc. Honors in Chemical Technology				
PST 42804	Research: B.Sc. Thesis in Chemical Technology/ Industrial Exposure: Report in Chemical Technology			TH
The Research Problem Should be Selected from any Area in Chemistry. The Research Project will be Stretched Throughout the Year, During the Semesters I and II. It will Include a Project Proposal, a Proposal Presentation, Progress Presentations, a Dissertation, a Poster 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. The Record book, which is Provided by the Department, Should be Maintained by the Students. 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 Begiven Separately.				

PST 42105	Literature Search Seminar in Chemical Technology	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 42206	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, Non-peer 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 Propose & Report Format, Research Manuscripts.				

B.Sc. Honors in Computer Science and Technology				
PST 42807	Research: B.Sc. 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 a Project Proposal, a Proposal Presentation, Progress Presentations, a Dissertation, a Poster 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. The Record book, which is Provided by the Department, Should be Maintained by the Students. 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 Begiven Separately.				

PST 42608	Industrial Training: Report in Computer Science and Technology		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.				

* The Independent Research / Project will be offered as an annual course unit in both semesters I and II, with a total value of 2 credits. Similarly, both Literature Search Seminar and Research / Industrial Exposure will be offered as an annual course unit in both semesters I and II, with a total value of 1 and 8 credits, respectively. Students will be evaluated through regular progress presentations from Semester I to the end of the Semester II.

Rules and Regulations

- It is compulsory for the students to complete the Level I of the *English Proficiency Course* in order to obtain the Physics or Chemistry or Computer Science for general degree or honors degree program. The other two levels of the course are optional.

- It is necessary to complete or become eligible for all the subjects from Year I semester I and II, and Year II Semester I, before selecting the respective specialization stream in

Physics or Chemistry or Computer Science for general degree or honors degree program.

- Note: Students who do not fulfil their eligibility on subjects for the Year I semester I & II and Year II Semester I, will be asked to fulfil their eligibility as soon as possible before selecting their specialization stream. Also, it is important to note that, time table of the subjects offered for the respective semesters will not be adjusted to help the students who do not fulfil their eligibility at their proper time.

- If a student unable to satisfy the condition listed in point 2 he/she will be given special consideration if he/she complete minimum of 80% course work in the above-mentioned period.

- To become eligible for a subject, a student must obtain the 100% attendance without any valid reasons or medical certificates (80% attendance, 20% absence with valid reasons and medical certificates).

- To be eligible to appear for practical (laboratory) examinations in each semester, students must fulfill the following attendance requirement:

    - 100% attendance in all scheduled practical classes is mandatory.
    - Up to 20% absence may be permitted only in cases of valid reasons, supported by documentary evidence such as an acceptable medical certificate or other officially approved justification.

Failure to meet the above criteria will result in ineligibility for the current practical examination, and any subsequent attempt will be treated as a repeat (second) attempt.

- Marks of the continuous assessments, and mid-semester examination of the first registered time period will be considered for final evaluation if any student complete his/her eligibility at another time frame other than his/her allowed first attempt.

- Note: Students who do not complete their continuous assessments at their first attempt will be given the fraction of marks assigned for the final exam. Example: Assume that the subject consists of 40% of the marks for continuous assessments and/or mid-semester exam and 60% of the marks for the final exam. Also considering the fact that he/she completed the eligibility criteria at any time period and sit only for the final exam without submitting any continuous assessments and/or mid-semester examination at his/her registered first attempt period, then, such student will only get 48% as the final results for grading if he/she gets 80 marks out of 100 for the final exam paper.

Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

Department of Sports Sciences and Physical Education

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

DEPARTMENT OF SPORTS SCIENCES AND PHYSICAL EDUCATION

Degree Program (PED)

Bachelor of Science Honors in Physical Education [BScHons (Phy Ed)]

Anticipated Graduate Profile

The underpinning four 'Es' philosophy, 'Earn, Engage, Evolve and Establish' is strategically placed as the guided essence of the degree program (Figure 1). The undergraduates are expected to link between the theoretical, the practical and experimental approaches in physical education and physical activity to develop the necessary skills for students to work effectively to enhance and advocate for their own and others' health wellbeing, safety and physical activity participation across their lifespan.

Graphical illustration based on 'Earn, Engage, Evolve and Establish' as undergraduate development process requirement. The revision of curriculum is promoting a blend of modern theoretical, practical, experiential, reflective and professional approaches to physical education. The diverse range of teaching methods are employed including lectures, seminars, workshops, case studies, practical sessions, tutorials, e-learning, field visits and individual project. Supervision is expected to supplement the students' own independent study. A wide variety of assessment types are used. These include written assignments (including essays and case studies); presentations (including oral and poster presentations); portfolios (a flexible combination of assessment types which usually include providing evidence of acquired skills/competencies and critical reflection on personal development); projects; examinations and research proposals. Finally, undergraduate will be able to analyses varied and changing personal and contextual factors to understand, and implement strategies to develop physical education and physical activity, locally, regionally and globally.

GRADUATE PROFILE OF BACHELOR OF SCIENCE HONOURS IN PHYSICAL EDUCATION

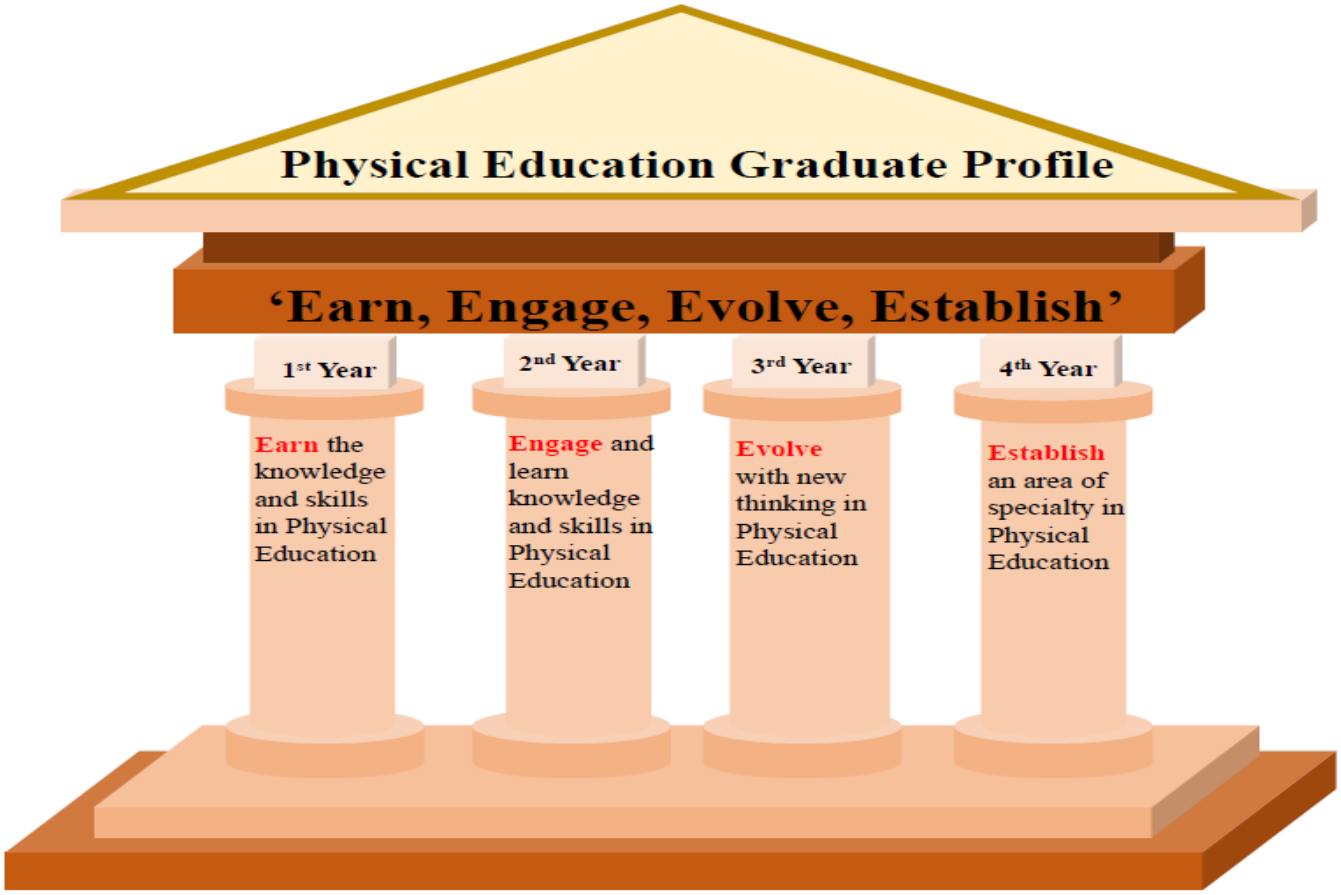


Figure 1: 'Es' Philosophy

Learning Outcomes of the Degree Program

PLO1	Demonstrate broad and coherent pedagogical and content knowledge for the professions related to Physical Education.
PLO2	Demonstrate an advanced knowledge of the connection between research and theory and the ability to use this knowledge to inform their practice as a Physical Education practitioner.
PLO3	Successfully complete an independent research project utilizing knowledge and the skills of analysis and synthesis to identify the research findings pertaining to an issue related to physical education.
PLO4	Have well-developed skills in student-focused pedagogy and practice to manipulate research-based material and mandatory documents related to policy, student learning and integrate teaching across physical education curricula areas.
PLO5	Display well-developed communication and evaluation skills as a reflective practitioner, articulating and analyzing the complex and dynamic role of the Physical Education Practitioner in the learning environment.
PLO6	Apply pedagogical skills and content knowledge to solve physical educational problems, integrate technology in the classroom, plan for all learners, apply pedagogical strategies for differentiation and reflect on their practice.
PLO7	Demonstrate higher order cognitive skills associated with evolving educational climate.
PLO8	Demonstrate the ability to autonomously apply educational ethics that value student differences, the importance of differentiation and social justice.

Summary of the Course

Course Code	Course Title	No of Credits	Compulsory (C) or Elective (E)
Year I Semester I			
PED 11101	Foundation of Movement Skill Acquisition in Gymnastics	1	Compulsory
PED 11102	Foundation of Movement Skill Acquisition in Athletics (Track Events)	1	Compulsory
PED 11103	Foundation of Movement Skill Acquisition in Volleyball	1	Compulsory
PED 11104	Swimming and Life Saving	1	Compulsory
PED 11205	Fundamental Motor Skills and Minor Games	2	Compulsory
PED 11206	Foundation of Physical Education	2	Compulsory
PED 11207	Professional Development	2	Compulsory
PED 11308	Human Anatomy and Physiology	3	Compulsory
PED 11109	General Fitness	1	Compulsory
Total Credits = 14 (Compulsory = 14 and Elective = 00)			
Year I Semester II			
PED 12101	Foundation of Movement Skill Acquisition in Netball	1	Compulsory
PED 12202	Foundation of Movement Skill Acquisition in Athletics (Field Events)	2	Compulsory
PED 12103	Aerobics and Rhythmic Activities	1	Compulsory
PED 12104	Sports Kinesiology	1	Compulsory
PED 12205	First Aid and Injury Prevention in Sports	2	Compulsory
PED 12206	Sports Exercise Physiology	2	Compulsory
PED 12207	Principals of Physical Education and Sports	2	Compulsory
PED 12208	Information Technology	2	Compulsory

PED 12209	Data Literacy and Numerical Thinking	2	Compulsory
	One Credit to be selected from the following Subjects		
PED 12110	Foundation of Movement Skill Acquisition in Table Tennis	1	Elective
PED 12111	Foundation of Movement Skill Acquisition in Tennis	1	Elective
PED 12112	Foundation of Movement Skill Acquisition in Badminton	1	Elective
	One Credit to be selected from the following Subjects		
PED 12113	Foundation of Movement Skill Acquisition in Cricket	1	Elective
PED 12114	Foundation of Movement Skill Acquisition in Baseball	1	Elective
PED 12115	Foundation of Movement Skill Acquisition in Elle	1	Elective
Total Credits = 17 (Compulsory = 15 and Elective = 02)			

Year II Semester I			
PED 21101	Foundation of Movement Skill Acquisition in Basketball	1	Compulsory
PED 21102	Foundation of Movement Skill Acquisition in Soccer	1	Compulsory
PED 21203	Practicum I: Teaching Methodology and Practice in Technical Model	2	Compulsory
PED 21204	Dance: Folk, Classical, and Cultural	2	Compulsory
PED 21205	Pedagogy in Physical Education	2	Compulsory
PED 21206	Health and Physical Education	2	Compulsory
PED 21207	Education Psychology	2	Compulsory
PED 21208	Basic Statistics	2	Compulsory
	One Credit to be selected from the following Subjects		
PED 21109	Foundation of Movement Skill Acquisition in Judo	1	Elective

PED 21110	Foundation of Movement Skill Acquisition in Karate	1	Elective
	One Credit to be selected from the following Subjects		
PED 21111	Foundation of Movement Skill Acquisition in Rugby	1	Elective
PED 21112	Foundation of Movement Skill Acquisition in Hockey	1	Elective
Total Credits = 16 (Compulsory = 14 and Elective = 02)			
Year II Semester II			
PED 22101	Foundation of Movement Skill Acquisition in Weightlifting	1	Compulsory
PED 22202	Practicum II: Teaching Methodology and Practice in TGFU Model	2	Compulsory
PED 22203	Health Behavior and Health Promotion	2	Compulsory
PED 22204	Curriculum Perspective and Issues in Physical Education	2	Compulsory
PED 22205	General Theory of Sports Training	2	Compulsory
PED 22206	Sports Biomechanics	2	Compulsory
PED 22207	Sports Nutrition	2	Compulsory
PED 22208	Statistics for Data Analysis	2	Compulsory
Total Credits = 15 (Compulsory = 15 and Elective = 00)			
Year III Semester I			
PED 31201	Teaching Outdoor Pursuits and Contemporary Activities	2	Compulsory
PED 31202	Traditional Sports and Sports Culture	2	Compulsory
PED 31203	Physical Education in Preschool to Tertiary Institution	2	Compulsory
PED 31304	Sport Administration and Human Resource Management	3	Compulsory
PED 31205	Advanced Theory of Sports Training	2	Compulsory
PED 31206	Sport Psychology	2	Compulsory
PED 31207	Research Methodology	2	Compulsory

PED 31208	Practicum III: Teaching Methodology and Practice in E5 Model	2	Compulsory
Total Credits = 17 (Compulsory = 17 and Elective = 00)			

Year III Semester II			
PED 32201	Specialization in Physical Education - I	2	Compulsory
PED 32202	Test, Measurement & Evaluation in Physical Education	2	Compulsory
PED 32203	Curriculum and Instruction in Physical Education	2	Compulsory
PED 32204	Sociology of Sports	2	Compulsory
PED 32205	Sport, Education Ethics & Law	2	Compulsory
PED 32206	Comparative Physical Education	2	Compulsory
PED 32207	Olympic Movement	2	Compulsory
PED 32208	Event Management	2	Compulsory
	One Credit to be selected from the following Subjects		
PED 32109	Sexual Health, Relationships and Sexualities	1	Elective
PED 32110	Politics, Economy and Policy in Sports and Physical Education	1	Elective
PED 32111	Strength and Conditioning	1	Elective
PED 32112	Drugs and Sports	1	Elective
Total Credits = 17 (Compulsory = 16 and Elective = 01)			
Year IV Semester I			
PED 41201	Specialization in Physical Education - II	2	Compulsory
PED 41202	Adapted Physical Education	2	Compulsory
PED 41203	Physical Literacy	2	Compulsory

PED 41204	Sport Facility Design	2	Compulsory
PED 41205	Science of Yoga and Relaxation	2	Compulsory
PED 41206	Community Service Project	2	Compulsory
PED 41207	Seminar in Physical Education	2	Compulsory
	Two Credits to be selected from the following Subjects		
PED 41108	Guidance & Counseling	1	Elective
PED 41109	Child and Adolescents Psychology	1	Elective
PED 41110	School Policy and Programs in Sri Lanka	1	Elective
PED 41111	Reflective Practices in Physical Education	1	Elective
Total Credits = 16 (Compulsory = 14 and Elective = 02)			
Year IV Semester II			
PED 42601	Research Project	6	Compulsory
PED 42202	Industrial Training	2	Compulsory
Total Credits = 08 (Compulsory = 08 and Elective = 00)			

Requirements for the completion of the Degree

i. Duration: **Four (04) years**

ii. Total Credits: **120 Credits**

iii. Research and Industrial Training: **8 Credits**

Semester	Compulsory (C)	Elective (E)	Total Credits
Year I Semester I	14	0	14
Year I Semester II	15	2	17
Year II Semester I	14	2	16
Year II Semester II	15	0	15
Year III Semester I	17	0	17
Year III Semester II	16	1	17
Year IV Semester I	14	2	16
Year IV Semester II	8	0	8
Total	**113**	**07**	**120**

Rules and Regulations

1. It is compulsory for the students to complete the Level I of the English Proficiency Course in order to obtain the B.Sc. Honors Degree in Physical Education. The other two levels of the course are optional.

2. Students should do the Community Service Project (PED 41206) relevant to Health and Physical Education promotion or Sports infrastructure development.

3. Industrial Training is a mandatory component of the Bachelor of Science Honors in Physical Education degree program. All students are required to successfully complete the Industrial Training course as a compulsory requirement to be eligible for the award of the degree. The training must be carried out in accordance with the instructions and guidelines provided in the Industrial Training Manual (PED 42202). Non-compliance with these guidelines may result in the delay or disqualification of degree completion.

4. Elective course unit will be offered provided a minimum of ten (10) of the registered students apply for the given course unit.

5. Students must follow the instructions and guidelines provided in the Specialization Manual (PED 32201 and PED 41201), which outlines the structure, selection process, subject requirements, assessments, and evaluation criteria. Adherence to these guidelines is essential.

Year I Semester I				
PED 11101	Foundation of Movement Skill Acquisition in Gymnastics	T	P	-
Introduces the basic principles and fundamental movements of gymnastics and evaluations of execution of performance. Topics include the history and development of gymnastics, basic body positions, movement patterns such as rolling, balancing, jumping, and simple floor exercises: forward rolls, backward rolls, handstands, and cartwheels. Explore basic apparatus skills on vault, balance beam (introductory), pommel horse, uneven bars and parallel bars. Safe teaching methodologies for beginners, including progressions, spotting techniques, and class organization.				
PED 11102	Foundation of Movement Skill Acquisition in Athletics (Track Events)	T	P	-
History of the athletics, Classification of track events, Layout of the track, Fundamental of the running, technical characteristics & skill progression of the sprints, starts of the race, middle & long distance running, relays, sprint hurdles, steeplechase, race walking, Important rules and regulations of running and race walking.				
PED 11103	Foundation of Movement Skill Acquisition in Volleyball	T	P	-
Introduction and history of volleyball, Basic rules and objectives of the game, Player positions and court markings, Fundamental movement skills: ready position, movement on court, jumping, landing, Basic techniques: underhand pass (dig), overhead pass (set), underhand serve, overhand serve, spike, block, Attacking and defending principles (basic concepts), Teaching methodology for beginners, Safety considerations and fair play				
PED 11104	Swimming & Life Saving	T	P	W
Introduction to swimming and the importance of water safety, basic water entry and exit techniques, floating and gliding skills, breathing control, and beginner-level swimming strokes, as freestyle, backstroke, and breaststroke. Essential life-saving and survival skills: treading water, sculling, the use of flotation aids, and basic rescue methods: throw and reach rescues. Recognize signs of drowning, safety protocols, and understand pool rules, etiquette, and the role of lifeguards.				
PED 11205	Fundamental Motor Skills and Minor Games	T	P	-
Introduction to FMS and Minor Games: Sequence of instruction, Critical FMS, Issues in teaching FMS. Fundamental motor skills and assessment: Classification of FMS, 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. Societal factors which influence the health and physical activity experiences of children across diverse contexts: Historical review, Games and their influence in bio psycho-social development during the pre-school and school stages, Important of games in the formation of values. Prepare games as an education and develop means: Appropriate selection of games, Teacher's roll as a leader of the game, Teaching pedagogy of games, developing game playing skill.				
PED 11206	Foundation of Physical Education	T	-	-

Introduction to Physical Education and Sport: Definitions and scope: physical education, sport, science, and management, Key conceptual foundations: reflective performer, equity, and inclusion. Philosophical and Psychological Foundations: Major philosophical schools and their influence on physical education: Basic psychological principles and human development in sport settings. Sociological Foundations: Role of sports in society, Issues of gender, class, ethnicity, and inclusion in physical education. Scientific Foundations: Introduction to exercise physiology and biomechanics, The contribution of scientific principles to performance and training. Historical Background of Global Sport and Physical Education: General history of sport: Ancient and Modern Olympics, Influence of social change and historical events on the development of sport. British Influence on Physical Education: Development of PE in England, British public-school traditions and Thomas Arnold's contribution, Emergence of games traditions and their diffusion across the empire.				
PED 11207	Professional Development	T	P	W
This course is designed to prepare first-year undergraduate students of the BSc in Physical Education for academic and professional success by focusing on essential personal, academic, and career-building skills. Key areas include career exploration, career development models, and the steps in career planning, providing students with a foundational understanding of how to shape their future pathways. Emphasis is placed on the development of a professional digital portfolio (LinkedIn profiles, personal blogs, or personal website), which students are required to compile and submit at the end of the course. The course also trains students in effective academic practices, including note-taking strategies, using AI tools ethically for learning, and understanding plagiarism and academic integrity. A critical component is the enhancement of English language and communication skills through interactive, creative methods such as drama, songs, role-plays and debates delivered through specialized coaching. The course structure is built around at least seven expert-led workshops, each focusing on one of the core areas: career development, digital portfolio building, AI and academic ethics, professional communication, and English language enhancement. A dedicated 20-hour practical based sessions on English role play, songs will be conducted by a professional, culminating in a student-led performance event as the final evaluation at the end of the semester, where students showcase their skills through role play, songs, and performances. This holistic course aims to build a confident, ethically responsible, and professionally equipped student ready for success in academic and physical education environments.				
PED 11308	Human Anatomy and Physiology	T	P	F
Introduction to Human Anatomy and Physiology, Cell Structure and Function, Muscular System, Skeletal System, Nervous System, Respiratory System, Circulatory System, Endocrine System, Digestive System, Urinary/Excretory System, Lymphatic System, Integumentary System, Reproductive System, Body Fluid, Homeostasis. (Follow the lab Manual for practical)				
PED 11109	General Fitness	T	P	-
Introduction to general fitness, Components of health-related fitness, Practical fitness activities (endurance, strength, flexibility, etc.), Monitoring and evaluation of fitness progress, Physiological responses to training, Fitness assessment methods, Basic nutrition for fitness, Planning individualized fitness programs.				
Year I Semester II				
PED 12101	Foundation of Movement Skill Acquisition in Netball	T	P	-

Introduction and history of netball, Basic rules and objectives of the game, Player positions and court markings, Fundamental movement skills: running, stopping, pivoting, jumping Basic techniques: passes, catching, shooting, attacking and defending principles, Teaching methodology for beginners, Safety considerations and fair play.				
PED 12202	Foundation of Movement Skill Acquisition in Athletics (Field Events)	T	P	W
Introduction, Classification of field events, Field event layouts & equipment, Fundamentals of jumps & throws, Skill and conditioning exercises, Games safety and organization, technical characteristics & skill progression of the long jump, triple jump, high jump, pole vault, shot put, discus throw, javelin throw, and hammer throw. Important rules and regulations of jumping and throwing.				
PED 12103	Aerobics and Rhythmic Activities	T	P	-
Introduction to aerobic and rhythmic activities, History and evolution of aerobics and rhythmic fitness, Importance and benefits of aerobic and rhythmic exercises, Principles of aerobic fitness and cardiovascular training, Basic rhythmic movement patterns and coordination, Low-impact and high-impact aerobics, Step aerobics and circuit-style aerobic routines, Muscle-toning and body conditioning exercises, Flexibility and cool-down techniques, Aerobics session planning and structuring, Teaching methods for rhythmic group fitness, Use of equipment in aerobic and rhythmic sessions, Safety, injury prevention.				
PED 12104	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 and application of sports kinesiology.				
PED 12205	First Aid and Injury Prevention in Sports	T	P	F
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 12206	Sports Exercise Physiology	T	P	-
Introduction to Sports Exercise Physiology, Energy Systems and Exercise Metabolism, Muscular System: Structure, Function, and Adaptation, Cardiovascular Response to Exercise, Respiratory Function During Exercise, Endocrine Response to Exercise, Fatigue, Recovery, and Thermoregulation, Basic Principles of Training and Performance Enhancement.				
PED 11207	Principals of Physical Education and Sports	T	-	-

Principles of Physical Education: Core principles, aims, and objectives of physical education, Holistic development: physical, mental, emotional, and social well-being. Development of Physical Education in Sri Lanka: Traditional physical activities and games before colonization, Impact of colonial rule on sport and PE (Portuguese, Dutch, British), Post-independence development of PE and national policies. Social Construction of Physical Education in Sri Lanka: Sociological perspectives, with reference to Ivor Goodson's work, Cultural, political, and institutional factors shaping PE systems. Contemporary Physical Education in Sri Lanka: Current practices in general education and higher education, Role of government, universities, and professional bodies, International Comparative Analysis. Overview of PE systems in: Europe and Asia.				
PED 12208	Information Technology	T	P	-
History and evolution of computers; Elements and functions of main computer components; Hardware and software overview; Classifications of computers by type and generations; Introduction to operating systems; Fundamental concepts of information systems; Basics of database systems; Introduction to computer networks; Overview of the Internet and World Wide Web; Productivity software skills including word processing (adding references, tables of content, reports), spreadsheets, database management software, and presentation tools; Introduction to sports analysis and performance analysis software; Creating and managing professional email accounts; Introduction to Google Scholar and other academic/professional online platforms.				
PED 12209	Data Literacy and Numerical Thinking	T	-	-
Arithmetic and Basic Mathematical Operations: addition, subtraction, multiplication, division, and order of operations; Mathematical Expressions and Basic Algebra: simplifying expressions, and solving simple and quadratic equations; Indices and Powers; Fractions, Decimals, and Percentages; Ratios and Proportions; Unit Conversions; length, mass, time, temperature, metric and imperial units; Straight line and Graphs; Averages: mean, median, and mode; Data and Data Visualization: bar graphs, pie charts, line graphs, and scatterplots; Introduction to Probability: basic concepts of probability; different approaches: theoretical, experimental (empirical), and subjective; measuring probability of events; conditional probability and Bayes' theorem.				
PED 12110	Foundation of Movement Skill Acquisition in Table Tennis	T	P	-
Introduction and history of table tennis, Objectives and basic rules of the game, Table dimensions, markings, and equipment specifications. Fundamental movement skills: stance, grip (shake hand and penhold). Basic strokes: forehand drive, backhand drive, push, serve, and footwork. Ball control and spin: understanding topspin, backspin, and sidespin. Serving techniques and rules. Basic tactics and strategies for singles and doubles play. Safety considerations and etiquette in table tennis. Introduction to basic officiating and scoring system.				
PED 12111	Foundation of Movement Skill Acquisition in Tennis	T	P	W
Introduction and history of tennis, Objectives and basic rules of the game, Court layout, markings, and equipment specifications. Fundamental movement skills: grip (Eastern, Western, Semi-Western), stance, and footwork. Basic techniques: forehand, backhand, serve, volley, and overhead. Rallying skills and consistency drills. Introduction to spin: topspin, backspin (basic understanding). Singles and doubles rules and court positioning. Basic offensive and defensive strategies. Teaching methodology for beginners (progressive				

instruction, drills, and feedback). Safety considerations and etiquette in tennis. Scoring system and basic officiating.				
PED 12112	Foundation of Movement Skill Acquisition in Badminton	T	P	-
Introduction and history of badminton, Objectives and basic rules of the game. Court layout, markings, and equipment (racket, shuttle, net). Fundamental movement skills: stance, grip (forehand, backhand), footwork patterns. Basic techniques: serve (short, long), clear, drop, smash, and net shot. Rallying techniques and shuttle control drills. Singles and doubles rules and court positioning. Basic offensive and defensive strategies. Teaching methodology for beginners (demonstration, drills, progressions). Skill development through lead-up games and practice routines. Safety considerations and injury prevention. Scoring system and basic officiating signals				
PED 12113	Foundation of Movement Skill Acquisition in Cricket	T	P	-
Introduction and history of cricket. Objectives and basic rules of the game. Field layout, pitch dimensions, and equipment used. Player roles and positions (batsman, bowler, fielder, wicketkeeper). Fundamental movement skills: running between wickets, fielding stance, catching technique. Basic batting techniques: grip, stance, front foot/back foot shots, defensive strokes. Basic bowling techniques: grip, run-up, action (pace and spin). Fielding skills: catching, throwing, ground fielding, and wicketkeeping basics. Introduction to singles, doubles, overs, and innings. Game formats: Test, ODI, T20 (basic understanding). Safety considerations and use of protective gear. Umpiring signals and basic officiating				
PED 12114	Foundation of Movement Skill Acquisition in Baseball	T	P	W
Introduction and history of baseball. Objectives and basic rules of the game. Field layout, positions, and equipment (bat, glove, ball, bases). Player roles and positions (pitcher, catcher, infielder, outfielder). Fundamental movement skills: running, sliding, catching, and throwing. Basic batting techniques: grip, stance, swing mechanics, and hitting drills. Basic fielding techniques: ground balls, fly balls, glove handling, and throwing accuracy. Pitching fundamentals: grip, windup, delivery, and release. Base running skills: sprinting, turning, and sliding techniques. Offensive and defensive strategies (introductory level). Safety considerations and use of protective equipment. Umpiring signals and basic officiating in baseball.				
PED 12115	Foundation of Movement Skill Acquisition in Elle	T	P	W
Introduction and history of Elle (Sri Lankan traditional sport). Objectives and cultural significance of the game. Field layout, equipment, and basic terminologies. Rules and regulations of Elle (batting, fielding, scoring, innings). Player roles and team structure. Fundamental movement skills: running, striking, throwing, catching. Basic techniques: underarm and overarm throws, hitting styles, base running. Fielding and defensive strategies (beginner level). Batting strategies and placement techniques. Safety measures and fair play principles.				
Year II Semester I				
PED 21101	Foundation of Movement Skill Acquisition in Basketball	T	P	-

Introduction and history of basketball, Objectives and basic rules of the game, Court markings, dimensions, and player positions, Fundamental movement skills: running, stopping, jumping, pivoting, Basic techniques: passing (chest, bounce, overhead), dribbling, shooting (set shot, layup, jump shot), Basic offensive and defensive skills and principles, Safety considerations, fair play, and teamwork, Basic officiating and signals.				
PED 21102	Foundation of Movement Skill Acquisition in Soccer	T	P	-
Foundational aspects of soccer, including the history and development of the game, its objectives, and the basic rules that govern play. Students will learn about the layout and dimensions of a standard soccer field, player roles and positions, and essential movement skills such as running, stopping, changing direction, and balance. Technical skill development focuses on ball control, passing (inside foot, instep), dribbling techniques, receiving/trapping, and basic shooting (instep drive, placement). The course also introduces fundamental offensive and defensive principles, promotes teamwork, fair play, and safety, and covers the basics of officiating and common referee signals.				
PED 21203	Practicum I: Teaching Methodology and Practice in Technical Model	T	P	-
Principles of Teaching Physical Education, Teacher and the teacher's role; Teachers' concern theory and check list; 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, Structure and Components of a PE Lesson Plan, Fundamental Movement Skills (FMS) and Motor Learning, Skill Acquisition Techniques (e.g., drills, command style), Observation and Analysis of Movement, Teaching Safety and Classroom Management, Assessment Tools for PE (rubrics, checklists), Micro-teaching sessions and peer feedback, 4-week school-based teaching practice (primary school preferred).				
PED 21204	Dance: Folk, Cultural and Classical	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 arrange of movement patterns: Group and Individual.				
PED 21205	Pedagogy in Physical Education	T	P	-
Introduction to pedagogy and its relevance in physical education, The role of the physical education teacher as a facilitator of learning, Learning theories and their application in physical education (behaviorism, constructivism, social learning, etc.), Instructional strategies and methods for different age groups and skill levels, Classroom and behavior management in PE settings, Creating inclusive physical education environments, Assessment and evaluation techniques in physical education, Use of feedback and questioning to enhance student learning, Motivation and engagement strategies in physical activity contexts, Differentiated instruction and adapting to diverse learners, Ethics and professional conduct in physical education teaching.				
PED 21206	Health and Physical Education	T	P	-
Introduction to health and its dimensions (physical, mental, emotional, social, and spiritual), Definition and importance of physical activity in promoting health and well-				

being, Relationship between physical activity, fitness, and health outcomes, Global and national guidelines for physical activity, Benefits of regular physical activity in preventing non-communicable diseases (NCDs), Components of health-related physical fitness: cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition, Lifestyle factors affecting health: nutrition, stress, sleep, substance use, Physical activity across the lifespan: children, youth, adults, older adults, Physical activity for special populations (e.g., persons with disabilities, chronic illnesses), Barriers and facilitators to physical activity participation.				
PED 21207	Education Psychology	T	P	-
Introduction to educational psychology, cognitive development (Piaget and Vygotsky), social and emotional development, moral and language development, individual differences, motivation in learning, learning theories (behaviorism, cognitivism, constructivism), Bloom's taxonomy, domains of learning (cognitive, affective, psychomotor), teaching strategies, classroom management, assessment and evaluation, educational measurement, inclusive education, application of psychology in teaching. 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	-
Introduction to statistics and probability: nature and scope, types of variables and data; Data Collection and Organization: methods, frequency tables, distributions; Data Summarization and Presentation: summary measures, graphs, and shapes of distributions; Random Variables and Probability Distributions: discrete and continuous random variables, binomial, Poisson, and normal distributions; Sampling Distributions: sampling concepts, sampling distribution of the sample mean, and Central Limit Theorem; Introduction to Statistical Software: data management, presentation, and describing data.				
PED 21109	Foundation of Movement Skill Acquisition in Judo	T	P	W
Foundational principles of judo, including its history, philosophy, objectives, and basic rules as defined by international standards. Standard judo mat layout, etiquette, and safety procedures essential for practice. Fundamental movement skills such as balance, posture, falling techniques, and basic gripping positions. Technical instruction includes introductory throwing techniques, hold-down techniques, and elementary escape movements. Emphasis is placed on discipline, respect, fair play, and the educational values of judo, alongside the understanding of basic officiating signals and scoring.				
PED 21110	Foundation of Movement Skill Acquisition in Karate	T	P	W
Fundamental concepts and history of Karate, its philosophy, objectives, and the basic rules followed in traditional and competitive practice. Proper etiquette, stances and movement coordination. Basic punches, kicks, blocks, and introductory kata to develop control, balance, and precision. It also covers basic kumite (sparring) drills in a safe and controlled environment, emphasizing discipline, respect, self-control, fair play, and awareness of safety protocols. Basic officiating signals and scoring methods used in competitions are also introduced.				
PED 21111	Foundation of Movement Skill Acquisition in Rugby	T	P	W

Fundamentals of rugby, including the origin and development of the game, its objectives, and the basic rules as governed by World Rugby. Field layout, dimensions, player roles, and team formations. Emphasis is placed on developing fundamental movement skills such as running, evasion, support play, and safe falling techniques. Technical instruction includes basic passing (lateral and spin pass), catching, tackling fundamentals, ball handling, and simple kicking techniques. Introductory offensive and defensive strategies, promotes teamwork, safety, and fair play, and introduces basic officiating signals and player conduct expectations.				
PED 21112	Foundation of Movement Skill Acquisition in Hockey	T	P	W
Foundational elements of field hockey, including the history and development of the game, its objectives, and the basic rules governed by the International Hockey Federation (FIH). Layout and markings of a standard hockey field, player positions, and essential safety measures. Fundamental movement and technical skills covered include grip techniques, ball control, dribbling (straight and zig-zag), push pass, hit, flick, and basic tackling. Offensive and defensive principles, positioning, and small-sided game play to promote tactical awareness. Emphasis is placed on teamwork, fair play, and basic officiating signals and rules interpretation.				
Year II Semester II				
PED 22101	Foundation of Movement Skill Acquisition in Weightlifting	T	P	W
Introduction and history of weightlifting as a sport, Fundamental movement patterns and body mechanics, Equipment familiarization: barbells, plates, collars, platforms, Warm-up and flexibility exercises specific to weightlifting, Teaching and learning basic techniques of the Snatch: grip, setup, pull, catch, and recovery, Teaching and learning basic techniques of the Clean & Jerk: grip, clean, front squat, jerk phases, Safety considerations and injury prevention in weightlifting, Strength and conditioning principles relevant to weightlifting, Common faults and corrective techniques, Introduction to competition rules and weight categories.				
PED 22202	Practicum II: Teaching Methodology and Practice in TGFU Model	T	P	F
Game Sense Pedagogy: Concepts and Application, Teaching games for understanding (TGFU): Six-Step Model and Modified Games, Teaching Invasion, Net/Wall, Striking/Fielding Games, Tactical Decision-Making and Skill Adaptation, Differentiated Instruction in PE, Peer Assessment and Feedback Strategies, Integration with Health and Life Skills Education, Designing Inclusive Game-based Lessons, 5-week teaching practice in school settings (secondary level).				
PED 22203	Health Behavior and Health Promotion	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. Introduction to Health promotion, Health Promotion Strategies and Approaches, Planning and Implementing Health Promotion Programs.				

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 linear and angular kinetics; The Newton's laws of motion; 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. (Reference Manual for PED 22206 Sport Biomechanics)				
PED 22207	Sports Nutrition	T	-	-
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 22208	Statistical Data Analysis	T	P	-
Introduction to Inference: point and interval estimation, hypothesis testing principles; Hypothesis Tests: tests for mean, proportions, and variance; Experimental Design: strategy of experimentation, basic principles, single-factor experiments; Analysis of Variance (ANOVA): CRD, and RCBD, mean comparison methods, factorial experiments; Nonparametric Statistics: single sample tests, two-sample tests, multiple sample tests, and rank correlation; Correlation and Linear Regression: introduction and basic concepts; Use of Statistical Software: hypothesis testing, confidence interval construction, analysis of rank data, analysis of simple and factorial experiment data.				
Year III Semester I				
PED 31201	Teaching Outdoor Pursuits and Contemporary Activities	T	P	W/F
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, Logistics and Preparations; Outdoor Recreation				

Consortium Non-Perial Mountains, Natural Resource Park, Camping, Practical applications in adventurer sports.				
PED 31202	Traditional Sports and Sports Culture	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. Introduction to Sports Culture: Definition and scope of sports culture, The role of culture in shaping sport and physical activity, Cultural values, beliefs, and ideologies in sport. Historical Development of Sports Culture: Traditional and indigenous games, Influence of colonization on sport, Globalization and the evolution of modern sport. Sport and Identity: National identity and patriotism through sport, Gender and sexuality in sport culture, Race, ethnicity, and class in sport participation and representation. Sport and Media: Role of media in constructing sports culture, Commercialization and commodification of sport, Representation of athletes and sports in media. Fan Culture and Spectatorship, Sociology of fans and fandom, Rituals, symbols, and community in sports spectatorship, Fan violence and hooliganism.				
PED 31203	Physical Education in Preschool to Tertiary Institution	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 Asia and Europe context; Physical education at present in the world; Comparison of physical education systems in deferent countries mentioned above with Sri Lankan system. Field trips: 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 trip to Ministry of Higher Education/ University Grant Commission to study physical education in higher educational institution in Sri Lanka.				
PED 31304	Sport Administration & Human Resource Management	T	-	-
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. Future directives of the Sport Administration. Principles, structure and leadership of the sport organizations: Structure of major Games organizing: Player management in sports; supporting athletes, athletes and commercialization, 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.				
PED 31205	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 31206	Sport Psychology	T	P	-
Fundamental psychological principles influencing athletic performance, motivation, and well-being in sports and physical education contexts: motivation theories, goal setting, arousal regulation, mental imagery, concentration, and confidence building. Impact of stress, anxiety, and burnout on athletes, along with coping strategies and resilience development. Group dynamics, leadership, communication skills, and the psychological aspects of injury and rehabilitation. Practical components involve applying psychological techniques to enhance performance and athlete mental health within coaching and teaching settings.				
PED 31207	Research Methodology	T	-	W
Definition of research and science, methods of inquiry, scientific method, characteristics and types of research (methods and designs); qualitative, quantitative, and mixed-method research; ethics of research; the research process including problem identification, literature review, hypothesis formulation, research design, data collection, data analysis, interpretation of results, and conclusion formation; writing research proposal, abstract, and review paper with emphasis on standard templates, structure, and formatting guidelines.				
PED 31208	Practicum III: Teaching Methodology and Practice in E5 Model	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).				
Year III Semester II				
PED 32201	Specialization in Physical Education - I	T	P	W
Overview of the chosen specialization area, Advanced concepts, theories, and current trends, applied practical sessions tailored to the specialization, Introduction to research and project work within the specialization, Reflective practice and professional development in specialization context. (Reference Manual for PED 32201 Specialization in PE - I)				
PED 32202	Test, Measurement & Evaluation in Physical Education	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	Curriculum and Instruction in Physical Education	T	-	W

Introduction to Curriculum Studies in Physical Education: Definitions, purposes, and scope of curriculum in PE, Curriculum vs. syllabus in educational planning. Philosophical and Theoretical Foundations of Curriculum, Behaviorist, humanistic, and constructivist influences, National curriculum philosophy and PE's role in general education. Curriculum Models in Physical Education, Discipline-based, Sport Education, Concept-based, and Long-Term Athlete Development (LTAD), Comparing Asian and European PE curriculum structures. PE Curriculum Design and Development Process, needs analysis, stakeholder consultation, and curriculum planning stages, Setting aims, learning outcomes, and horizontal/vertical alignment. Curriculum Mapping and Alignment, linking subjects to Program Learning Outcomes (PLOs), Aligning PE curriculum with SLQF and national standards. National and International Policy Influences, PE in general education reforms, WHO and UNESCO guidelines on quality PE, Interpreting curriculum documents and policy briefs. Evaluation and Reform of PE Curricula, Tools and methods for curriculum evaluation, Feedback from stakeholders: students, teachers, employers, Adapting curriculum to contemporary challenges (e.g., obesity, digitalization, inclusion).				
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 relatingto 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	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 trips: 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 trip to Ministry of Higher Education/ University Grant Commission to study physical education in higher educational institution in Sri Lanka.				
PED 32207	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 32208	Event Management	T	-	
Introduction to Event Planning in PE: Types of events in school and community PE settings, Objectives and benefits of organizing PE-related events, Roles and responsibilities in event teams. Steps in Planning a PE/Sports Event: Event conceptualization and goal setting, Designing event proposals and action plans, Timeline development and task allocation. Organizational Structure and Team Management: Committees (e.g., logistics, media, registration, first aid, technical), Volunteer recruitment and role distribution, Coordination and communication strategies. Estimating costs and preparing budgets, Sourcing equipment and sponsorship, Procurement and inventory tracking. Venue, Equipment, and Risk Management: Venue inspection and layout planning, Safety planning and emergency protocols, Legal and ethical considerations. Marketing, Promotion, and Communication: Creating promotional materials (digital and print), Using social media for event outreach, Communication with participants and stakeholders. On-Site Event Execution. Post-Event Evaluation and Reporting. Event plan for selected sport competitions (case study or practical engagement).				
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	Politics, Economy and Policy in Sports and Physical Education	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 32111	Strength and Conditioning	T	-	

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 32112	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, 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 41201	Specialization in Physical Education II	T	P	W
Advanced applied methodologies and techniques, Specialized project or case study work, Integration of theory and practice in real-world contexts, Leadership, ethics, and professionalism within the specialization, Preparation for career and further education pathways. (Reference Manual for PED 41201 Specialization in PE - II)				
PED 41202	Adapted Physical Education	T	P	-
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 41203	Physical Literacy	T	P	W
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 and physical fitness.				
PED 41204	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				

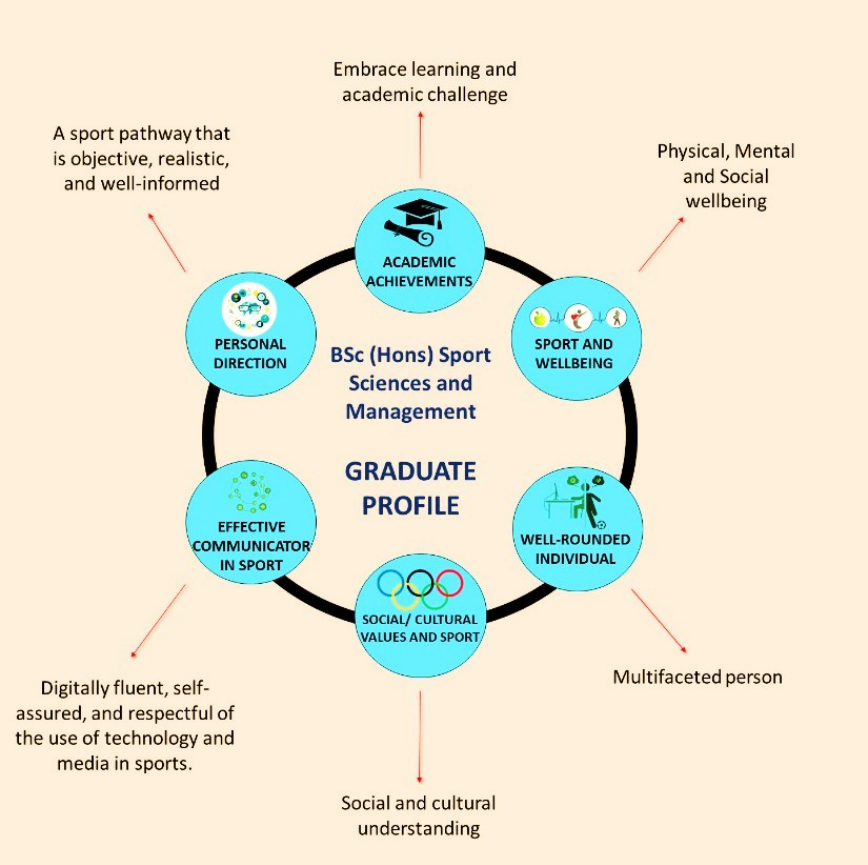
to the measuring equipment, Errors of measurement, Drawing track and field facilities and different court layouts.				
PED 41205	Science of Yoga and Relaxation	T	P	W
Introduction, Basic technique and practice of yoga, Breath control (pranayama), Meditation techniques, Physical postures (yoga asana), Mantras (sacred chants) and Philosophical and religious scriptures, Yoga sutras.				
PED 41206	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 41207	Seminar in PE	T	P	W
Introduction to seminar practice including the purpose and importance of seminars in PE; selecting relevant topics related to PE, sport, health, or pedagogy; researching current issues and emerging trends; seminar preparation and content development including structuring content (introduction, main body, practical application), using evidence-based literature, data, and best practices, and designing supporting materials such as presentations, posters, and handouts; developing oral presentation skills focusing on voice projection, clarity, body language, managing questions, interactive dialogue, time management, and audience engagement. The course includes at least five expert-led workshops covering these key areas, with each session followed by student-led seminar preparation and presentation. Students will engage in peer review, reflective practice, and rehearsals, culminating in a final seminar event where each student delivers a comprehensive presentation demonstrating their research, analytical, and communication skills.				
PED 41108	Guidance & Counseling	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				
PED 41109	Child and Adolescents 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 41110	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 41111	Reflective Practices in Physical Education	T	P	W
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.				
Year IV Semester II				
PED 42601	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 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 establish links with relevant organizations during the first semester 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	P		
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.				

Degree Programme (SSM)

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 Sciences 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 sciences and sport management programmes in professional and sport coaching/teaching contexts.
- Skillful leaders in the field of sport.
- Responsible citizens who are ethical and professional in action.

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 subject code respectively. Example: The course code of SSM 12308 denotes the following.

Degree Program	Year	Semester	No. of Credits	Subject Code
Sport **S**ciences and **M**anagement	**1**	**2**	**3**	**08**

Summary of the Course

YEAR I SEMESTER I			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 11101	Foundation of Sport Sciences and Management	1	Compulsory
SSM 11302	Foundation of Professional Development	3	Compulsory
SSM 11203	Foundation of First Aid in Sport	2	Compulsory
SSM 11104	Movement Concepts, Skill Analysis, Performance, and Practices in Gymnastics	1	Compulsory
SSM 11105	Movement Concepts, Skill Analysis, Performance, and Practices in Swimming & Life Saving	1	Compulsory
SSM 11106	Movement Concepts, Skill Analysis, Performance, and Practices in Athletics (Track Events)	1	Compulsory
SSM 11107	Movement Concepts, Skill Analysis, Performance, and Practices in Basketball	1	Compulsory
SSM 11108	Movement Concepts, Skill Analysis, Performance, and Practices in Volleyball	1	Compulsory
SSM 11209	Basic of Mathematics	2	Compulsory
SSM 11210	Human Anatomy	2	Compulsory
SSM 11211	Introduction to Sport Management	2	Compulsory
Total Credits = 17			

YEAR I SEMESTER II			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 12201	Fundamental Motor Skills	2	Compulsory
SSM 12102	Movement Concepts, Skill Analysis, Performance, and Practices in Athletics (Field Event-Jump)	1	Compulsory
SSM 12103	Movement Concepts, Skill Analysis, Performance, and Practices in Netball	1	Compulsory
SSM 12104	Movement Concepts, Skill Analysis, Performance, and Practices in Soccer	1	Compulsory
SSM 12305	Exercise Biochemistry	3	Compulsory
SSM 12206	Basic Physics	2	Compulsory
SSM 12207	Human Physiology	2	Compulsory
SSM 12208	Olympic Movement and Olympism	2	Compulsory
SSM 12109	Introduction to Information Technology	1	Compulsory
One credit to be selected from the following elective subjects			
SSM 12110	Traditional Sport and Sport Culture in Sri Lanka	1	Elective
SSM 12111	Sport for Differently Abled Persons	1	Elective
Total Credits = 16			

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-Throw)	1	Compulsory
SSM 21102	Movement Concepts, Skill Analysis, Performance, and Practices in Weightlifting	1	Compulsory
SSM 21203	Fundamentals of Statistics	2	Compulsory
SSM 21204	Education Psychology	2	Compulsory
SSM 21205	Introduction to Sport Biomechanics	2	Compulsory
SSM 21206	Concepts of Sport Event Management	2	Compulsory

SSM 21207	Sport Facility Design and Management	2	Compulsory
SSM 21108	Kinesiology	1	Compulsory
One credit to be selected from the following elective subjects			
SSM 21109	Movement Concepts, Skill Analysis, Performance, and Practices in Table Tennis	1	Elective
SSM 21110	Movement Concepts, Skill Analysis, Performance, and Practices in Tennis	1	Elective
SSM 21111	Movement Concepts, Skill Analysis, Performance, and Practices in Badminton	1	Elective
One credit to be selected from the following elective subjects			
SSM 21112	Movement Concepts, Skill Analysis, Performance, and Practices in Rugby	1	Elective
SSM 21113	Movement Concepts, Skill Analysis, Performance, and Practices in Hockey	1	Elective
Total Credits = 15			

YEAR II SEMESTER II			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 22201	Sport Physiology	2	Compulsory
SSM 22202	Sport Injury Prevention and Rehabilitation	2	Compulsory
SSM 22203	Theory and Methodology of Sports Training	2	Compulsory
SSM 22204	Practicum 1: Teaching Methodology	2	Compulsory
SSM 22205	Human Resource Management in Sport and Leisure	2	Compulsory
SSM 22206	Design of Experiments and Analysis	2	Compulsory
SSM 22207	Marketing Approaches in Managing Sports	2	Compulsory
One credit to be selected from the following elective subjects			
SSM 22108	Movement Concepts, Skill Analysis, Performance, and Practices in Judo	1	Elective
SSM 22109	Movement Concepts, Skill Analysis, Performance, and Practices in Wrestling	1	Elective

One credit to be selected from the following elective subjects			
SSM 22110	Movement Concepts, Skill Analysis, Performance, and Practices in Cricket	1	Elective
SSM 22111	Movement Concepts, Skill Analysis, Performance, and Practices in Elle	1	Elective
Total Credits = 16			

YEAR III SEMESTER I			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 31201	Exercise Physiology	2	Compulsory
SSM 31202	Sport Biomechanics	2	Compulsory
SSM 31303	Sport Nutrition	3	Compulsory
SSM 31204	Sport Psychology	2	Compulsory
SSM 31105	Long Term Athlete Development	1	Compulsory
SSM 31206	Advanced Theory and Methodology of Sports Training	2	Compulsory
SSM 31207	Statistical Modelling and Survey Methods	2	Compulsory
SSM 31208	Legal Perspectives in Managing Sport	2	Compulsory
One credit to be selected from the following elective subjects			
SSM 31109	Movement Concepts, Skill Analysis, Performance, and Practices in Sport Aerobic	1	Elective
SSM 31110	Movement Concepts, Skill Analysis, Performance, and Practices in Fitness Aerobic	1	Elective
Total Credits = 17			

YEAR III SEMESTER II			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 32201	Sport Media and Communication	2	Compulsory
SSM 32202	Outdoor Recreation and Leadership	2	Compulsory

SSM 32203	Practicum II: Teaching Methodology and Practice	2	Compulsory
SSM 32204	Test, Measurement, and Evaluation of Physical Activity	2	Compulsory
SSM 32205	Research Methods and Design in Physical Activity and Sport	2	Compulsory
SSM 32206	Financial Management in Sport Organization	2	Compulsory
SSM 32207	Sport Sociology and Community Service	2	Compulsory
SSM 32208	Sport Technology, Innovation, and Entrepreneurship	2	Compulsory
Two credits to be selected from the following elective subjects			
SSM 32209	Specialization I: Sport Training	2	Elective
SSM 32210	Specialization I: Sport Psychology	2	Elective
SSM 32211	Specialization I: Sport Management	2	Elective
SSM 32212	Specialization I: Applied Biomechanics	2	Elective
Total Credits = 18			

YEAR IV SEMESTER 1			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 41201	Exercise Prescription	2	Compulsory
SSM 41202	Practicum III: Teaching Practice	2	Compulsory
SSM 41303	Sport Administration	3	Compulsory
SSM 41204	Tourism Promotion Through Sport and Leisure	2	Compulsory
One credit to be selected from the following elective subjects			
SSM 41105	Digital Society and Sport Application	1	Elective
SSM 41106	Nutrition Periodization	1	Elective
SSM 41107	Science of Yoga and Relaxation	1	Elective
Three credits to be selected from the following elective subjects			
SSM 41308	Specialization II: Sport Training	3	Elective
SSM 41309	Specialization II: Sport Psychology	3	Elective
SSM 41310	Specialization II: Sport Management	3	Elective
SSM 41311	Specialization II: Applied Biomechanics	3	Elective
Total Credits = 13			

YEAR IV SEMESTER II			
Course Code	**Course Title**	**Credits**	**Compulsory or Elective**
SSM 42601	Final Year Research Project	6	Compulsory
SSM 42202	Industrial Training	2	Compulsory
Total Credits = 08			

Summary of Credits Required

	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	17	15	13	14	16	16	9	8
Credited and Elective courses	0	1	2	2	1	2	4	0
Total credits	**33**		**31**		**35**		**21**	
Total credits for the degree programme	**120**							

Detail Syllabus

Abbreviations

CA - Continues Assessment

F - Field visits

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 - Pre Requisite Course

T - Theory

TH - Thesis

W - Workshops

WAG - Women's Artistic Gymnastics

Rules and Regulations
Sports Practical and Specialization

Student can be selected for Specialization-I and the same area will be continued in Specialization-II according to the availability of specialized lecturers (internal or external). Though students select specialization subject, which can named Sport Training, Sports Psychology Sport Management, and Applied Biomechanics. In the Sport Training, sport from the MCSAPP subjects, categorized as group games (Cricket/Elle, Netball, Rugby/Hockey, Soccer, Basketball and Volleyball) and individual games (Athletics, Gymnastics, Judo/Wrestling, Aerobics, Swimming and Lifesaving, and Tennis/Table Tennis/Badminton) can be selected. The Specialization subject will be offered to provide a minimum of 8 of the registered students applies for specialization-I. 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' requirements considering the course ILOs of sport in Specialization-I. The Department will provide visiting lecturers for Specialization subjects if a minimum of ten (10) of the registered students apply for specialization I.

Department will finalize the specialization offering subjects with the concern of senior lecturers who are engaged in Specialization subjects and MCSAPP courses. Students have to do the research project interact with the specialization with the approval of the department. If necessary to evaluate student theoretical knowledge of specialization I & II, the theory-based evaluation will be introduced by 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 practical (MCSAPP and Specialization in Sport Training) 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 who has an absent from the practical session.

Pre Requisite Courses

Pre Requisite Courses (PRC) students must have taken 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 specialization area.

In the first academic year, most of the subjects consist of basic science and the 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.

English Proficiency

It is compulsory for the students to complete the Level I of the English Proficiency Course in order to obtain the B.Sc. Honours Degree Programm in Sport Sciences and Management. The other two levels of the course are optional.

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 for any classes or 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 lectures (theory and practical) with the concern of senior lecturers.

Requirements for the Completion of the Degree

- Students should earn a total of 120 credits to be eligible for the award of BSc Honours in Sport Sciences and Management. Optional courses other than MCSAPP and Specialization 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 for the General English Level I Programmes is also a requirement for the award of the B.Sc. Honours Degree in Sport Sciences and Management. General English Level II and Level III is a non-compulsory (optional) course module. Students who wish to enhance their English skills further may choose to enroll voluntarily, and upon successful completion, a separate certificate of achievement will be awarded.

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, and Foundation of Professional Development courses must include a minimum of 3 CA and the lecturer may increase the number of CA according to the 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 2 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 the 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 applies 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.

Major Areas of the Curriculum

Basic Sciences – Anatomy, Basic Mathematics, Basic Physics, Basic Physiology, Design of Experiments and Statistical Methods, Fundamentals of Statistics, Introduction to Biomechanics, Kinesiology, Statistical Modelling and Survey Methods.

Sports Sciences – Applied Biomechanics, Exercise Biochemistry, Exercise Physiology, Exercise Prescription, Fundamental Motor Skills, Foundation of First Aid in Sport, Sport Injury and Prevention, Sport Biomechanics, Sport Injury & Prevention, Sport Nutrition, Sports Physiology, Sport Psychology, and Test, Measurement and Evaluation of Physical Activity.

Sport Management –Foundation of Sport Science and Management**,** Introduction to Sport Management**,** Olympic Movement and Olympism, Concept of Sport Event Management, Outdoor Recreation & Leadership, Marketing Approaches in Managing Sports, Tourism Promotion Through Sport and Leisure, Introduction to Sport Management, Human Resource Management in Sport and Leisure, Accounting and Financial Management, Sport Administration, Concept of Sport Event Management, Sport Media and Communication, Sport Facility Design and Management, Specialization in Sports Management I, and Specialization in Sports Management II.

Social Sciences –Sport Sociology and Community Service, Traditional Sports and Sport Culture in Sri Lanka.

Coach Education – General Fitness, Foundation of Professional Development, Movement Concept, Skill Analysis, Performance and Practices, Fundamental Motor Skills and Practices of Games, Fitness Aerobics, Sport Aerobics, Theory and Methodology of Sports Training, Advanced Theory and Methodology of Sports Training, Sport Education Model & Game Sense Approach, Advanced Practicum, Long Term Athlete / Player development (LTAD), Sports for Differently Abled Persons, Education Psychology, Practicum: Teaching Methodology and Teaching Practice, Science of Yoga and Relaxation, Specialization in Sports Training I, Specialization in Sports Training II, Specialization in Applied Biomechanics I, and Specialization in Applied Biomechanics II, Specialization in Sports Psychology I, Specialization in Sports Psychology II.

Technological Subjects - Introduction to Information Technology, Digital Society & Sport Application and Sport Technology, Innovation and Entrepreneurship.

Research and Communication- Research Methods and Design in Physical Activity and Sport, B.Sc. Research Project in Sport Sciences and Management, and Industrial Training.

Weightage for subject allocation based on the notional learning hours

Science and Technology	12%
Sports Sciences	20%
Sport Management	20%
Social Sciences	01%
Coach Education	26%
Soft Skills and Scientific Communication	20%

Detailed Syllabus

Year I Semester I				
SSM 11101	Foundation of Sport 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 11302	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 11203	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-Requisite: 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	W

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: (Expert in the field): Measurements in field and event management for the school National level competition.
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	W

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	F

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, Integumentary system, Urinary System, Digestive system, Reproductive system, Sensory organs of the human body, Embryology.

Field visit: (By subject lecturer or internal or external expert in the field): Arrange for real exposure to observe the dissection of human body.

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

Year I Semester II

SSM 12201	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	W

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.

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: (Expert in the field): Measurements in field and event management for the school National level competition.

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 personal 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	W
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, Integumentary 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 12110	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 12111	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				

Year II Semester I				
SSM 21101	Movement Concepts, Skill Analysis, Performance, and Practices in Athletics (Field Event-Throw)	T	P	W

Movement Concept:
Sport Movement Concept will be covered in main four concepts: body awareness, special awareness, space, and relationship of Athletics (Field Event-Throw) movements.

Skill Analysis:
Skill analysis for Athletics (Field Event-Throw) movements will be analyzed according to the updated Athletics Technical Manual which is introduced by World Athletics.

Performance:
Selected Athletics (Field Event-Throw) 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: (Expert in the field): Measurements in field and event management for the school National level competition.

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	W

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	-	-

The course includes the study of developmental theories (Piaget, Vygotsky, Erikson), individual differences (intelligence, learning styles), motivation, learning theories (behaviorism, constructivism), Bloom's taxonomy, learning domains, instructional design, classroom and behavior management, assessment and evaluation, educational measurement, and inclusive education.

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	P	W

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.

Workshop: (Expert in the field): Measurements in field and event management for the School and National level competition.

SSM 21108	Kinesiology	T	P	W

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

Workshop: (Expert in the field): Usage of concepts in Kinesiology for sport & exercise training.

PRC: 11210 Human Anatomy

SSM 21109	Movement Concepts, Skill Analysis, Performance, and Practices in Table Tennis	T	P	W

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 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 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 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.

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 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): Strategic 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	W

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 (by an expert in the field): Strategic coaching methods and player management, umpiring and event management, of national and school level Rugby will be addressed.
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	W
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	W
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 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 22109	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 defense, 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 defense, 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	Movement Concepts, Skill Analysis, Performance, and Practices in Cricket	T	P	W

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 22111	Movement Concepts, Skill Analysis, Performance, and Practices in Elle	T	P	W

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 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 31204	Sport Psychology	T	P	W
The course explores the psychological foundations of sport, focusing on how mental factors influence performance. Topics include motivation, confidence, arousal, concentration, group dynamics, mental imagery, aggression, and the psychological aspects of injury. Students learn practical tools used in mental skills training and gain insights into applying sport psychology in training, coaching, and recovery contexts.				

SSM 31105	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 31206	Advanced Theory and Methodology of Sport Training	T	P	W
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 31207	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 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 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 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 32202	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 32203	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 32204	Test, Measurement, and Evaluation of Physical Activity and Sport	T	P	-

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 32205	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 32206	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 32207	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 32208	Sport Technology, Innovation, and Entrepreneurship	T	P	W
This course introduces fundamental topics related to sport technology, innovation and entrepreneurship. Structure of Mind Map, 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				

SSM 32209	Specialization I: Sport Training	T	P	W
The following topics will be covered, Introduction to the Coaching Process (Role of the Coach, the code of ethics of the coaches), Tactics & Different type of individual sport/game situation drills, Formation systems (Attacking, Defensive & Individual Strategies). Match Systems, Planning of training, Training Sessions, Statistics especially for the sport. 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.

SSM 32210	Specialization I: Sport Psychology	T	P	W

Introduction to the subjects: Applied psychological principles such as motivation, emotional control, and resilience, while also highlighting the philosophical role of mental strength in sports.

Ethics and practices: Coaches and psychologists must follow ethical standards and play a key role in shaping athletes' psychological readiness through positive behavior and communication.

Applied theories, training and Therapies for issues: General psychological preparation focuses on building core mental skills, while special preparation targets sport-specific mental demands. Techniques include relaxation, visualization, self-talk, and goal setting. Both traditional and modern methods such as PST (Psychological Skill Training) CBT (Cognitive Behavioral Training), REBT (Rational Emotive Behavioral Therapy), and mindfulness are used to enhance mental fitness and performance during training and competition.

PCR: SSM 21204 Education Psychology or SSM 31204 Sport Psychology

SSM 32211	Specialization I: Sport Management	T	P	W

Sport Governance and Policy Development: The structure and functioning of sport governance in Sri Lanka and compares it with global governance models. Students will critically examine how national and international governing bodies operate, and how effective governance contributes to transparency, accountability, and athlete development. Emphasis is placed on the development of sustainable sport policies that promote national development, inclusion, and community well-being.

Strategic Leadership and Sport Organization Management: Develop key competencies in strategic planning, decision-making, and leadership within sport organizations. Topics include organizational vision and mission setting, performance evaluation, and ethical leadership. This section equips learners with practical tools to manage sport institutions efficiently and to address real-world challenges using data-driven strategies.

Athlete Development and Community Engagement: Focuses on the FTEM (Foundation, Talent, Elite, Mastery) framework to understand athlete development pathways. Students will explore the role of community sport in talent identification and inclusion, with a strong focus on promoting equity and access across all levels of sport. Engagement with diverse communities and stakeholder networks will help foster practical insights into grassroots and elite sport development.

Applied Learning, Research, and Contemporary Issues: The final section integrates applied learning through case studies, fieldwork, and interaction with government bodies, NGOs, federations, and private sector entities. Students will explore specialized topics such as sport tourism, athlete welfare, and emerging global trends like digitalization and esports. The module culminates in a capstone project proposal that allows students to apply research methods to a real-world problem in sport management.

PCR: SSM 21206 Concepts of Sport Event Management or SSM 21207 Sport Facility Design and Management or SSM 22207 Marketing Approaches in Managing Sports

SSM 322112	Specialization I: Applied Biomechanics	T	P	W
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				

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	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 41204	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 41105	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 41106	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				

SSM 41107	Science of Yoga and Relaxation	T	P	-
Etymology, meaning and misconceptions yoga, Importance and aims and Yoga, Ethics & Yoga, Yoga in Vedas, Karmuyoga, Bhukthiyoga, Rajayoga, Hathayoga, Pathanjali yogassutra, Health education, Yoga food, Exercise system, Suryanamaskaraya,				

Asana's (Standing Asana, Sitting position asana, Lying position asana, Supine position asana, Yoga therapy) Pranayama and Dhyana (Mediation), Deeper breathing, Yogic breathing, Nadishodhya pranayama, Shetkari kumbha), Kriya Mudra, Dhyam, Yoga and Sport.

SSM 41308	Specialization II: Sport Training	T	P	W

The following topics will be covered: Refereeing & officiating, coaching practice (advanced training methods, coaching of the match and coach's behavior), performance analysis (different evaluation of techniques , tactics & match analysis, movement and skill analysis), psychological practice (motivation and coaching, mental skills training and evaluation), and nutrition planning & application. Students need to continue specializing in 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 project), and students need to submit the project report with a presentation. The department organizes workshops relevant to particular sports.

Note: Students need to continue specializing in the same subject and sport that they selected in specialization I.

PCR: SSM 32209 Specialization I: Sport Training

SSM 41309	Specialization II: Sport Psychology	T	P	W

Problem identification and planning: Building upon the theoretical foundation established in Specialization I, this module focuses on the practical application of sports psychology in real-world sporting environments. Through case-based learning, students will critically analyze complex psychological issues such as athlete burnout, aggression, anxiety, stress, doping behavior, performance slumps, injury rehabilitation, and challenges in team cohesion.

Implementation: The course emphasizes the use of evidence-based approaches, particularly Cognitive Behavioral Therapy (CBT) and Rational Emotive Behavioral Therapy (REBT), to address these issues effectively. Students will be guided through the process of identifying key psychological concerns in sport contexts, developing intervention proposals, and planning practical applications. Course components include an introduction to course objectives and planning, a recap of PST (Psychological Skills Training), CBT, and REBT, issue identification in sports psychology, proposal writing based on identified problems, fieldwork experience, progress discussions through group collaboration, report writing, and preparation for a final presentation.

The module simulates the role of a practicing sport psychologist, encouraging students to engage with athletes, coaches, and sport organizations, and to apply critical thinking and evidence-based decision-making throughout the learning process.

Note: Students need to continue specializing in the same subject that they selected in specialization I.

PCR: SSM 32210 Specialization I: Sport Psychology

SSM 41310	Specialization II: Sport Management	T	P	W

Introduction: Critical issues in sport management through a case-based and research-oriented learning approach. It emphasizes real-world application, encouraging students to analyze current challenges, apply management theories, and evaluate decision-making in various sport contexts. The course is designed to develop students' capacity to generate evidence-based, sustainable, and context-specific solutions that address both national priorities and community needs in Sri Lanka and beyond.

Theoretical Foundations and Issue Identification: Introduction to course objectives and a review of key theories relevant to sport management, governance, and policy. Using these theoretical frameworks, students will analyze case studies of local and international sport management issues. They will then identify a current issue within Sri Lanka's sport context to investigate further.

Proposal Development and Case Studies: After selecting their topic, students will prepare a proposal that outlines the issue, background context, objectives, and expected outcomes. Guided by their proposal, students will conduct a mini research project/case studies using qualitative or mixed-methods approaches such as interviews, document reviews, or surveys. This process includes stakeholder engagement to gather insights from sport organizations, athletes, or community members.

Fieldwork, Analysis, and Presentation: Students will participate in fieldwork activities aligned with their mini research. They will engage in group discussions to reflect on progress, share findings, and receive feedback. The course culminates in the submission of a written report and a final presentation where students demonstrate critical analysis, practical understanding, and strategic thinking in addressing the selected issue.

Note: Students need to continue specializing in the same subject that they selected in specialization I.

PCR: SSM 32211 Specialization I: Sport Management

SSM 41311	Specialization II: Applied Biomechanics	T	P	W

Sport Specific Performance analysis: Sprinting and acceleration mechanics, Throwing and striking biomechanics (cricket, baseball, tennis), Jumping and landing mechanics (volleyball, basketball);

Common sports injuries: ACL, shoulder dislocations, stress fractures, Mechanisms of injury (overuse vs. acute), Load management and injury thresholds;

Biomechanics in Training and Coaching: Monitoring and modifying technique for injury prevention, Load optimization (force plates or wearable tech), Feedback methods in coaching (real-time video analysis)

Technology in Applied Biomechanics: Wearable sensors and motion tracking, 3D analysis systems, Simulation and modeling for performance optimization

Applied Case Studies: Performance profiling of elite athletes, Injury prevention strategy for a selected sport, Biomechanics role in return-to-play decisions

Ethics and Professional Practice: Athlete data privacy,Validity of commercial biomechanical tools, Collaborating with coaches, physiotherapists, and analysts

Note: Students need to continue specializing in the same subject that they selected in specialization I.

PCR: SSM 32212 Specialization I: Applied Biomechanics

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

ENGLISH CURRICULUM

English Proficiency Course

The English Proficiency Course, designed considering the SLQF guidelines, is conducted for all the undergraduates of the Faculty of Applied Sciences through the English Language Teaching Unit of the Faculty of Applied Sciences in collaboration with the Department of English Language Teaching, Sabaragamuwa University of Sri Lanka. The course is intended to be an integrated skills, activity-based language proficiency programme.

Aims and Objectives

The English Proficiency Course aims to familiarize non-native speakers of the language with the skills and strategies required for effective interaction in English. It also aims to make the students confident in using the language appropriately, accurately and fluently in any given situation.
In addition to the above mentioned objectives, each level of this course has its own specific objectives.

Components of the Course

This Course is conducted under three levels. Level I, *General English*, focuses on the basic language requirements of the freshers as most of them begin their studies in the medium of English. Level I commences with the Intensive English Programme and runs through the first year first semester. Level I examination is be held along with Semester One Examinations.
Level II, *Academic English*, focuses on the language needs for academic purposes with the aim of assisting the students excel in their academic ventures. This level also deals with the language structures and components the students need immediately to carry out their academic tasks. Level II examination is held along with Semester Two Examinations.
Level III, *Professional English*, focuses on the deferred language needs of students. This will be helpful for their professional development and to function well and effectively in the industry where language is a crucial issue. Components related to Business English and Business communication will also be dealt with in this level. Level III examination is conducted along with Semester One Examinations.

Requirement of English Language Proficiency

It is compulsory for all the undergraduates of the Faculty of Applied Sciences to complete Level I in order to obtain the degree. The other two Levels are optional. However, it is expected to award a *Certificate in English Proficiency* to the students who successfully complete all the three Levels.

LEVEL I

Subject	General English
Subject Code	EGP-L1141
Prerequisite	None

Credit value	04	
Status	Compulsory	
Time allocation	Direct Learning (Contact) hrs	Independent Learning hrs
	60 hours	140 hours

Intended Learning Outcome

Upon the successful completion of this course, the student will be able to:

ILO 1 use singular and plural appropriately
ILO 2 construct grammatically correct sentences using various pronouns
ILO 3 identify the gist of the meaning and specific information in reading
ILO 4 understand the formation of adjectives and use them meaningfully.
ILO 5 use punctuation correctly
ILO 6 construct a meaningful paragraph
ILO 7 form adverbs and use them appropriately
ILO 8 demonstrate the knowledge of discourse markers
ILO 9 use simple tenses effectively
ILO 10 identify specific information through listening
ILO 11 develop general essays
ILO 12 exhibit the usage of continuous tenses contextually
ILO 13 describe pictures using relevant grammatical structures.
ILO 14 guess the meanings of unfamiliar words through the context
ILO 15 use perfect tenses to express ideas
ILO 16 buildup sentences using conjunctions
1LO 17 apply the knowledge of perfect continuous tenses in communication
ILO 18 write informal letters and messages
1LO 19 use modal verbs to express ideas
1LO 20 construct passive sentences meaningfully and accurately.
ILO 21 use determiners in sentences to make nouns more meaningful
ILO 22 demonstrate the knowledge of prepositions in constructing sentences
ILO 23 form appropriate and grammatical questions

Course Content

i. Different ways of forming plural nouns
ii. Pronouns and their uses
iii. Reading for skimming and scanning
iv. Formation and types of adjectives
v. Punctuation and capitalization

vi.	Paragraph writing considering the structure and components
vii.	Types and formation of adverbs
viii.	Types and use of discourse markers
ix.	Forms and uses of simple tenses
x.	Listening to general passages to identify specific information.
xi.	Writing essays related to general topics
xii.	Forms and uses of continuous tenses
xiii.	Picture description using *There is / There are* and *present continuous*
xiv.	Reading and guessing the contextual meaning
xv.	Forms and uses of perfect tenses
xvi.	Uses and types of conjunctions
xvii.	Forms and uses of perfect continuous tenses
xviii.	Informal letters and messages
xix.	Modal verbs and their uses
xx.	Structure and uses of passive voice
xxi.	Uses and functions of determiners
xxii.	Types of prepositions
xxiii.	Formation of questions based on reading and listening passages

Mode of Delivery

Lectures, classroom discussions, student-centered learning activities, role plays

Mode of Evaluation

Continuous Assessments: 30%

Level-end written examination: 70%

The students must obtain at least 40% to complete Level I.

Recommended Reading

BBC Learn English: http://www.bbc.co.uk/learningenglish/

Donald Hall, Sven Birkerts (1997)*Writing Well,* Longman Publishing Group

Hewings, M. (1999) *Advanced English Grammar*, Cambridge University Press

Learn English Teens Skills Practice: https://learnenglishteens.britishcouncil.org/skills

Murphy, R. (2012). *English grammar in use: A self-study reference and practice book for Intermediate learners of English*. Cambridge: Cambridge University Press.

Murray, N. 2012. *Writing Essays in English Language and Linguistics*, Cambridge University Press.

Redman, S. (1997). *English vocabulary in use*: Pre-intermediate and intermediate. Cambridge: Cambridge University Press

Swan, M. (2005). *Practical English usage.* UK: Oxford University Press

Thomson, A. J., & Martinet, A. V. (2010). *A practical English grammar.* Oxford: Oxford University Press

Truss, L. (2003). Eats, shoots & leaves: *The zero tolerance approach to punctuation.* UK: Gotham Books.

LEVEL II

Subject	Academic English	
Subject Code	EAP-L2221	
Prerequisite	Level I: General English	
Credit value	02	
Status	Optional	
Time allocation	Direct Learning (Contact) hrs	Independent Learning hrs
	30 hours	70 hours

Intended Learning Outcome

Upon the successful completion of this course, the student will be able to:

ILO 1 apply sentence patterns required to compare and contrast
ILO 2 identify the stated main idea in academic texts
ILO 3 learn appropriate grammatical structure needed to give instruction
ILO 4 comprehend information by listening to academic texts
ILO 5 summarize academic texts
ILO 6 apply language skills required to describe processes
ILO 7 demonstrate linguistic knowledge in cause and effect relationship
ILO 8 analyze graphs, charts, and tables
ILO 9 deliver an academic speech
ILO 10 distinguish facts and opinions in reading and listening
ILO 11 handle academic/formal essays successfully
ILO 12 define scientific/academic terms related to their fields

Course Content

i. Comparison and contrast between two objects, incidents, etc.
ii. Reading for the main idea and the supporting details
iii. Giving instructions (how to do something)
iv. Listening to academic texts for comprehension
v. Tips and techniques for summarizing
vi. Process description (how something is done)
vii. Cause and Effect relationship
viii. Describing and analysis of information in graphs, charts, and tables
ix. Tips and guidelines for delivering an academic speech
x. Reading and listening passages to identify facts and opinions
xi. Academic/formal essay writing
xii. Defining scientific terms using relative pronouns

Mode of Delivery

Lectures, presentations, interactive group discussions, debates, online resources

Mode of Evaluation

Continuous Assessments: 30%

End-level written examination: 70%

The students must obtain at least 40% to complete Level II.

Recommended Reading

Baily, S. (2011). *Academic Writing: A handbook for international students* (3rd Ed.). UK: Routledge

Craswell, G. 2004. *Writing for Academic Success*. Sage Publications.

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

Jordan, R. R. (1990). *Academic writing course*. Harlow: Longman

Marshall, S. (2017). *Advance in academic writing*. UK: Pearson Education ESL.

McCarthy, M., & O'Dell, F.(2008). *Academic vocabulary in use: 50 units of academic vocabulary reference and practice*. Cambridge: Cambridge University Press.

Swales, J. M., & Feak, C. B. (2004). *Academic writing for graduate students: Essential tasks and skills* (Vol. 1). Ann Arbor: University of Michigan Press.

LEVEL III

Subject	Professional English	
Subject Code	EPP-L3221	
Prerequisite	Level II: Academic English	
Credit value	02	
Status	Optional	
Time allocation	Direct Learning (Contact) hrs	Independent Learning hrs
	30 hours	70 hours

Intended Learning Outcome

Upon the successful completion of this course, the student will be able to:

ILO 1 develop an effective curriculum vitae.
ILO 2 practice cover letters and understand its importance
ILO 3 infer the implied information/meaning in reading and listening
ILO 4 construct and deliver persuasive speeches and arguments
ILO 5 make effective presentations
ILO 6 demonstrate the knowledge on writing formal letters, memos and notices
ILO 7 construct letters of request and complaint
ILO 8 apply language structures used in debates
ILO 9 prepare agenda and take down minutes
ILO 10 handle skills needed for public speaking

Course Content

i. Writing curriculum vitae/resume
ii. Cover letters and their importance
iii. Reading and listening for unexpressed ideas/information
iv. Techniques and strategies in persuasive speeches and arguments
v. Tips and techniques for effective presentations
vi. Formal letter writing and memos for official correspondence
vii. Format and style in writing request and complaint letters.
viii. Engaging in debates on controversial / ethical issues

ix. Preparation of agenda and taking down minutes x. Public Speaking strategies and skills
Mode of Delivery Lectures, collaborative learning, panel discussions, student presentations, discussions
Mode of Evaluation Presentations: 30% End-level written examination: 70% The students must obtain at least 40% to complete Level III.
Recommended Reading Baugh. L. S., Fryar, M., & Thomas, D. A., (1998). *How to write first-class business Correspondence*. Illinois, USA: NTC Publishing Group. Grusendorf, M. (2011*). English for presentations*. UK: Oxford University Press. Guffey, M. E. & Loewy, D. *Business communication: Process and product* (9th ed.). US: Cengage Learning. Heyer, S. (1996). True stories in the news: *A beginning reader* (3rd ed.). UK: Pearson Publishers. Longman Communication 3000 wordlist: https://www.lextutor.ca/freq/lists_download/longman_3000_list.pdf Mascull, B. (2003). *Business vocabulary in use.* New York, Cambridge University Press. Osborn, M. & Osborn, S. (2009). *Public speaking* (8th ed.). US: Allyn & Bacon. Spiropoulos, M. (2006). *Interview skills that win the job: Simple techniques for answering the tough questions*. US: Allen Unwin. Thill, J.V. & Bovee, C. (2013). *Excellence in business communication* (10th ed.). New York: Pearsons Education Inc. Wilding, E. (2015). *Presentations:* Students' book. Reading: Garnet Education.

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.

$$\textbf{Grade Point Avarage (GPA)} = \frac{\sum_{i=1}^{n} GP(i).CP(i)}{N}$$

n = *Number of Subjects assigned per year*
$GP(i)$ = *Grade Point of i^{th} Subject*
$CP(i)$ = *Credit Points of i^{th} Subject*
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 BSc Honours degree programs 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 general 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 grade obtainable to C 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 nonacademic 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 ViceChancellor 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 ViceChancellor 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 the 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 reevaluate 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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