UNDERGRADUATE PROGRAMME

The Faculty of Engineering offers a four-year full-time undergraduate programme leading to the degree of Bachelor of the Science of Engineering (BScEng). Admission to the undergraduate programme in the Faculty of Engineering is subject to government policy on university admissions. The minimum requirements are passes in Combined Mathematics, Physics and Chemistry at the GCE (Advanced Level) Examination.

The four-year full-time BScEng degree programme at the Faculty of Engineering comprises the General Programme during the first year and Specialization Programme in the remaining three years. A student can pursue studies in one of the following fields of specialization:

* Chemical and Process Engineering
* Civil Engineering
* Computer Engineering
* Electrical and Electronic Engineering
* Manufacturing and Industrial Engineering
* Mechanical Engineering

The structure of the undergraduate degree programme at the Faculty of Engineering is illustrated below.

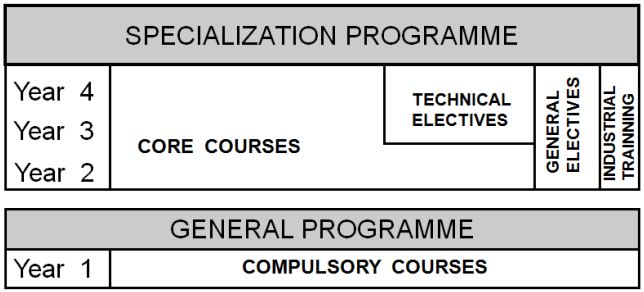

Fig 1.1 Programme structure

Each academic semester is normally made up of 15 weeks of teaching, a recess week and a week-long end-of-semester examination. The evaluation of performance of a student in each course is carried out through continuous assessments and end-of-semester examination. The medium of instruction at the Faculty of Engineering is English.

The Rules and Regulations relating to the Degree of Bachelor of the Science of Engineering at the Faculty of Engineering are given in Annexure I.

GENERAL PROGRAMME IN ENGINEERING

The General Programme in Engineering, which is conducted in the first academic year, is a common programme for all the students at the Faculty of Engineering. There are 12 courses to be completed under the General Programme, which consists of two semesters. The tweleve courses are given in Table 2.1 below.

Table 2.1: Courses in the General Programme

Course	Code	Credits
English I	GP 101	3
English II	GP 102	3
Mathematics I	GP 103	3
Mathematics II	GP 104	3
Computing	GP 106	3
Electricity	GP 108	3
Materials Science	GP 109	3
Engineering Mechanics	GP 110	3
Elementary Thermodynamics	GP 111	3
Engineering Measurements	GP 112	3
Fundamentals of Manufacture	GP 113	3
Engineering Drawing	GP 114	3
Total		36

A student should have successfully or provisionally completed the General Programme in Engineering and should have got selected to a field of specialization as specified in Rules and Regulations given in Annexure I for him/her to continue studies by registering for the Specialization Programme in Engineering.

Students are chosen to different fields of specialization at the end of the General Program of Engineering, based on his/her preference to a particular field of specialization. In case of many students wanting to follow a particular field of specialization, priority of allocation will be given to students with higher overall performance in the General Programme in Engineering.

SPECIALIZATION PROGRAMME IN ENGINEERING

During the second, third and fourth years, the engineering students follow the Specialization Programme to which they have been chosen at the end of their first year of study. During these years, they follow courses recommended for their respective fields of specialization and an industrial training in the industry for a period of 20-24 weeks, as specified in the Rules and Regulations given in Annexure I. These courses are grouped into two major categories as core courses and elective courses.

Core courses comprise taught courses, research projects, design work, laboratory and field work and they contribute to about 75% of the total credits earned during these years. Core courses are specific to the chosen field of study, and are compulsory. Research projects are open-ended projects carried out by an individual student or by a small group of students under supervision.

Elective courses are divided into technical elective courses and general elective courses. Technical electives are designed to give a deeper understanding of some selected areas within the core or to provide technical knowledge to supplement the core, and are opened to the choice of the students. The core courses and technical elective courses offered by different departments are listed under Departments of Study. General elective courses are non-technical courses from outside the field of engineering and are listed under General Elective Courses.

Table 3.1: Credits to be earned in each category of courses of the specialization programme

Field of Specialization	Courses/ Projects	Credits for BScEng degree	Credits for BScEng degree with class honours
Chemical and Process Engineering	Core courses	**72**	**75**
	Regular core courses and design projects	**69**	**63**
	Research projects	**03**	**12**
	Electives courses	**24**	**33**
	Technical electives	**12**	**18**
	General electives	**12**	**15**
Civil Engineering	Core courses	**81**	**84**
	Regular courses	**75**	**75**
	Multi-disciplinary design projects	**03**	**03**
	Research projects	**03**	**06**
	Electives courses	**15**	**24**
	Technical electives	**08**	**16**
	General electives	**07**	**08**
Computer Engineering	Core courses	**72**	**75**
	Regular core courses and design projects	**69**	**69**
	Research projects	**03**	**06**
	Electives courses	**24**	**33**
	Technical electives	**09**	**18**
	General electives	**15**	**15**
Electrical and Electronic Engineering	Core courses	**75**	**78**
	Regular courses	**72**	**72**
	Research projects	**03**	**06**
	Electives courses	**21**	**30**
	Technical electives	**09**	**15**
	General electives	**12**	**15**
Manufacturing and Industrial Engineering	Core courses	**72**	**75**
	Regular core courses and design projects	**72**	**72**
	Research projects	**-**	**03**
	Electives courses	**24**	**33**
	Technical electives	**12**	**18**
	General electives	**12**	**15**
Mechanical Engineering	Core courses	**69**	**75**
	Regular core courses and design projects	**66**	**66**
	Research projects	**03**	**09**
	Electives courses	**27**	**33**
	Technical electives	**15**	**18**
	General electives	**12**	**15**
Industrial Training		06	06
Total		**102**	**114**

DEPARTMENT OF CHEMICAL & PROCESS ENGINEERING

The Department of Chemical & Process Engineering offers a BScEng degree programme in the field of Chemical and Process (C&P) Engineering. C&P engineering graduates have the knowledge, understanding and skills required for the safe, sustainable and economical design, modification, operation, control and the effective management of small- and large-scale physical, chemical and bio processing plants. The products from these plants are as wide ranging as refined fuels, chemicals, processed food, composite and specialized materials, electronics and pharmaceuticals.

The graduates of the department are conversant in the knowledge and skills required for working with refrigeration and air conditioning technology, combustion and emissions technology, sustainable processing technology, energy technology and environmental pollution control technology. They have the knowledge, understanding and skills required for the use of appropriate mathematical techniques, equipment, and pertinent software or appropriate programming language in solving engineering problems.

Courses offered in the department are designed to prepare its graduates to be gainfully employed at petroleum refineries, chemical manufacturing facilities, pharmaceutical industry, food processing industry, biotechnology industry, process-software development businesses, quality control and management authorities, industrial pollution control and environmental pollution abatement organizations, sustainable development initiatives and strategies development cells, and composite material using industries such as aerospace, automotive, biomedical, electronic, environmental and space industry.

The department provides courses in fundamentals of chemical engineering and separation processes, theory and design of process equipment and energy systems, reaction and biological process engineering, industrial process technology, industrial safety and health, energy technology for process industry, industrial pollution control system design, industrial and advanced fluid mechanics, instrumentation and measurement, petroleum engineering, food process engineering and in the environmental management systems. Complete design of a selected process industry is carried out through two project-based core courses offered in the final year of study under the close guidance of the academic staff at the department. The department also provides supervision for undergraduate research projects in the project-based courses, Process Engineering Project & Seminar, Independent Study and Process Engineering Research Project. Courses of a broader interest involving thermodynamics, heat transfer, materials science, strength of materials, mechanics of machines and electrical power are provided with the support of other departments.

The department has the following seven laboratories for undergraduate, postgraduate and research work:

- Unit Operations and Separation Processes Laboratories
- Analytical Instruments Laboratory
- Food Engineering Laboratory
- Biochemical Engineering Laboratory
- Computing Laboratory
- Analytical Chemistry Laboratory
- Energy Engineering Laboratory

The department possesses analytical instruments such as GC (Gas Chromatograph), HPLC (High Performance Liquid Chromatograph), AAS (Atomic Absorption Spectrophotometer) and UV/Visible Spectrophotometer.

Current research interests and activities of the department include environmental pollution control, Food processing, green productivity, cleaner production, sustainable development, combustion, renewable energy, energy conservation and energy economics, biodiesel and bioethanol production, gasification, biogas processing, fluidised bed technology, drying, data mining, process modelling and optimization using artificial intelligence, robotics for process industry, etc.

The department provides research supervision for higher degrees leading to PGDip, MSc, MScEng, MPhil and PhD in Chemical and Process Engineering and related fields, and a specialized postgraduate programme in Environmental Pollution Control Engineering (EPCEng).

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Table 4.1 Course structure for specialization in Chemical and Process Engineering

		CODE	COURSE UNIT TITLE	CREDITS	PRE-REQUISITES
YEAR 2	SEMESTER 3	CE201	Mechanics of Materials I	3	-
		CE202	Fluids Mechanics I	3	-
		EE280	Introduction to Electrical Engineering I	3	-
		EM201	Mathematics III	3	-
		ME211	Mechanics of Machines I	3	-
		CP201	Chemical Engineering Fundamentals	3	-
	SEMESTER 4	CE207	Materials Science I	3	-
		EM202	Mathematics IV	3	-
		ME205	Tribology and Power Transmission Elements	3	-
		ME207	Applied Thermodynamics I	3	-
		CP202	Separation Process Principles	3	-
		EM203	Numerical Methods in Chemical & Process Engineering	3	-
YEAR 3	SEMESTER 5				
		ME303	Applied Thermodynamics II	3	ME207
		ME306	Control Systems	3	-
		CP303	Reaction Engineering	3	-
			Technical / General Electives	Recommended for a total of 9 credits	
	SEMESTER 6	CP304	Process Equipment Design	3	CP201, CP202
		CP305	Energy Systems Design	3	ME303
		CP308	Process Engineering Project & Seminar	3	-
			Technical / General Electives	Recommended for a total of 9 credits	

YEAR 4	**SEMESTER 7**				
		PR408	Industrial Engineering and Decision Sciences	3	-
		CP407	Independent Study	3	-
		CP408	Basics in Process Engineering Design Project	3	CP304, CP305
			Technical / General Electives	Recommended for a total of 3 credits	
			Technical / General Electives to earn eligibility for Class Honours	Recommended for a total of 6 credits	
	SEMESTER 8	PR409	Management Principles and Economics	3	-
		CP406	Industrial Safety and Health	3	-
		CP409	Advanced Process Engineering Design Project	3	CP408
		CP507	Process Engineering Research Project to earn eligibility for Class Honours	3	-
			Technical / General Electives to earn eligibility for Class Honours	Recommended for a total of 3 credits	

Courses Offered

Core Courses

CP201 Chemical Engineering Fundamentals (3 credits)
CP202 Separation Process Principles (3 credits)

CP303 Reaction Engineering (3 credits)
CP304 Process Equipment Design (3 credits); Prerequisites: CP201, CP202
CP305 Energy Systems Design (3 credits); Prerequisite: ME303
CP308 Process Engineering Project & Seminar (3 credits)

CP406 Industrial Safety and Health (3 credits)
CP407 Independent Study (3credits)
CP408 Basics in Process Engineering Design Project (3 credits); Prerequisites: CP304, CP305
CP409 Advanced Process Engineering Design Project (3 credits); Prerequisite: CP408

Technical Elective Courses *

CP502 Advanced Fluid Mechanics (3 credits); Prerequisite: CE202
CP503 Industrial Process Technology (3 credits)
CP504 Biological Process Engineering (3 credits); Prerequisite: CP303
CP505 Instrumentation and Measurement (3 credits)
CP506 Industrial Pollution Control System Design (3 credits)
CP507 Process Engineering Research Project (3 credits)
CP508 Energy Technology for the Process Industry (3 credits); Prerequisite: ME303
CP509 Petroleum Engineering (3 credits)
CP511 Food Process Engineering (3 credits)
CP512 Environmental Management Systems (3 credits)
CP513 Industrial Fluid Mechanics (3 credits)
CP514 Sustainability for Process Industry (S4PI) Work Camp (1 credit)
CP515 Modelling and Simulations of Simultaneous Transport Phenomena with MATLAB ® and COMSOL Multiphysics ® (3Credits)

General Elective Courses

CP551 Sustainable Development (3 credits)

*Note: Students are required to earn credits for a minimum of four Technical Elective courses from the list given below: CP502, CP504, CP506, CP508, CP511, CP513, and CP514

DEPARTMENT OF CIVIL ENGINEERING

The Department of Civil Engineering is the largest department in the Faculty and has produced about 50 per cent of the engineering graduates from the Faculty. Civil engineering graduates are expected to play key roles in planning, designing, constructing and managing roads, bridges, dams, buildings and public utilities, water supply, sewerage, irrigation, drainage and pollution control schemes etc. The Civil Engineering curriculum covers a wide range of subjects in three main areas:

- Materials and Structural Engineering which includes Properties and Mechanics of Materials and Structures
- Geotechnical and Transportation Engineering which includes Geotechnical Engineering, Engineering Geology, Surveying and Highway Engineering
- Water Resources and Environmental Engineering, which includes Fluid Mechanics, Hydrology, Hydraulics and Environmental Engineering.

The Department also offers specialized courses in Computer Applications in Structural Engineering, Foundation Engineering, Water Resources Engineering, etc. as elective subjects in the final year. Field visits, seminars and research projects form a part of the curriculum. Practical aspects of civil engineering are emphasised through laboratory, field and design classes, multidisciplinary projects and a field camp.

The Department has the following laboratories with specialized up-to-date facilities for teaching, research and consultancy services:

- The Materials Laboratory with facilities for investigation of the physical, mechanical and durability charateriscticts of diverse types of materials used for engineering applications. The materials that the laboratory can handle are inclusive of cementitious products, ingredients of concrete and asphalt, metals, timber, polymers and ceramics. Services are also provided to the industry for quality management purposes.
- The Metallurgy Laboratory with facilities for investigating the impact and hardness, microscopic analysis using metallurgical microscopes and the atomic absorption spectrometer, x-ray views for investigating metals and heat treatments of metals.
- The Structures Laboratory with a strong floor of 6 m x 12 m with reaction frames supporting 500 kN and 250 kN static hydraulic jacks capable of testing medium scale pre cast products such as Hume pipes, Manhole covers, Steel gratings etc for relevant SLS, BS and other similar standards. The laboratory can also provide on-site structural testing facilities to measure deflections, strains, accelerations with online monitoring and data logging facilities for both static and dynamic testing.
- The Fluid Mechanics Laboratory equipped with wind tunnels, tilting flumes with fixed and movable beds, wave flumes, a towing carriage with tank and facilities for testing scale models, test rigs for testing of pipes, pumps, turbines and fans are primarily used for demonstrating fluid mechanics, hydraulic and hydrologic principles to undergraduate and postgraduate students as well as for their research activities. Services are also provided to the industry in the areas of physical and mathematical model studies, field measurements and testing work related to water resources development projects.
- The Environmental Engineering Laboratory with facilities for water and wastewater analysis, and is equipped with a microbiological laboratory. The Laboratory has been fully furnished with the state-of-the-art analytical instruments that have the capacity to cater to a wide spectrum of analytical service needs. Besides, the laboratory is equipped with

most coveted technical and academic expertise related to the sphere of environmental engineering domain to cater to academic and industrial needs. Following specialized instrumentations are available: Atomic Absorption Spectrophotometer, Gas Chromatograph, HPLC Ion Chromatograph, HPLC Carbamate Analysis System, Organic Elemental Analyzer, Total Organic Carbon Analyzer and general water & wastewater quality parameter testing (BOD, COD, TSS, turbidity, MLVSS etc).

- The Geotechnical Laboratory is equipped with facilities to carry out field and laboratory tests in the specialised fields of geotechnical engineering and engineering geology. Field tests include SPT, SCPT, DCPT, Seismic Refraction Test, Resistivity Test and, laboratory tests include Classification Tests, UU, CU and CD Triaxial Tests, Direct Shear Test, Consolidation Test, Compaction Test, CBR test, Permeability Test, Rock Shear Test, LAAV Test, Slake Durability Test, Soundness Test and Determination of Shear Wave Velocity. In addition, the laboratory provides computing services using state of art software such as FLAC, Geostudio and Plaxis for the numerical analysis of many geotechnical engineering problems. A wide range of consultancy services are offered to the industry in all aspects of geotechnical analysis, design and site investigation.

- The Surveying, Highway and Transportation Engineering Laboratory is equipped with Total stations, theodolites, levels and electronic distance meters and GPS/GIS facilities for comprehensive land surveying and contouring. Furthermore, Benkelman beam, variety of surface roughness/ resistance testing equipments and weight bridges for highway pavement evaluations and all laboratory testing related to bitumen and asphalt are available in this laboratory (Marshall test, penetration, elongation, softening point, flash and fire point).

- The Computer Aided Structural Analysis Laboratory with facilities of more than one hundred computers is used for teaching and research on the analysis of structural systems using finite element programs. Mainly, licened versions of Sap 2000 and Midas FEa are available for linear and nonlinear analysis of structures for static and dynamic loadings.

Research carried out in the department can be classified under final year student projects, postgraduate diploma and master's degree projects, graduate studies by research students, and reseach conducted by the academic staff. Some of the current areas of research include: Structural behaviour under seismic loading; Structural health monitoring and retrofitting; Fatigue damage assessment for bridges; Mechanical behaviour of novel materials; Condition assessment of existing structures; Stability of land fills and gas diffusivity characterisation; Strength characterisation of railway ballast subjected to fouling; Stabilisation characteristics of soft and corase grained soils; Down-scaling of climate projections and rainfall and runoff modelling; Hydrodynamics and sedimentation modelling of reservoirs; Costal flood hazard and risk assessments and costal sediment transport; Water and wastewater management technologies; Transport and traffic planning of small/medium cities.

Over the years the Department has conducted postgraduate courses leading to the Master's Degree and has admitted graduate students for research studies leading to MPhil and PhD. Part time Postgraduate Diploma and Master's Degree programmes are offered by the Department to provide postgraduate level education in the fields of Structural Engineering, Environmental & Water Engineering, Geotechnical Engineering and Disaster Management. There are also plans to expand the scope of the postgraduate programmes to other areas of Civil Engineering.

The Department maintains close links with industry through consulting work, CPD programmes, participation in professional activities and through conferences and seminars conducted by the staff.

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Table 5.1 Course structure for specialization in Civil Engineering

		CODE	TITLE	CREDITS	PRE-REQUISITES
YEAR 2	SEMESTER 3:	CE201	Mechanics of Materials I	3	.
		CE202	Fluid Mechanics I	3	.
		CE210	Engineering Surveying	3	.
		EE280	Introduction to Electrical Engineering I	3	.
		ME202	Mechanical Engineering for Civil Engineers	3	.
		EM201	Mathematics III	3	.
	SEMESTER 4	CE204	Geomechanics	3	CE201
		CE205	Engineering Hydrology	3	.
		CE208	Structural Analysis	3	CE201
		CE209	Building Construction	3	.
		CE219	Civil Engineering Laboratory I	1	CE201, CE202
		EM202	Mathematics IV	3	.
		MA201	Engineering Management	3	.
YEAR 3	SEMESTER 5	CE302	Environmental Engineering	3	.
		CE305	Hydraulics	3	
		CE312	Design of Structures II	3	CE208
		CE310	Geotechnical Engineering	3	CE204
		CE318	Transportation and Highway Engineering	3	.
		CE319	Civil Engineering Laboratory II	1	CE 202, CE 204
		EM315	Numerical Methods for Civil Engineers	2	-
			General Electives		
	SEMESTER 6	CE307	Finite Element Methods in Solid Mechanics	3	CE201
		CE308	Geotechnical Design	2	CE310
		CE311	Hydraulic Engineering and Design	3	.
		CE306	Design of Structures I	3	CE208
		CE316	Advanced Mechanics of Materials	2	CE201
		CE317	Civil Engineering field work	3	CE210
		CE320	Civil Engineering Laboratory III	1	CE219, CE319
			Technical Electives/ General Electives		

YEAR 4	SEMESTER 7	CE403	Construction Management	3	MA201
		CE405	Civil Engineering Project I	3	.
			Technical Electives/ General Electives		
	SEMESTER 8	CE402	Multi-Disciplinary Design Project	3	.
			Technical Electives / General Electives		
		CE406	Civil Engineering Project II to earn eligibility for Class Honours	3	CE405

Courses Offered

Core Courses

CE201 Mechanics of Materials I (3 credits)
CE202 Fluid Mechanics I (3 credits)
CE204 Geomechanics (3 credits); Prerequisite: CE201
CE205 Engineering Hydrology (3 credits)
CE207* Materials Science I (3 credits)
CE208 Structural Analysis (3 credits) : Prerequisite : CE201
CE209 Building Construction (3 credits)
CE210 Engineering Surveying (3 credits)
CE219 Civil Engineering Laboratory I (1 credit); Prerequisite: CE201 and CE202

CE301* Mechanics of Materials II (3 credits); Prerequisite: CE201
CE302 Environmental Engineering (3 credits)
CE304* Fluid Mechanics II (3 credits)
CE305 Hydraulics (3 credits)
CE306 Design of Structures I (3 credits); Prerequisite: CE208
CE307 Finite Element Methods in Solid Mechanics (3 credits); Prerequisite: CE201
CE308 Geotechnical Design (2 Credits); Prerequisite: CE310
CE309* Materials Science II (3 credits) ; Prerequisite : CE207
CE310 Geotechnical Engineering (3 credits); Prerequisite: CE204
CE311 Hydraulic Engineering and Design (3 credits)
CE312 Design of Structures II (3 credits); Prerequisite: CE208
CE316 Advanced Mechanics of Materials (2 credits); Prerequisite: CE201
CE317 Civil Engineering Fieldwork (3 credits)
CE318 Transportation and Highway Engineering (3 credits)
CE319 Civil Engineering Laboratory II (1 credit); Prerequisite: CE202 and CE204
CE320 Civil Engineering Laboratory III (1 credit); Prerequisite: CE219 and CE319

CE401* Mechanics of Materials III (3 credits); Prerequisite: CE301
CE402 Multi-Disciplinary Design Project (3 credits)
CE403 Construction Management (3 credits)
CE405 Civil Engineering Project I (3 credits)
CE406 Civil Engineering Project II (3 credits); Prerequisite: CE405

*Offered for the other departments

Core Courses Offered by Other Departments for the Civil Engineering Students

MA201	Engineering Management (3 credits)
EM315	Nuemerical Methods for Civil Engineers (2 credits)

Technical Elective Courses (2 credits per course)

CE514	Ground Improvement and Geosynthetics
CE515	Geohazard Management
CE521	Advanced Geomechanics; Prerequisite: CE204
CE522	Foundation Engineering ; Prerequisite: CE310
CE523	Geotechnical Design and Construction; Prerequisite: CE310
CE532	Highway Engineering and Design; Prerequisite: CE318
CE533	Traffic Engineering; Prerequisite: CE318
CE534	Traffic Management; Prerequisite: CE318
CE535	Transportation Planning; Prerequisite: CE318
CE542	Hydraulic Structures; Prerequisite: CE311
CE545	Coastal Engineering and Coastal Zone Management; Prerequisite: CE311
CE553	Irrigation and Drainage Engineering; Prerequisite: CE311
CE561	Integrated River Basin Management; Prerequisite: CE205
CE568	Industrial Pollution Control; Prerequisite: CE302
CE570	Water Supply and Wastewater Engineering; Prerequisite: CE302
CE571	Environmental Health and Sanitation
CE586	Dynamics of Structures
CE587	Design of Structures III; Prerequisite: CE306, CE312
CE588	Construction Equipment and Material Management; Prerequisite: CE403
CE589	Sustainable Design and Construction
CE591	Design of High-rise Buildings; Prerequisite: CE306, CE312
CE592	Concrete Technology; Prerequisite: CE312
CE593	Construction Planning; Prerequisite: MA201
CE594	Computer Aided Structural Analysis and Design; Prerequisite: CE307
CE598	GIS and RS for Civil Engineers
CE599	Disaster Management

Technical Elective Courses Offered by other Departments for the Civil Engineering Students

EM310	Operations Research I (3 credits) : Prerequisites GP103, GP104, EM201, EM202
EM502	Optimization (3 credits)

DEPARTMENT OF COMPUTER ENGINEERING

The Department of Computer Engineering (then known as Computer Sciences) was established in the Faculty of Engineering in 1985. Although it is the youngest degree awarding department in the faculty, it is one of the premier Computer Engineering departments in the country's University system. Initially the main function of the department was to conduct computing related courses to the students in all disciplines of the Faculty. Later, in year 2000, the department started offering the Computer Engineering degree as a specialisation in engineering. Today it is a fully-fledged department, robust with a capable and energetic staff, rich in its resources and course content and showing maturity which belies its age.

Computer Engineering degree is a unique combination of computer science and electrical engineering. It includes the science and technology of design, construction, implementation and maintenance of software and hardware components of modern computer-controlled systems. Computer engineers have in-depth knowledge in hardware, software design as well as hardware-software integration. They are involved in all aspects of computing, from the design and use of individual microprocessors, circuit design and large-scale system integration, to kernel hacking, databases, networking, security and telecommunications.

Entrance to the Computer Engineering stream of study is highly competitive and its content, though challenging and demanding, is ultimately exceedingly rewarding. The courses offered provide a comprehensive coverage in Computer Engineering. Unlike many Computer Science/Engineering schools that tend to teach the details of the latest in-demand skills, skills that will soon be out-dated, we believe in providing a solid understanding of the foundations of Computer Engineering. These principles allow students to adapt to the inevitable changes in technology by developing practical skills on top of the foundations using leading-edge technologies. Such an approach inevitably makes the degree challenging and highly rewarding.

The curriculum of Computer Engineering degree is a four-year program with 150 credit hours including the General Programme and the Industrial Training. It provides the necessary theoretical background combined with hands-on practical experience in order to prepare graduates for their future careers. The program focuses on computer architecture and design, computer networks, databases, software engineering and computer applications in industry. It is geared towards the needs of not only industries but also higher educational sectors to ensure a smooth transition after a student’s graduation.

The department continuously creates and strengthens its ties with other universities and industries. All its examination papers are currently moderated by faculty members from prestigious foreign universities and some of our ongoing research are conducted in collaboration with researchers from leading foreign universities. Already, some of the courses are offered with industrial collaboration. Industrial ties have further been strengthened by the IFS and hSenid Research and Development (R&D) laboratories housed within the Department. The Department also houses the one and only NVIDIA GPU Research Center in the country. Computer Engineering graduates are highly sought after by local as well as international employers.

Research conducted by the department has greatly expanded over the years. The Embedded Systems and Computer Architecture Laboratory (ESCAL) is a research group whose interests concern on the architectural aspects of embedded systems and associated problems with a particular focus on the combination of the theory and practice. The Systems Engineering Group at Peradeniya (SEGPe) is a research group mainly focusing on the use of small kernel technology for secure and reliable systems construction and the application of formal methods to system design and implementation. The Complex Reactive & Intelligent Systems (CRISL) group concentrates on model-based design and formal verification of complex reactive systems, Logic/Supervisory Control and fault diagnosis of Discrete Event Dynamic Systems, and issues related to reconfigurable control of these systems. The department also conducts active research on Cryptography and Network Security.

Laboratory facilities in the department provide the means to experience and practice the Engineering skills acquired during the learning process. The department provides a general laboratory with sixty high performance computers with fast Internet connectivity and this facility is open even after hours to aid self learning. Special laboratories are equipped with proper equipment to get hands on experience on networking, interfacing, digital design and embedded systems. A special laboratory environment is provided for students who participate in projects. They have the freedom to use these resources as required.

The department library is well stocked with text books, CDs, DVDs, etc. which the students can borrow for a specified period (usually for a semester). Advanced teaching aids such as multimedia based teaching and web-based learning resources are used by staff members to enhance the learning experience.

Independent student activities are encouraged via a student body, the Association of Computer Engineering Students (ACES), which aims to further the potential of students by catering to their professional and societal development needs and enhancing their competencies such as leadership skills.

The department's greatest strength is perhaps in its energetic and passionate staff constantly driving undergraduates to excel in their studies. Academic staff of the Department of Computer Engineering has been and continues to be trained from higher education institutions all around the globe from the Silicon Valley in the US to the premier universities in the UK, Europe and Asia Pacific. The warm and welcoming atmosphere created by the exuberant staff has formed a family-like bondage that creates a strong cohesive unit and thus the Department of Computer Engineering has become a home for elites in engineering.

Academic Staff

Head of the Department
KWHMRDB Elkaduwe, BScEng *Peradeniya*, PhD *UNSW*

Senior Lecturers
AU Bandaranayake, BScEng *Peradeniya*, PhD *Cincinnati*
DS Deegalla, BScEng *Peradeniy*a, PhLic *Stockholm*, MIEEE, AMIE *SL*
SD Dewasurendra, BScEng *Sri Lanka*, MEng *AIT Bangko*k, DEA INP *Grenoble*, PhD INP *Grenoble*, MIMechE, CEng UK, CEng *SL*, MIE *SL*, MIEEE
KWHMRDB Elkaduwe, BScEng *Peradeniya*, PhD *UNSW*
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Z Maraikar, BSc *Colombo*, MSc *Vrije*
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RG Ragel, BScEng *Peradeniya*, PhD *UNSW*, MIET, SMIEEE
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M Sandirigama, BScEng *Peradeniya*, MSc, PhD *Ehime*, Attorney-at-Law *SL*

Lecturers
D Herath, BScEng *Peradeniya*

Table 6.1 Course structure for specialization in Computer Engineering

		CODE	TITLE	CREDITS	PRE-REQUISITES
YEAR 2	SEMESTER 3	CO221	Digital Design	3	-
		CO222	Programming Methodology	3	-.
		CO223	Computer Communication Networks I	3	-.
		EM201	Mathematics III	3	-
		EM313	Discrete Mathematics	3	-
		EE282	Network Analysis for Computer Engineering	3	-
	SEMESTER 4	CO224	Computer Architecture	3	CO221, CO222
		CO225	Software Construction	3	CO222
		CO226	Database Systems	3	CO222, EM313
		EE285	Electronics I	3	-
		EM202	Mathematics IV	3	-
		EM314	Numerical Methods	3	-
	SHORT	CO227	Computer Engineering Project	2	CO225, CO226
		General Electives		7	-
YEAR 3					
	SEMESTER 5	CO321	Embedded Systems	3	CO224
		CO322	Data Structures and Algorithms	3	CO225
		CO323	Computer Communication Networks II	3	CO223
		CO324	Network and Web Application Design	3	CO223, CO225
		CO325	Computer and Network Security	3	CO223
		EE386	Electronics II	3	EE285
	SEMESTER 6	CO326	Computer Systems Engineering: Industrial Networks	3	CO321, EE386
		CO327	Operating Systems	3	CO224, CO322
		CO328	Software Engineering	3	CO226, CO322, CO324
		EE387	Signal Processing	4	EE282, EM202
		Technical Electives		5	-

YEAR 4	SEMESTER 7	CO421	Final Year Project I	3	-
		CO422	Professional Practices	2	-
		CO423	Software Project Management	2	-
		CO424	Information Systems Management	2	-
	SEMESTER 8	CO425	Final Year Project II	3	CO421
		Technical Electives		13	
		General Electives		2	

Students are expected to earn 15 credits from general elective courses. Out of these credits:

- 6 credits should be earned from CO422: Professional Practices (2), CO423: Software Project Management (2) and CO424: Information Systems Management (2).
- In addition:
    - 5 credits should be earned from general electives categorized under *Management and Economics.*
    - 2 credits should be earned from general electives categorized under *Arts and Humanities*, and
    - 2 credits should be earned from the general electives categorized under *Political and Social Sciences.*

Courses Offered

Core Courses

CO221 Digital Design (3 credits)
CO222 Programming Methodology (3 credits)
CO223 Computer Communication Networks I (3 credits)
CO224 Computer Architecture (3 credits); Prerequisites: CO221, CO222
CO225 Software Construction (3 credits); Prerequisite: CO222
CO226 Database Systems (3 credits); Prerequisites: CO222, EM313
CO227 Computer Engineering Project (2 credits); Prerequisites: CO225, CO226
CO252 Introduction to Programming and Networking for Electrical Engineering (3 credits)

CO321 Embedded Systems (3 credits); Prerequisite: CO224
CO322 Data Structures and Algorithms (3 credits); Prerequisite: CO225

CO323 Computer Communication Networks II (3 credits); Prerequisite: CO223
CO324 Network and Web Application Design (3 credits); Prerequisites: CO223, CO225
CO325 Computer and Network Security (3 credits); Prerequisite: CO223
CO326 Computer Systems Engineering: Industrial Networks (3 credits); Prerequisites: CO321, EE386
CO327 Operating Systems (3 credits); Prerequisites: CO224, CO322
CO328 Software Engineering (3 credits); Prerequisites: CO226, CO322, CO324
CO421 Final Year Project I (3 credits)
CO425 Final Year Project II (3 credits); Prerequisites: CO421

General Elective Courses

CO422 Professional Practices (2 credits)
CO423 Software Project Management (2 credits)
CO424 Information Systems Management (2 credits)

Technical Elective Courses

CO502 Advanced Computer Architecture (3 credits); Prerequisite: CO224
CO503 Advanced Embedded Systems (3 credits); Prerequisite: CO321
CO504 Hardware Software Co-design (3 credits); Prerequisites: CO224
CO513 Advanced Computer Communication Networks (3 credits); Prerequisite: CO323
CO514 Optical Communication Networks (3 credits); Prerequisite: CO323
CO521 Compilers (3 credits); Prerequisite: CO322
CO523 Programming Languages (3 credits); Prerequisite: CO322
CO524 Parallel Computers and Algorithms (3 credits); Prerequisite: CO327
CO526 Advanced Operating Systems (3 credits); Prerequisite: CO327
CO527 Advanced Database Systems (3 credits); Prerequisite: CO226
CO528 Applied Software Architecture (3 credits); Prerequisite: CO328
CO541 Artificial Intelligence (3 credits); Prerequisite: CO222
CO542 Neural Networks and Fuzzy Systems (3 credits)
CO543 Image Processing (3 credits)
CO544 Machine Learning and Data Mining (3 credits); Prerequisite: CO322
CO551 Theory of Computation (3 credits)
CO552 Game Theory and Markov Decision Processes (3 credits); Prerequisite: EM202

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

The department provides basic courses to all engineering students on the principles of electrical and electronic engineering to a depth appropriate to the generalist, and advanced courses to the specialist student in areas of (i) Communication and Information Engineering, (ii) Power, Energy Systems and High Voltage Engineering, (iii) Electronics Instrumentation and Bio-medical Engineering, and (iv) Control, Robotics and Automation Engineering. Proper choice of technical electives offered from the above four sub disciplines gives opportunity for the undergraduates following electrical and electronic engineering study program to further specialize in one of the below mentioned sub disciplines in electrical and electronic engineering.

- Communication and Information Engineering
- Power, Energy Systems and High Voltage Engineering
- Electronics and Instrumentation Engineering
- Control, Robotics and Automation Engineering

The curriculum of electrical and electronic engineering study program has been cleverly designed in such a way that interested students can also obtain a major specialization in one area while obtaining a minor specialization in another area out of the sub disciplines mentioned above.

The department has an integrated laboratory which caters to all electrical and electronic engineering students. This consists of the following laboratories: Elementary Laboratory, Communications Laboratory, MIC Fabrication Laboratory, Optical Fiber Laboratory, RF and Microwave Laboratory, Power Systems and Electrical Machines Laboratory, High Voltage Engineering Laboratory, Power Electronic and Industrial Application Laboratory, Electrical Machine and Drives Laboratory, Controls Robotics and Automation Laboratory, ROBOCON Laboratory, Electronics and Digital Instrumentation Laboratory, Energy Laboratory, Innovative Research and Product Development Laboratory.

Laboratories for Communication and Information Engineering area have the following state of the art resources: Network Analyzers, Spectrum Analyzers, RF and Microwave Measuring Devices, Bluetooth Development Tool Kit, Antenna System Demonstration and Design Kit, Fibre Optic transmitter and Receiver Units, Radar Development Kit, Noise Figure Meter, Protocol Analyzer.

Laboratories for Power, Energy and High Voltage Engineering area have the following state of the art resources: AC/DC Variable frequency meter standard modules, High Precision Volt meters, High Precision Ampere meters, Impedance meters, Active and Reactive Power meters, Frequency meters, Harmonic analyzers, Noise Level meters, High Voltage High Current AC/DC generators, Impulse Generators, Partial Discharge Detectors, Insulation Diagnostic System, Karl fisher titrator and Oil test cell, various DC and AC electrical machines, transmission line models, transformer winding machines, PSCAD software, IPSA software.

Laboratories for Electronics & Instrumentation Engineering area have the following state of the art resources: Logic Analyzers, Signal Pulse and Function Generators, Voltage and Frequency Converters and Counters, Agilent Advisor, Intelligent Universal Programmers, Industrial Embedded Computers, GPIB platforms and FPGA development boards.

Laboratories for Control, Robotics and Automation engineering area have the following state of the art resources: Digital power meter, Digital torque meter, Dynamic signal analyzer, Isolated current measurement system, DSP systems, Flux2D & Flux3D software, 6 DOF Industrial Robot Manipulators and Mobile Robots.

A separate project area with well-equipped individual laboratory set-ups has been allocated to students for their undergraduate projects and research works. The department also maintains its own autonomous computer network while still being a part of the main University network. This facility allows the students to use some of the advanced simulation tools for their laboratory, project and research works.

The department is well in line with the world green energy concept, for example by installing 60 kW solar panels on the department's roof-top and supplying electricity to the faculty. The continuous research development in the department will give opportunity to students to conduct their projects and research work in multi-disciplinary areas in electrical and electronic engineering.

Academic Staff

Head of the Department
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HMVR Herath, BScEng *Peradeniya*, MS Miami, Dr.-Ing *Paderborn*, SMIEEE, CEng, MIE *SL*, MOSA
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MB Dissanayake, BScEng *Peradeniya*, PhD *Surrey*, MIEEE, AMIE *SL*
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WL Abeygunasekera, BScEng *Peradeniya*, MSc *Purdue*, PhD *Peradeniya*, MIEEE, AMIE *SL*

Table 7.1 Course structure for specialization in Electrical and Electronic Engineering

		CODE	TITLE	CREDITS	PRE-REQUISITES
YEAR 2	SEMESTER 3	EE 201	Network Analysis	3	-
		EE 251	Principles of Electrical Measurements	3	-
		EE 252	Electronic Devices and Circuits	3	-
		EE 253	Digital Logic Design	3	-
		EM 201	Mathematics III	3	-
		ME 201	Mechanics of Machines I	3	-
	SEMESTER 4	EE 254	Electronic Instrumentation	3	-
		EE 257	Signals and Systems	3	-
		EE 255	Electric Power	2	
		EE 256	Power and Energy	2	-
		CO 253	Introduction to Programming and networking for Electrical Engineering	3	-
		EM 202	Mathematics IV	3	-
		ME 210	Thermodynamics for Electrical and Electronic Engineers	2	-

YEAR 3	SEMESTER 5	EE 320	Electromagnetic Theory	2	-
		EE 351	Electronic Circuits	3	EE 252
		EE 322	Embedded Systems Design	3	EE 253, CO253
		EE 325	Digital Signal Processing	3	EE 257
		EE 352	Automatic Control	2	EE 257
		EE 358	Electrical Machines	3	EE255, EE256
		EM 308	Complex Analysis	2	EM201, EM202
	SEMESTER 6	EE 357	Communication Systems	3	EE 201, EE 257
		EE 353	Discrete Time Control Systems	3	EE352, EE325, EE358
		EE 354	Power Engineering	3	EE358
		EE 355	Applied Electromagnetics	3	EE 320
		EE 356	Electronic Product Design and Manufacture	3	-
			General Elective	3	-
YEAR 4	SEMESTER 7	EE 401/ EE 512	Communication Theory	3	EE357
			OR		-
		EE 402/ EE 501	Advanced Control Systems	3	EE352, EE353
			OR		-
		EE 403/ EE 559	Integrated Analog Electronic Circuits	3	EE252, EE351
			OR		-
		EE 404/ EE 572	Electric Power Systems	3	EE354
		EE 405	Undergraduate Project I	3	-
			Technical/ General Electives		
	SEMESTER 8		Technical/ General Electives		
		EE 406	Undergraduate Project II	3	

Courses Offered

Core Courses

EE201 Network Analysis (3 Credits)
EE251 Principles of Electrical Measurements (3 Credits)
EE252 Electronic Devices and Circuits (3 Credits)
EE253 Digital Logic Design (3 Credits)
EE254 Electronic Instrumentation (3 Credits)
EE255 Electric Power (2 Credits)
EE256 Power and Energy (2 Credits)
EE257 Signals and Systems (3 Credits)
EE280 Introduction to Electrical Engineering I (3 Credits)
EE281 Introduction to Electrical Engineering II (3 Credits)
EE282 Network Analysis for Computer Engineering (3 Credits)
EE285 Electronics I (3 Credits)
EE320 Electromagnetic Theory (2 Credits)
EE322 Embedded Systems Design (3 Credits); Prerequisites: EE253, CO253
EE325 Digital Signal Processing (3 Credits); Prerequisites: EE257
EE358 Electrical Machines (3 Credits); Prerequisites: EE255, EE256
EE351 Electronic Circuits (3 Credits); Prerequisites: EE252
EE352 Automatic Control (2 Credits); Prerequisites: EE257
EE353 Discrete Time Control Systems (3 Credits); Prerequisites: EE352, EE325, EE358
EE354 Power Engineering (3 Credits); Prerequisites: EE358
EE355 Applied Electromagnetics (3 Credits); Prerequisites: EE320
EE356 Electronic Product Design and Manufacture (3 Credits)
EE357 Communication Systems (3 Credits); Prerequisites: EE201, EE257
EE380 Electrical Power and Machines (3 Credits)
EE386 Electronics II (3 Credits); Prerequisites: EE285
EE387 Signal processing (4 credits); Prerequisites: EE282, EM302

EE401/EE512 Communication Theory (3 Credits); Prerequisites: EE 357
EE402/EE501 Advanced Control Systems (3 Credits); Prerequisites: EE352, EE353
EE403/EE559 Integrated Analog Electronic Circuits (3 Credits); Prerequisites: EE252, EE351
EE404/EE572 Electric Power Systems (3 Credits); Prerequisites: EE354
EE405 Undergraduate Projects I (3 Credits)
EE406 Undergraduate Projects II (3 Credits)

Technical Elective Courses

EE511 Antennas and Propagation (3 Credits); Prerequisites: EE320, EE355
EE522 Telecommunication and Wireless Systems (3 Credits); Prerequisite: EE357
EE514 Data Communications (3 Credits); Prerequisites: EE357
EE593 Advanced Signal Processing (3 credits); Prerequisites: EE257, EE325
EE518 Digital Communications (3 Credits); Prerequisite: EE512 or EE401
EE538 Electrical Machines and Drive Systems (3 Credits); Prerequisites: EE358, EE352, EE354
EE539 Nonlinear and Multivariable Systems (3 Credits); Prerequisites: EE352 or ME306
EE540 Nanotechnology for Electrical and Electronic Engineering Applications (3 credits); Prerequisites: EE201, EE252, EE352
EE554 Microwave Techniques (3 Credits); Prerequisites: EE320 and EE355
EE561 Industrial Instrumentation (3 Credits); Prerequisites: EE251, EE254
EE575 Power Electronic Applications and Design (3 Credits); Prerequisites: EE351
EE576 High Voltage Engineering (3 Credits); Prerequisites: EE255, EE256
EE592 Modern Power Systems (3 Credits); Prerequisites: EE572 or EE404
EE580 Introduction to Biomedical Engineering (3 Credits); Prerequisites: EE252 or EE281 or EE285
EE587 Digital Systems Design and Synthesis (3 Credits); Prerequisites: EE252, EE322
EE594 Industrial Robotics and Automation (3Credits); Prerequisites: EE352 or ME306
EE595 Machine Intelligence and Smart Systems (3Credits); Prerequisites: EM201
EE596 Image and Video Coding (3 credits); Prerequisites: EE257, EE325

DEPARTMENT OF ENGINEERING MANAGEMENT

The Department of Engineering Management was established in the year 2002, in the Faculty of Engineering, University of Peradeniya in order to cater for multidisciplinary managerial roles that engineers are expected to perform in the industry.

The need for the boundary-less organizational activities, which result from increasing competitive business environments as well as globalised technical advancements render it impossible for engineers to confine to a single discipline. In order to be in par with the growing demands of the role of the engineer as a manager, she/he has to be equipped with necessary managerial and soft transferable skills supplementary to the technical expertise gained through their relevant specialization. In addition, the engineering manager should link engineering advancement to economic development while being a socially and professionally responsible individual. Department is contributing to produce such professional engineering managers, well versed with requisite managerial & leadership skills with a broader perception of their professional responsibility and accountability towards the society and environment by integrating the engineering discipline and management concepts.

Secondly, the accreditation process for the degree programme in the field of engineering requires to develop, in engineers, the ability to function effectively as an individual and a member of multi-disciplinary and multi-cultural teams, with the capacity to be a leader or a manager as well as an effective team member. The understanding of social, cultural, global and environmental responsibilities of the professional engineer and the understanding of professional and ethical responsibilities and commitment to them are also required by the present day engineer. The Department of Engineering Management expects to satisfy these requirements of the accreditation process, while promoting the lifelong learning and building up capacity to do so, in the graduate engineers of the Faculty of Engineering, University of Peradeniya.

Finally, the department expects to fulfil the objective of blending all disciplines of engineering together to cater for a ‘whole concept,’ amalgamating the individual, vested interests of every department, which may result in a broader perception of the professional responsibility of an engineer.

Academic Staff

Head of the Department
GBB Herath, BScEng *Peradeniya*, MEng *AIT Bangkok*, PhD *Tokyo*

Senior Lecturers
KKK Sylva, BScEng. *Peradeniya*, MEng *AIT Bangkok*, MBA *PIM Jayawardenapura*, AMIE *SL*
SM Dissanayaka, BScEng. *Peradeniya*, MPhil *HKU Hong Kong*, AMIE *SL*
IWN Bandaranayake, BScEng. *Peradeniya*, MBA *AIT Bangkok*, MSc *SKEMA France*, AMIE *SL*

Lecturers
IDY Ekanayake, BSc Eng. *Peradeniya*, CEng, MIE *SL*

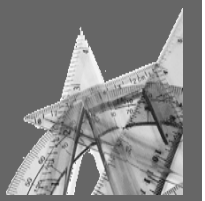
Courses Offered

Core Courses

MA201 Engineering Management (3 Credits)

Elective Courses

EF505 Management in Practice with Case Studies (3 credits)
EF510 Technology and Economic Development (3 credits)
EF522 Sri Lankan Technology (3 credits)
EF526 Marketing and Finance (3 credits)
EF530 Engineering Management (3 Credits)



DEPARTMENT OF ENGINEERING MATHEMATICS

A strong background in Mathematics is essential for the degree programme of Bachelor of the Science of Engineering in order to develop analytical thinking and the ability to use it as a tool to seek solutions to engineering problems. The courses in Engineering Mathematics have been designed keeping this in mind. In the first two years, Mathematics is taught as core course units for all undergraduates. The courses are continually updated by incorporating current techniques and new applications. As a result, most of the courses offered contain a strong computing component.

The students entering the Faculty have a wide spectrum of abilities and there are many students who are weak in Mathematics. Special attention is given to weaker students through small tutorial groups. A programme of remedial teaching for new entrants is also provided by the department every year. This is designed to help the students to bridge the gap between the school and the first year course in the Faculty. A particularly important aspect of each lecture series is the evaluation of the teaching performance, by the students, to provide the necessary feedback for improvements.

The department conducts a postgraduate diploma programme in Engineering Mathematics, which is currently a part time programme. This programme with a significant research component is designed especially to train engineering and science graduates to apply mathematical tools to solve problems in the industry. The department also provides research supervision to students reading for MPhil and PhD degrees in specified areas.

Several academic divisions have been established within the department in order to further the mathematics education of the engineers and to facilitate the development of research activities. Divisions have been established in areas in which the department has strong research potential. Currently, there are five distinct divisions within the department.

Division of Operations Research and Optimization
Division of Systems Modeling
Division of Software Engineering
Division of Decision Sciences and Statistics
Division of Mathematics and Engineering Education

The members of the department are also involved in developing mathematical, management and educational software packages for use in the department and for undergraduate and postgraduate programmes. Some of the specific areas of current interest include computer aided learning packages, optimization routines, mathematical modeling, real time systems, databases for inventory and students' performance data, and timetable scheduling software.

The department is also involved in research programmes in collaboration with research groups in foreign universities. Several members of the department have addressed the national needs by publishing text books for the G.C.E. (Advanced Level) Examination and for undergraduates. These books have been widely acclaimed as being authoritative by the experts in the relevant fields.

Academic Staff

Head of the Department
GWRMR Palamakumbura, BSc *Peradeniya*, MSc, PhD *Texas Tech*

Senior Professors
KS Walgama, BScEng *Moratuwa*, MEng *PII Netherlands*, MSc *Alberta*, PhD *Luleå*, CEng, MIE *SL*

Professors
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Senior Lecturers
K Perera, BSc *Jayawardenapura*, MA, PhD *SUNYAlbany*
DSK Karunasinghe, BScEng *Peradeniya*, PhD *NUS Singapore*
GWRMR Palamakumbura, BSc *Peradeniya*, MSc, PhD *Texas Tech*
SPC Perera, BScEng *Peradeniya*, MSc, PhD *Texas Tech*, MIEEE
MIM Ishak, BSc *Peradeniya*, MSc *Kansas*, PhD *Kansas*
R Meegaskumbura, BSc *Peradeniya*, MSc *Massachusetts*, PhD *Texas Tech*
CK Walgampaya BScEng *Peradeniya*, MSc, PhD *Louisville*
NL Jayatilake, BScEng *Peradeniya*, MPhil *Peradeniya*, AMIE *SL*
PAJ Gunatilake BScEng *Moratuwa*, MSc, PhD *Texas Tech*
RMS Dissanayake, BSc *Peradeniya*, MPhil *Peradeniya*

Courses Offered

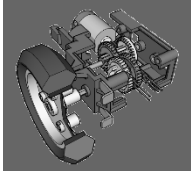
Core Courses

EM201 Mathematics III (3 credits)
EM202 Mathematics IV (3 credits)
EM203 Numerical Methods in Chemical & Process Engineering (3 credits)
EM308 Complex Analysis (2 credits); Prerequisites: EM201, EM202
EM313 Discrete Mathematics (3 credits)
EM314 Numerical Methods for Civil Engineers (2 Credit)

Technical Elective Courses

EM309 Industrial Statistics (3 credits); Prerequisites: None
EM310 Operations Research I (3 credits); Prerequisites: EM201, EM202
EM311 Mathematical Modelling (2 credits); Prerequisites: EM201, EM202
EM312 Fourier Analysis (3 credits); Prerequisites: EM201, EM202
EM501 Operations Research II (2 credits); *Prerequisite*: EM310
EM502 Optimization (3 credits)
EM503 Graph Theory (2 credits); *Prerequisites*: EM201, EM202
EM504 Evolutionary Algorithms (2 credits); *Prerequisites*: EM201, EM202
EM506 Design of Algorithms (2 credits); *Prerequisites*: EM201, EM202
EM507 System Simulation (2 credits)
EM508 Symbolic Mathematics (2 credits)
EM509 Stochastic Processes (2 credits); *Prerequisites*: EM201, EM202
EM510 Decision Theory (2 credits); *Prerequisites*: EM201, EM202
EM511 Regression Analysis (2 credits); *Prerequisites*: EM201, EM202
EM512 Sampling Theory (1 credit); *Prerequisites*: EM201, EM202
EM513 Design and Analysis of Experiments (2 credits); *Prerequisites*: EM201, EM202
EM514 Partial Differential Equations (2 credits); *Prerequisites*: EM201, EM202
EM515 Eigen Function Methods for Differential Equations (2 credits)
EM516 Advanced Engineering Dynamics (2 credits); *Prerequisites*: EM201, EM202
EM517 Nonlinear Dynamical System (2 credits); *Prerequisites*: EM201, EM202
EM518 Advanced Numerical Methods (2 credits); *Prerequisites*: EM201, EM202
EM519 Introduction to Finite Element Method (2 credits); *Prerequisites*: EM201, EM202
EM520 Solar Radiation (2 credits); *Prerequisites*: EM201, EM202
EM521 Integral Equations (2 credits); *Prerequisites*: EM201, EM202
EM522 Tensors (2 credits); *Prerequisites*: EM201, EM202
EM523 Calculus of Variations (2 credits); *Prerequisites*: EM201, EM202

DEPARTMENT OF MANUFACTURING AND INDUSTRIAL ENGINEERING



The Department of Manufacturing and Industrial Engineering, established as Department of Production Engineering in 1976, has produced about 1000 graduates specializing in the field of Production Engineering. In 2017, the department was granted approval by UGC to change the name of the undergraduate specialization degree programme to "Manufacturing and Industrial Engineering" to better reflect the attributes of the graduates and to be in line with industry trends.

The department aims to develop the profile of the Manufacturing and Industrial Engineer in two major complementary areas: (i) mastery of manufacturing technology, including manufacturing processes and industrial automation, and (ii) mastery of the design and operation of manufacturing systems, including aspects of industrial and manufacturing systems engineering.

Students specializing in Manufacturing and Industrial Engineering are free to make their choice by selecting optional courses appropriately. The core courses are designed to suit both categories.

The department is well equipped with modern manufacturing and laboratory facilities:

- Machining Laboratory (Computer Aided Manufacturing (CAM) facility with two CNC Machining Centers, CNC Turning Center, Laser Cutters, Wirecut EDM Machine, Injection Moulding machine)
- Robotics and Automation Laboratory (ABB Robot, Computer Integrated Manufacturing (CIM) System complete with SCARA robots, machine vision, machining and transport systems, hydraulic/pneumatic trainer kits)
- Additive Manufacturing Laboratory (including 3D Printers of both FDM and SLA type, 3D Scanner)
- Advanced Metrology Laboratory (including CNC Coordinate Measuring (CMM) facility, Laser Scan Micrometer, Surface Roughness Tester)
- CAD/CAM Laboratory (Licensed software includes SolidWorks & SolidCAM, FluidSim, Simulation software (Arena, Simul8) and Production Planning Software Suites (Siemens Tecnomatix Software Bundle))
- Sustainable Manufacturing and Design Laboratory

The Engineering Faculty Workshops are linked to the department. However, the former is run as an independent administrative unit with its own Director. The Engineering Workshops house a variety of conventional machine tools for metal working as well as a wood workshop.

The Department of Manufacturing and Industrial Engineering offers postgraduate programmes in:

- Manufacturing Engineering and
- Engineering Management

The department has ongoing research programmes in the following main thrust areas:

- Additive manufacturing
- CAD-CAM integration
- Machining
- Robotics and mechatronics
- Sustainable design and manufacturing
- Lean manufacturing
- Industrial automation
- Intelligent control
- Analytical and simulation modelling of manufacturing systems
- Six Sigma

The department provides consultancy services to the local industry in:

- Design, Assembly and Automation of Machines
- Technology Innovation
- Industrial Automation/ Robotics/ PLC Solutions
- System Design/ Evaluation
- CAD/CAM and Die & Mould Design
- Product Innovation and Prototyping
- Hydraulic/ Pneumatic Systems Design
- Welding Automation
- Machine Tools – Diagnostics/ Monitoring/ Innovative Machining
- Manufacturing Process Improvements
- Lean and Sustainable Manufacturing
- Eco Design and Product Life Cycle Analysis
- Industrial Engineering
- Manufacturing Systems Modeling and Simulation
- Plant Layout Design
- Materials Selection and Processing
- Manufacturing Processes, Economics and Human Factors in Manufacturing
- Statistics-based Quality Improvement (Six Sigma) in Manufacturing Processes
- Manufacturing Process Control
- Project Management
- Organizational aspects related to Manufacturing

Academic Staff

Head of the Department
CD Senanayake, BScEng *Peradeniya,* PhD *NUS*

Professor
SD Pathirana, BScEng *Peradeniya,* MSc *RUGhent,* DEng *Tokyo,* MIEEE, CEng, MIET, FIE *SL*

Senior Lecturers
NKBMP Nanayakkara, BScEng *Peradeniya,* PhD *Deakin*
RA Ekanayake, BScEng *Peradeniya,* PhD *UNSW*
CD Senanayake, BScEng *Peradeniya,* PhD *NUS*
KMAK Kulatunga, BScEng *Peradeniya,* PhD *UTS*
P Gamage, BScEng *Peradeniya,* PhD *Massey*

Lecturers
M Dharamawardana, BScEng *Peradeniya,* MSc *NFU*
AMBGDA Athauda, BScEng *Peradeniya*
HMMM Jayawickrama, BScEng *Peradeniya*
WMSB Kumarasinghe, BScEng *Moratuwa*

Table 10.1 Course structure for specialization in Manufacturing and Industrial Engineering

		CODE	TITLE	CREDITS	PRE-REQUISITES
YEAR 2	SEMESTER 3	CE 201	Mechanics of Materials I	3	-
		EE 280	Introduction to Electrical Engineering I	3	-
		EM 201	Mathematics III	3	-
		ME 211	Mechanics of Machines	3	-
		ME 213	Computer Aided Drafting and Solid Modeling	3	-
		PR 204	Product Design and Development	3	-
	SEMESTER 4	CE 207	Material Science I	3	-
		EE 281	Introduction to Electrical Engineering II	3	-
		EM 202	Mathematics IV	3	-
		PR 205	Machining Technology	3	-
		ME 209	Machine Design I	3	ME211, ME213
		PR 206	Manufacturing Planning and Control	3	EM 201
					.
YEAR 3	SEMESTER 5	CE 301	Mechanics of Materials II	3	CE 201
		EE 380	Electrical Power and Machines	3	-
		PR 314	Manufacturing Automation	3	EE 280, EE 281
		ME 306	Control Systems	3	-
		PR 315	Manufacturing Systems	3	PR 206
			Technical / General Electives		-
	SEMESTER 6	ME 302	Machine Design II	3	ME 209
		PR 316	Forming Processes	3	CE 201,CE 207
		PR 317	Quality and Reliability Engineering	3	-
			Technical / General Electives		

YEAR 4	**SEMESTER 7**	PR 404	CAD/CAM	3	PR204
		PR 408	Industrial Engineering and Decision Sciences	3	-
		PR 410	Manufacturing Engineering Project I	3	-
			Technical/ General Electives		
	SEMESTER 8	PR 409	Management Principles and Economics	3	-
		PR 411	Manufacturing Engineering Project II to earn eligibility for Class Honours	3	-
			Technical/ General Electives		

Courses Offered

Core Courses

PR204 Product Design and Development (3 credits)
PR205 Machining Technology (3 credits)
PR206 Manufacturing Planning and Control (3 credits)

PR314 Manufacturing Automation (3 credits)
PR315 Manufacturing Systems (3 credits)
PR316 Forming Processes (3 credits)
PR317 Quality and Reliability Engineering (3 credits)

PR404 CAD/CAM (3 credits)
PR408 Industrial Engineering and Decision Sciences (3 credits)
PR409 Management Principles and Economics (3 credits)
PR410 Manufacturing Engineering Project I (3 credits)
PR411 Manufacturing Engineering Project II (3 credits)

Technical Elective Courses

PR303 Machine Tool Engineering (3 credits)
PR311 Production Engineering for Mechanical Engineers (3 credits)
PR503 Control of Discrete Event Dynamic Systems (3 credits); Prerequisites: EM202, ME306
PR506 Manufacturing Processes (3 credits)
PR509 Plant Layout & Plant Management (3 credits)
PR510 Manufacturing Technology III (3 credits)
PR513 Modeling and Control of Mechatronic Systems (3 credits); Prerequisites: ME306
PR515 Financial and Management Accounting for Engineers (3 credits)
PR516 Sustainable Manufacturing (3 credits)
PR517 Lean Manufacturing (3 credits)
PR518 Performance Evaluation of Manufacturing Systems (3 credits); Prerequisites: PR315
PR519 Robotics and Autonomous Systems (3 credits); Prerequisites: ME 306, PR 513
PR520 Introduction to Nanotechnology (2 credits)
PR521 Additive Manufacturing (3 credits)

DEPARTMENT OF MECHANICAL ENGINEERING

Mechanical Engineering is at the heart of today's global industry where electronics, computers, and mechanical devices are increasingly becoming more and more integrated. The Department of Mechanical Engineering provides a broad knowledge and training necessary for the development of new technology and devices required for the advancement of such a multidisciplinary global industry. The program provides a wide education opportunity required for the understanding and application of physical phenomena in specific areas such as robotics and automation, machine design, and thermo-fluids.

The department houses state of the art laboratory equipment for developing a deeper understanding of the concepts. The Applied Mechanics laboratory has a unique collection of experimental and demonstration equipment, most of which were designed and fabricated in the Faculty. These are used in a problem based student centric fashion to develop a fundamental understanding of various resonance phenomena, advanced concepts in mechanics, and the operation of various machines. The Thermodynamics Laboratory houses both basic and advanced experimental facilities for heat transfer, combustion, engine testing and agricultural engineering. The laboratory also has several items of laboratory equipment in refrigeration and air-conditioning. It houses the best steam engineering facility in the country. Recent additions to the collection of laboratory equipment are unmanned vision based aerial and mobile robots, industrial mechatronic systems, multi-fuel test rigs, and ocean wave energy conversion systems. The department also has one of the largest computer aided modelling and simulations facilities in the country. Graduates who undergo this learning experience typically find postgraduate opportunities in globally reputed programmes or employment in research and development institutions, or as Engineers in industries such as automation, manufacturing, generation and transmission of power, transportation, refrigeration and air-conditioning, design, and maintenance of machinery.

The department has carried out pioneering research of international standing in vibration analysis, geometric methods in control for robotic systems, decentralized control of multi-agent systems, solar energy, ocean wave energy, combustion control and wind power. The current research interests and activities in the department include vision guided intelligent robots, multi-agent systems, alternative fuels and fuel additives, modelling and analysis of ocean wave energy conversion systems, development of alternative methods for refrigeration and air-conditioning, corrosion, nonlinear control theory, mechatronics, automobile engineering and computational fluid dynamics. The department also has a strong postgraduate program in these areas leading to full time MPhil and PhD degrees. It also runs a part time MSc program in building services engineering to cater to a popular demand in the local industry.

The department has also provided expert advice and consultancy services to industrial establishments in the state, corporate and private sectors in a number of areas relating to mechanical engineering. Among the services provided are the use of unmanned aerial vehicles for terrain mapping, testing of fuels and lubricants, calibration of equipment, design of mechanical systems, mitigation and measurement of noise and vibration, balancing of rotors, and design of industrial refrigeration systems for food & agriculture industry and post-harvest processing.

Academic Staff

Head of the Department
SDGSP Gunawardane, BScEng *Peradeniya*, MEng, PhD *Muroran*, MIE *SL*, CEng

Professor

L Rajapaksha, BScEng *Peradeniya*, MEng *AIT Bangkok*, PhD *London*, MIE*SL*, MIIAR, MASHRAE, CEng, FIMechE

Senior Lecturers
EMPB Boyagoda, BScEng *Peradeniya*, MEng, DEng *Yamaguchi*
SDGSP Gunawardane, BScEng *Peradeniya*, MEng, PhD *Muroran*, MIE *SL*, CEng
DAAC Ratnaweera, BScEng *Peradeniya*, PhD *Melbourne*
DHS Maithripala, BScEng *Peradeniya*, Mphil *Peradeniya*, MSc, PhD *Texas Tech*
WPD Fernando, BScEng *Moratuwa*, MSc, PhD *KTH-Stockholm*
JC Rajaguru, BScEng *Peradeniya*, MSc *Plymouth*, PhD *Waikato*

Lecturers

IW Kularatne, BScEng *Peradeniya*, MScEng *Peradeniya*
LU Bakmeedeniya, BScEng *Peradeniya*, MSc *KTH-Stockholm*
UA Higgoda, BScEng *Peradeniya*, MSc *KTH-Stockholm*

Senior Engineering Teaching Assistant

KGS Mangalika, BScEng *Peradeniya*, MEng *AIT Bangkok*

Engineering Teaching Assistant
U Kotakadeniya, BScEng *Peradeniya*

Table 11.1 Course structure for specialization in Mechanical Engineering

		CODE	TITLE	CREDITS	PRE-REQUISITES
YEAR 2	SEMESTER 3	ME 211	Mechanics of Machines	3	-
		ME213	Computer Aided Drafting and Solid Modelling	3	-
		CE201	Mechanics of Materials I	3	-
		CE202	Fluid Mechanics I	3	-
		EE280	Introduction to Electrical Engineering I	3	-
		EM201	Mathematics III	3	-
	SEMESTER 4	ME209	Machine Design I	3	ME211, ME213
		CE207	Materials Science I	3	-
		ME207	Applied Thermodynamics I	3	-
		ME205	Tribology and Power Transmission Elements	3	-
		EM202	Mathematics IV	3	-
		EE281	Introduction to Electrical Engineering II	3	-
YEAR 3	SEMESTER 5	CE301	Mechanics of Materials II	3	CE201
		CE309	Materials Science II	3	CE207
		ME301	Vibrations	3	-
		ME303	Applied Thermodynamics II	3	ME207
		ME306	Control Systems	3	-
			Technical Electives / General Electives		
	SEMESTER 6	ME302	Machine Design II	3	ME209
		CE304	Fluid Mechanics II	3	-
		ME309	Mechanical Engineering Individual Project	3	-
		PR311	Production Engineering for Mechanical Engineers	3	-
			Technical Electives / General Electives		

YEAR 4	SEMESTER 7	PR408	Industrial Engineering and Decision Sciences	3	-
			Technical Electives / General Electives		
		ME406	Mechanical Engineering Group Project I (to earn eligibility for Class Honours)	3	
	SEMESTER 8	PR409	Management Principles and Economics	3	-
			Technical Electives /General Electives		
		ME407	Mechanical Engineering Group Project II (to earn eligibility for Class Honours)	3	ME406

Courses Offered

Core Courses

ME211 Mechanics of Machines (3 credits)
ME202 Mechanical Engineering for Civil Engineers (3 credits)
ME213 Computer Aided Drafting and Solid Modelling (3 credits)
ME205 Tribology and Power Transmission Elements (3 credits)
ME207 Applied Thermodynamics I (3 credits)
ME209 Machine Design I (3 credits); Prerequisites: ME211, ME213
ME210 Thermodynamics for Electrical Engineers (2 credits)

ME301 Vibrations (3 credits)
ME302 Machine Design II (3 credits); *Prerequisite*: ME209
ME303 Applied Thermodynamics II (3 credits); *Prerequisite*: ME207
ME306 Control Systems (3 credits)
ME309 Mechanical Engineering Individual Project (3 credits)

ME406 Mechanical Engineering Group Project I (3 credits)
ME407 Mechanical Engineering Group Project II (3 credits); *Prerequisite*: ME406

Technical Elective Courses

ME501 Heat Transfer (2 credits); *Prerequisite*: ME 303
ME502 Ergonomics (2 credits)
ME503 Composite Materials (2 credits); *Prerequisite*: CE309
ME505 Advanced Control Engineering (2 credits); *Prerequisite*: ME306
ME506 Digital Systems Engineering (2 credits); *Prerequisite*: ME306
ME508 Automobile Engineering (2 credits); *Prerequisite*: ME202 or ME207
ME509 Non-linear Control Systems (2 credits); *Prerequisite*: ME306
ME520 Computer Aided Modeling and Finite Element Analysis (3 credits)
ME511 Advanced Vibration Theory (2 credits); *Prerequisite*: ME 301
ME512 Energy Technology (2 credits); *Prerequisite*: ME 303
ME513 Applied Thermodynamics III (2 credits); *Prerequisite*: ME 303
ME514 Maintenance Management (2 credits)
ME515 Mechatronics (3 credits)
ME518 Rigid Body Mechanics (3 credits)

GENERAL ELECTIVE COURSES

General elective courses are conducted for all fileds of specialization in the Specialization Programme. Overall coordination of these courses is done by the Engineering Education Unit (EEU) of the Faculty and individual course coordination is done by different departments. In addition, each department may offer a set of general elective subjects relevant to the field of specialization. Qualified staff members in the respectrive disciplines are channelled from or outside the Faculty to conduct the general elective courses. The general elective courses acceptable for claiming credits for each fields of specilaition are announced by relevant departments. A student has the freedom to choose his/her general electives from among the list of general elective courses recommended by his/her Department of Study, subject to the condition that he/she is required to earn a minimum of 02 credits from each one of the following three categories:

i. Management and Economics
ii. Arts and Humanities
iii. Political and Social Sciences

The general elective courses offered at present are given below. The list is subject to periodic revision:

CP551 Sustainable Development (3 credits)
EF501 The Engineer in Society (2 credits)
EF505 Management in Practice with Case Studies (3 credits)
EF509 Engineer as an Entrepreneur (3 credits)
EF510 Technology and Economic Development (3 credits)
EF511 Social Project (2 credits)*

EF513 Introduction to Music (2 credits)
EF516 Painting and Sculpture (2 credits)
EF519 Written English for Communication (1 credit)
EF520 Effective Communication in English through Speech (1 credit)
EF521 Intellectual Property (1 credit)
EF522 Sri Lankan Technology (3 credits)
EF524 Business Law (3 credits)
EF526 Marketing and Finance (3 credits)
EF528 Introduction to Digital Art (3 credits)

* This general elective course is not recommended for students in Civil Engineering specialization.

Table 12.1: General elective course categories

General Elective Course	Management and Economics	Arts and Humanities	Political and Social Sciences
CP551 Sustainable Development			✓
EF501 The Engineer in Society		✓	✓
EF505 Management in Practice with Case Studies	✓		
EF509 Engineer as an Entrepreneur	✓		
EF510 Technology and Economic Development	✓		✓
EF511 Social Project			✓
EF513 Introduction to Music		✓	
EF516 Painting and Sculpture		✓	
EF519 Written English for Communication		✓	
EF520 Effective Communication in English through Speech		✓	
EF521 Intellectual Property	✓		
EF522 Sri Lankan Technology	✓		
EF524 Business Law	✓		
EF526 Marketing and Finance	✓		
EF528 Introduction to Digital Art		✓	

INDUSTRIAL TRAINING AND CAREER GUIDANCE UNIT

Industrial Training and Career Guidance Unit (ITCGU) is responsible for arranging, monitoring and evaluation of industrial training in liaison with the National Apprentice and Industrial Training Authority (NAITA). This unit is also responsible for planning and organizing activities for developing other skills of undergraduates which are demanded by the engineering organizations and for guiding students for gainful employment prospects.

Industrial Training (TR400)

TR400 Industrial Training (6 credits) is a compulsory course and successful completion of the course is required for the award of the degree of Bachelor of the Science of Engineering. Students are given Pass/Fail grades and the student who scores highest marks at the assessment is awarded the "J.B. Dissanayake prize for Industrial Training".

A student who fails to satisfactorily complete the Industrial Training course will be required to undergo further training and appear for an assessment to be eligible for the award of the degree of Bachelor of the Science of Engineering.

Placements in the participating industries are arranged for undergraduates during the industrial training sessions in the academic calendar of the Faculty so that 20 to 24 weeks training in industry is achieved.

Undergraduates are expected to acquire hands-on experience not only in the engineering aspects of the work, but also in related matters such as management, industrial safety, quality assurance, ethical practices, sustainability practices etc. Students have to maintain a daily diary during training and submit a comprehensive report covering each period of training. The assessment is done at an interview conducted by a panel consisting of a practicing engineer from industry, an officer from NAITA, lecturers from the relevant department and the ITCGU. This assessment is normally conducted in the second semester of the final year of studies.

Career Guidance

Career Guidance has been recognized as an important part of the education and training of the undergraduate. The undergraduates are assisted by the ITCGU to select their future careers to suit their abilities, wishes and expectations. The ITCGU liaises with these industrial sector establishments to organize capacity building sessions to develop the skills required to be successful in the job market. These include orientation of the undergraduates to develop the career related skills such as communication, leadership and teamwork. These programmes are initiated during the orientation period of new entrants and are continued throughout the four year course duration The ITCGU maintains links with industry organizations and exchange information mutually benefiting each other.

The ITCGU plays a major role in organizing the annual Career Fair of the Faculty of Engineering. The major objective of organizing the Career Fair is to provide an opportunity for industrial organizations to get to know the potential of their future employees and for final year undergraduates to learn about the current trends in the employment market and the demands of the industrial sector.

Academic Staff

Director
WRMU Wickramasinghe, BScEng *Peradeniya*, PGDipIE *OUSL*, CEng, MIE *SL*

Senior Lectrurers
SB Wijekoon, BScEng *Peradeniya*, MEng *Moratuwa*, MBA *Deakin*, D.Tech *Deakin*, Dip in Commercial Arbitration, CEng, FIE *SL*, MICE *London*, Int PE, FIPM *SL*
WRMU Wickramasinghe, BScEng *Peradeniya*, PGDipIE *OUSL*, CEng, MIE *SL*

Lecturers
SWMSSK Wijeratne, BScEng *Peradeniya*, MScEng *Peradeniya*, AMIE *SL*
MMGV Shyamalee, BScEng *Peradeniya*, MEng *Nagoya*, AMIE *SL*
GKJ Perera, BScEng *Peradeniya*, AMIE *SL*

FEES

Fees payable by students will be determined in accordance with the decisions made by the university authorities and are subject to revision from time to time. Concessions are available to teachers and officers of the University of Peradeniya. Refund of fees is made only under exceptional circumstances.

Sri Lankan students should pay fees to the credit of the relevant account of the University of Peradeniya at the People's Bank or Bank of Ceylon.

Foreign students should pay the fees in foreign currency, viz., US dollars. They could do so by sending a Bank Draft/Tele Transfer made in favour of the Registrar of the University of Peradeniya. Non-citizens resident in Sri Lanka may pay the prescribed fees in local currency.

1 UNDERGRADUATE COURSES AND EXAMINATIONS

1.1 Fees Payable by New Entrants

Admission fee	Rs. 600.00
Registration Fee	Rs. 200.00
Laboratory Fee	Rs. 500.00
Other Fees*	Rs. 300.00
Total	Rs. 1600.00

***Other Fees:**

Sports Facilities Fee	Rs. 100.00
P. S. U.	Rs. 25.00
Arts Council	Rs. 60.00
Hall Facilities	Rs. 15.00
Medical Fee	Rs. 100.00

1.2 Fees payable in each academic year

Renewal Fee	Rs. 150.00
Other Fees*	Rs. 300.00
Total	Rs. 450.00

1.3 Examination Fees*

The undergraduate student is not required to pay any fees for the first attempt of an End-of-Semester examination. Fees are payable for subsequent attempts of End-of-Semester examinations of the semesters and Special Session in the General Programme in Engineering and Specialization Programme in Engineering.

* The fees payable are reviewed by the Faculty and the rates that apply will be announced at the beginning of each semester.

POSTGRADUATE COURSES AND HIGHER DEGREES

The perception among some professional engineers that postgraduate courses are for those seeking academic careers has by and large been dispelled, and engineers in the field/industry are increasingly aware of the benefits of such courses to update and advance their knowledge. The Faculty has sought to meet the resultant demand for advanced knowledge by offering appropriately designed postgraduate courses, with combinations of lectures, coursework and research in varying proportions and scope that lead to diplomas/degrees. The courses are available at five levels:

- Postgraduate Diploma in Engineering or in any other approved field of study – PGDip.
- Degree of Master of the Science of Engineering – MScEng.
- Degree of Master of Science – MSc
- Degree of Master of Philosophy – MPhil
- Degree of Doctor of Philosophy – PhD

The programmes are sufficiently flexible in structure to accommodate students with diverse professional backgrounds and varying degrees of financial and time constraints. Students are admitted to any one of the four distinct categories:

- Regular full-time postgraduate students
- Regular part-time postgraduate students
- Provisional students
- Casual students

Following postgraduate programmes are currently available in Faculty of Engineering.

Programme	**Coordinator**
Structural Engineering	Dr. (Mrs.) C. K. Pathirana
Environmental and Water Engineering	Dr. GBB Herath
Quantity Surveying	Dr. PBG Dissanayake
Geotechnical Eng. and Engineering Geology	Dr. MCM Nasvi
Electrical & Electronic Engineering	Dr. PJ Binduhewa
Wireless communication (Double Degree)	Dr. H Suraweera
Computer Engineering	Dr. RG Ragel
Mechanical Engineering	Dr. AC Ratnaweera
Manufacturing Engineering	Dr. KMAK Kulatunga
Engineering Management	Dr. KMAK Kulatunga
Highways and Traffic Engineering	Dr. WMVSK Wickramasinghe
Sustainable Built Environment	Dr. AMACS Bandara
Construction and Project Management	Ms. KKK Sylva
Chemical and Process Engineering	Dr. (Ms.) MA Elangasinghe
Engineering Mathematics	Dr. MIM Ishak

All the departments offer Postgraduate Diploma (by research)/ MPhil/ PhD programmes.

ACADEMIC FACILITIES

1 THE ENGINEERING LIBRARY

The Engineering Library meets the needs of the undergraduates, graduates and academic staff of the Faculty. Its collection is part of the stock of the Library of the University of Peradeniya. It contains a wide range of books and periodicals in Civil, Electrical, Mechanical, Production, Chemical, Computer Engineering, Management and Mathematics. It also has a fair collection of books on the Natural Sciences. It is constantly being brought up to date with new accessions. The collection of some important reference journals goes back to the 1930s. Presently there are about 50,000 books and periodicals available in this engineering library. Some electronic journal packages are also provided by the library. The present library in the new building was opened in 2000 to provide more reading facilities for the increasing student population.

All students are required to get themselves registered at the Library in the beginning of the first year, so that they can use bar coded University identity card for borrowing books. Orientation programmes are provided on the general use of the Library early in a student's career, followed by more specific instructions on the literature of particular subject fields, so that a student may have some insight into the depth and breadth of information available to him/her as and when he/she requires it.

Library Opening Hours

Monday to Friday	7.30 am – 6.30 pm
Saturday and Sundays	7.30 am - 4.15 pm
Closed on public holidays	

Requirements of undergraduate students, post-graduate students and academic staff and will, of course, to some extent rely on the inter-library loan system. Every effort is made to obtain the required literature from other libraries in Sri Lanka and abroad. Ready assistance is available to all Library users. Further details of the Library services may be found in the library website < http://www.lib.pdn.ac.lk/libraries/eng/>.

Senior Assistant Librarian
KPND Peiris, BSc *Peradeniya*, MPhil *Peradeniya*, MLS *Colombo*, ASLLA

2 ENGINEERING WORKSHOPS

The Engineering Workshops consist of the Machine Shop (metal work), the Fitting Shop, the Foundry, the Smithy, the Welding shop and the Carpentry Shop.

The Engineering Workshops have two main functions. Firstly, its resources and facilities are utilized for academic work and training of engineering undergraduates.

Experiments as well as training sessions are conducted for the first, third, and final year undergraduates in the areas of Workshop Technology, Production Engineering and Production Technology. In addition to these, the manufacture of necessary hardware for student projects is also carried out in the workshops.

The other function includes the manufacture of equipment for teaching and research, maintenance of machines and equipment, industrial training of undergraduates and NAITA (National Apprentice Industrial and Training Authority) trainees, industrial consultancy work (design, manufacturing of machines and mechanisms for industry), evaluation of craftsman and technical personnel, and a variety of fabrication work for the faculty.

Director
DAAC Ratnaweera, BScEng *Peradeniya,* PhD *Melbourne*

Workshop Engineer
MMK Sirisena, BScEng *Peradeniya,* CEng, MIE *SL*

3 COMPUTING CENTRE

The University Computing Centre (CC) was established in 1971 when the University acquired an IBM 1130 Computing System, the first in the country. In 1973 the CC was moved to a new building. The Computing Centre was absorbed into the newly established Department of Computer Sciences in 1985. Since 1995 it has been functioning as an independent unit.

During the eighties the Centre began to acquire microcomputers. It now possesses a variety of hardware that includes three servers and about 75 networked workstations that are running on a 100 Mbps switched Ethernet. Commonly used application software, compilers and Internet services are available for users.

The services provided by the Centre include

- The computing facilities for undergraduate and postgraduate courses which have computer based labs.
- Conducting the Foundation IT Course for the new entrants during their orientation period.
- Conducting supporting courses for academic and non-academic staff.
- Providing computer and peripheral repairs for the entire university.
- Developing Information Systems for the Faculty of Engineering.
- Coordinating and administrating the Faculty of Engineering e-Learning System (FEeLS).

Director
RMRDB Ranaweera, BScEng *Peradeniya*, MSBmE PhD *Purdue*, SMIEEE, AMIE *SL*

Lecturer
SHI Rathnapala, BSc *Colombo*, MSc *Kelaniya*

Programmer cum Senior System Analyst-GrI
KWDM Chandrasiri, BSc (*Hons) Peradeniya*, PGDip *Colombo*, MSc *Peradeniya*

Systems Engieneer-GrI
HMSH Bandara, BSc *Sabaragamuwa*, MSc *Peradeniya*

Instructor (Computer Technology)
DAN de Silva, BSc *Peradeniya*, MSc *Peradeniya*

4 ELECTRICAL & ELECTRONIC WORKSHOP

The central electronics workshop was set up in 1970 as a service unit attached to the Electrical and Electronic Engineering Department to undertake servicing and repairs to electronic equipment of a scientific nature belonging to all the faculties of the University. It has since extended its capabilities to the design and manufacture of small items of electronic equipment, with its services extended to scientific establishments outside the university. Currently the centre works as a separate unit belonging to the university.

Director
JRSS Kumara, BScEng, Mphil *Peradeniya*, Tech Lic, PhD *Chalmers*, MIEEE, AMIE *SL*

5 ENGLISH LANGUAGE TEACHING UNIT (ELTU); THE LANGUAGE LABORATORY

The medium of instruction in the Faculty of Engineering is English. New entrants are therefore called upon to communicate effectively in English. Since 1968, the Faculty of Engineering has made special provision for the teaching of English as a second language to the new entrants. An English Language Teaching Unit was set up in the Faculty in 1985 for the purpose of teaching English to first and second year students, and now regular classes are held for third year students as well. Classes are held for fourth year students as well as technical and clerical staff, on request.

A well-equipped language laboratory, installed in 1985, with audio-video facilities for 30 students and a master control unit for teachers, meets the needs of undergraduates and staff of all faculties of the University. In addition to self-access material for learners of English and other languages, expert guidance is also available in the Language Laboratory.

Co-ordinator
UG Karunaratne, BA *Peradeniya*

6 ENGINEERING EDUCATION UNIT (EEU); AUDIO-VISUAL FACILITY

The Engineering Education Unit was established in the Faculty of Engineering in 1985 primarily with the view to coordinating activities in the following areas:

- Staff development
- Curriculum development
- Provision of audio-visual facilities for educational purposes
- Freshmen orientation

The management and development of the EEU is the responsibility of a committee consisting of the Dean, the Director of the unit and members of the permanent academic staff appointed by the Faculty Board. The EEU has a professional audio-visual studio equipped with Non-Linear video editing and production system. EEU also have state of the art digital video and digital still cameras. Members of the teaching staff of the Faculty utilize these facilities to produce educational videos for use in their teaching and laboratory experiments. Three seminar rooms of capacities 105, 86 and 70 equipped with large screen multimedia projection facilities, digital white boards, visual system presenters and overhead projectors are maintained by the EEU. In addition, the audio visual systems of the Faculty conference room and E.O.E. Pereira Theatre are maintained by the EEU. The conference room has a seating capacity of 28 and is equipped with a digital whiteboard and a video conferencing system. The E.O.E. Pereira Theatre has seating capacity of 582 and is equipped with high power multimedia projectors and an extra large screen and a 6 mm portable film projector. The EEU has installed multimedia facilities to all lecture rooms and Drawing Office I of the Faculty. In addition, the EEU maintains and operates the public address system within the Faculty. From the year 2014, the EEU has been performing the overall coordination of the General Elective (GE) courses offered to 3rd and 4th year students of the Faculty.

Director
SMKB Samarakoon, BScEng *Peradeniya*, MEng *AIT Bangkok*, PhD *Cardiff*, MIET, CEng *UK*, CEng *SL*, MIE *SL*, MIEEE

7 CENTRE FOR ENGINEERING RESEARCH AND POSTGRADUATE STUDIES (CERPS)

The Engineering Research Unit originally established in 1990 was transformed to the Centre for Engineering Research and Postgraduate Studies in 2001. Since then CERPS, as it came to be known thereafter, has coordinated Research Activities and Postgraduate Studies in the Faculty of Engineering, and has been instrumental in the drafting of basic policy framework in this regard along with the Faculty Regulations governing postgraduate studies.

Activities of the Centre are organised along two axes:

- The Postgraduate Studies Arm of CERPS and
- The Research Arm of CERPS.

(a) The Postgraduate Studies Arm of CERPS

Mission: The mission of the Postgraduate Studies Arm of CERPS is the facilitation of Postgraduate Studies and related activities in the Faculty of Engineering by networking and coordinating all matters related to policy formulation, establishment, running, funding and development of individual Postgraduate Programmes in the Faculty to foster unhampered development of intra- and inter-departmental Postgraduate Programme initiatives.

The postgraduate studies organisation within the Faculty of Engineering is a network of Postgraduate (PG) Programmes each with a Programme Coordinator.

The Postgraduate Arm of CERPS provides the forum for policy formulation in postgraduate studies in Engineering.

(b) The Research Arm of CERPS

Mission: The mission of the Research Arm of CERPS is the facilitation of research activities in the Faculty of Engineering by networking and coordinating matters relating to policy formulation, establishment, running, funding and termination of individual Research Groups in the Faculty to foster unhampered development of individual and collective research initiatives by faculty members.

The research organisation within the Faculty of Engineering is a network of research groups and research teams.

The Research Arm of CERPS provides the forum for policy formulation in Engineering research.

The Research Arm coordinates Sessions on Engineering & Built Environment as part of Peradeniya University International Research Sessions (iPURSE). Coordination of the award and administration of University Research Grants for the Faculty of Engineering is also handled by CERPS.

Director
DN Uduwawala, BScEng *Peradeniya*, Tech Lic, PhD *KTH*, CEng, MIESL, SMIEEE

8 ENGINEERING DESIGN CENTRE (EDC)

The Engineering Design Centre (EDC) of the Faculty of Engineering, University of Peradeniya was established with the assistance from the Commonwealth Science Council in 1993, with the objective of supporting Sri Lankan industries through industrial consultancy, sponsored research and continuing professional development.

Vision: To become the leading commercial entity in the field of Engineering among the Universities of Sri Lanka.

Mission: To strengthen research and development (R&D) capacity of the University of Peradeniya by establishing sustainable partnership with industries, while supporting to upgrade the science and technology (S&T) education system of the University**.**

The Engineering Design Centre was funded by the Asian Development Bank (ADB) Science and Technology Personnel Development (STPD) Project under the Ministry of Science and Technology and its director heads the Centre. Policy decisions with regard to management and operation of the Centre will be conveyed to the Director by the EDC Management Committee. This Committee consists of eight members of the Faculty Board, the Director EDC and is headed by the Dean/ Engineering.

EDC directly involves in industrial activities and carries out administrative and financial aspects of engineering projects undertaken by the Faculty. The Faculty works with EDC project engineers to provide technical and engineering inputs to the Projects. These projects handle problems in the industry related to a wide spectrum of specialties in engineering.

The EDC became a self-supporting commercial entity with its own full-time staff with effect from 01.10.2004. Today EDC consists of full-time (contract basis) engineers in the sections of promotion, services and administration, and the Director.

Director
BGLT Samaranayake, BSc Eng *Peradeniya*, Tech Lic, PhD *KTH*, SMIEEE, AMIE *SL*

Engineers
P Wansekara, BScEng *Peradeniya*
R N De Alwis, BScEng *Peradeniya*

GENERAL FACILITIES

1 HALLS OF RESIDENCE

The University of Peradeniya is essentially a residential university and most of the students are given comfortable living accommodation and easy access to a wide range of facilities for recreation and relaxation in the University Park that are open to all students. There are eight Halls of Residence and a hostel for men, three Halls of Residence and a hostel for women, and four hostels for bhikkus. Expansion of accommodation has not kept pace with the increase in student intake.

2 SPORTS AND RECREATION

The campus has extensive facilities for sports and recreation, the hub of which is a large gymnasium for indoor sports such as badminton, basketball, netball, table tennis, weight lifting, wrestling etc. Outdoor sports grounds with ample space exist for cricket, rugby football, soccer, hockey, tennis, volleyball and other games. There are separate grounds for track and field athletic activities. Most significantly the 50 m swimming pool at Peradeniya is the only University swimming pool in Sri Lanka. It is available to all members of the University and to the public at large. All sports activities are supervised by the Department of Physical Education, and instructors and coaches are available to help students in their training.

3 STUDENT SOCIETIES

The diverse interests covered by societies open to students comprise a major attraction of life in a residential university. These societies are either university-based or faculty-based. The larger societies in the Faculty of Engineering are departmental groups, which have been in existence long enough to develop their own conventions and traditions. They are the Society of Chemical and Process Engineering Students (SCaPES), the Civil Engineering Society (CES Association of Computer Engineering Students (ACES), the Electrical and Electronic Engineering Society (EEES), the Mechanical Engineering Society (MES), and the Manufacturing Engineering Association (MEA). Students interested in music, drama, literature, politics, religion etc. join in the activities of the appropriate university societies or faculty societies based on extra-mural and, sometimes, esoteric interests.

4 RELIGIOUS ACTIVITIES AND PLACES OF WORSHIP

Religious activities are organised for the university as a whole, and there are five registered student societies:

- The Buddhist Brotherhood
- The Hindu Society
- Newman Society (for Roman Catholics)
- The Student Christian Movement
- The University Muslim Majlis

The University Park has places of worship for each of the five major religious denominations.

5 THEATRE

The E.O.E. Pereira Theatre in the Faculty of Engineering, with a seating capacity of 582 and excellent acoustics, is the largest theatre in the campus. Although built primarily for academic gatherings of engineering students, it is also a popular centre for dramas and musical concerts, and the venue for Special Convocations and meetings of learned societies.

6 STUDENTS CENTRE

The Faculty has a Students Centre with a range of facilities and is freely accessible to the students. It is also a popular venue for social gatherings of students.

7 HEALTH SERVICES

A team of medical officers and supporting staff at the University Health Centre provide health care for the campus community –students as well as staff. The Health Centre also has a medical laboratory. Health care takes the form of daily OPD service, IDP for minor ailments whilst emergency cases are referred to the Peradeniya Teaching Hospital or to the General Hospital, Kandy. Dental care is provided by the Faculty of Dental Sciences.

8 STUDENT COUNSELLING

The University provides counselling service, with assurance of complete confidentiality, to students facing problems of a personal, social or academic nature. The team of counsellors comprises several members of the senior academic staff of the different faculties and the medical officers of the Health Centre. Five of the counsellors belong to the Faculty of Engineering, and attend to the special needs of the engineering students.

9 THE FACULTY CANTEENS

There are two canteens in the Faculty that provide meals and refreshments. The Faculty of Engineering Canteen Committee, comprising staff and students of the Faculty, manages both canteens. The second canteen was opened in 2003 in response to the demands due to the increase in student intake. Each canteen has counters for the sale of stationery, drawing instruments etc. as well as facilities for photocopying and bookbinding.

10 ROAD, RAIL AND POSTAL SERVICES

The university community is served by the Sarasavi Uyana railway station and a Special Grade Post Office both located on the perimeter of the campus. There is also a small post office in the heart of the campus. Public roads run through the campus and carry bus services that link the Colombo-Kandy trunk road, which skirts the University Park. The Engineering Faculty is located between the lower Gampola road and upper Gampola road. Both routes have regular bus services. The Peradeniya Junction railway station is within walking distance, around 500 meters, from the Faculty. The distance by road is, however, longer at around 1.5 kilometres.

11 BANKING

The two major state banks, the Bank of Ceylon and the People's Bank, have had their branches within the campus for many years, but, a few years ago, the former moved into larger premises just outside the perimeter of the University Park. However, sub-branches of both banks, located in the Senate Building Extension, are open in the mornings of working days.

OTHER DETAILS OF THE FACULTY

1. ENGINEERING GRADUATES

Number of Graduates as of 31st December 2016	
Chemical & Process Engineering	403
Civil Engineering	6,361
Computer Engineering	703
Electrical & Electronic Engineering	2,384
Mechanical Engineering	1,488
Production Engineering	1,068
Total	**12,407**

2. THE FACULTY COLOUR

The official colour of the Faculty is pink, and is displayed by the garland that the engineering graduand receives at the Annual University Convocation. Since the colours of the University are gold and maroon, the Faculty uses pink and maroon on the covers of its publications.

3. PAST DEANS OF THE FACULTY

Prof. EOE Pereira	1950-65 & 1966-69
Prof. RH Paul	1965-66
Prof. JCV Chinnappa	1969-71
Prof. HB de Silva	1972-75
Prof. A Thurairajah	1975-77 & 1982-85
Prof. WP Jayasekara	1977-82
Prof. CLV Jayatilleka	1985-86 & 1988-89
Prof. M Amaratunga	1986-88
Prof. MP Ranaweera	1989-94
Prof. S Ranatunga	1994-99
Prof. WJN Fernando	1999-2002
Dr. SD Pathirana	2002-2005
Prof. SBS Abayakoon	2005-2009
Prof. SB Weerakoon	2009-2012

5. PAST PROFESSORS OF THE FACULTY

Prof. EOE Pereira	Civil Engineering
Prof. RH Paul	Electrical & Electronic Engineering
Prof. JCV Chinnappa	Mechanical Engineering
Prof. EF Bartholomeusz	Engineering Mathematics
Prof. WP Jayasekara	Electrical & Electronic Engineering
Prof. S Mahalingam	Mechanical Engineering
Prof. A Thurairajah	Civil Engineering
Prof. WMG Fernando	Electrical & Electronic Engineering
Prof. HB de Silva	Civil Engineering
Prof. M Amaratunga	Civil Engineering
Prof. JA Gunawardena	Electrical & Electronic Engineering
Prof. CLV Jayatilleke	Mechanical Engineering
Prof. R Galappatthi	Civil Engineering
Prof. RJKSK Ranatunge	Production Engineering
Prof. WJN Fernando	Chemical Engineering
Prof. TDMA Samuel	Engineering Mathematics
Prof. GE Amirthanathan	Civil Engineering
Prof. MP Ranaweera	Civil Engineering
Prof. S Sivasegaram	MechanicalEngineering
Prof. SRH Hoole	Electrical & Electronic Engineering
Prof. SB Siyambalapitiya	Engineering Mathematics
Prof. N Ekanayake	Electrical & Electronic Engineering
Prof. KGHCN Seneviratne	Civil Engineering

6. EMERITUS PROFESSORS OF THE FACULTY

Prof. RH Paul	1967
Prof. EOE Pereira	1971
Prof. WMG Fernando	1990
Prof. WP Jayasekara	1996
Prof. S Mahalingam	1996
Prof. JA Gunawardena	2003
Prof. CLV Jayatilleke	2004
Prof. TDMA Samuel	2006
Prof. MP Ranaweera	2008
Prof. WJN Fernando	2011
Prof. EMN Ekanayake	2012

7. HONORARY DOCTORS OF SCIENCE

Prof. EOE Pereira	1978
Prof. RH Paul	1981
Prof. A Thurairajah	1994
Eng. ANS Kulasinghe	2005

ANNEXURE I

RULES AND REGULATIONS RELATING TO THE DEGREE OF BACHELOR OF THE SCIENCE OF ENGINEERING

REGULATIONS RELATING TO THE DEGREE OF BACHELOR OF THE SCIENCE OF ENGINEERING

1. This regulation may be cited as the University of Peradeniya, Sri Lanka, Regulation Number [ST/349/8.3.1.6/13] and amendment as per the UGC Circular No.901 for the Degree of Bachelor of the Science of Engineering (BScEng) that will come into effect from 1st of October 2011.

2. The programme of study for the Degree of Bachelor of the Science of Engineering shall be of four academic years' duration and shall consist of General Programme in Engineering and Specialization Programme in Engineering prescribed by this Regulation and the Rules hereunder.

3. Subject to provisions of this regulation, the Faculty Board of the Faculty of Engineering shall make appropriate Rules for the conduct of the degree programme.

4. A candidate may be admitted to the Degree of Bachelor of the Science of Engineering if he/she
    a) has been admitted as a student of the University under the Statutes of the University governing the admission of students to the University;
    b) has thereafter followed to the satisfaction of the Vice Chancellor the courses of study prescribed by this Regulation and the Rules hereunder;
    c) has successfully completed or been exempted from the General Programme in Engineering; and
    d) has successfully completed the Specialization Programme in Engineering.

5. The contents, the method of assessment and the credit values of courses shall be prescribed by the Faculty Board on approval of the Senate for each course of the General and Specialization Programmes in Engineering.

6. Courses shall be offered in semesters scheduled during the programme of study and students shall register for courses they wish to follow in each semester.

7. In order to obtain credits from a course, a student is required to follow the course satisfactorily and attain a minimum specified standard in the evaluation of the course as prescribed by Rules.

8. The credit load of a student in a semester should not exceed a maximum specified by Rules.

9. The Senate may prescribe courses and/or training, whether inside or outside the University, in addition to the courses specified by Rules. A candidate shall not be deemed to be qualified for the Degree of Bachelor of the Science of Engineering unless he/she has completed such courses and/or training to the satisfaction of the Vice Chancellor.

10. A student registered to the programme of study, shall follow the programme of study without discontinuity, except in the event of his/her being prevented by the university from following the programme of study, until he/she completes the programme of study subject to the maximum period stipulated for completion of the programme of study in this Regulation.

11. In the event of discontinuity in following the programme of study without the approval of the Dean as prescribed by Rules, the student will be considered to have abandoned the programme of study. A student who has abandoned the programme of study will not be readmitted except with the approval of the Senate on the recommendation of the Faculty Board.

Course Evaluation

12. The Faculty Board with the approval of the Senate shall appoint an Evaluation Panel for each course of the General and Specialization Programmes in Engineering offered in every semester.

13. The Evaluation Panel for a course shall comprise at least three members including a coordinator, a moderator, and members of the academic staff and Visiting Lecturers teaching the course concerned.

14. Each Evaluation Panel shall be responsible for the assessment of students in respective courses by means of oral, practical and/or written assessments as necessary.

15. Due to compelling reasons the performance of a student in a course may be re-evaluated by a Review Panel appointed by the Faculty Board on the recommendation of the Head of the Department concerned and/ or the Dean with the approval of the Senate.

16. The Dean may authorize a make-up examination in respect of a student who fails to face a scheduled examination of a course for a valid reason as prescribed by Rules.

17. Under exceptional circumstances the Dean may allow a student who fails to comply with a compulsory requirement of a course to fulfil such requirement at a later date as prescribed by Rules.

GENERAL PROGRAMME IN ENGINEERING

18. The General Programme in Engineering shall be of duration of one academic year, and shall be provided as courses equivalent to the total course credits as prescribed by Rules.

19. A student may be exempted from courses of the General Programme in Engineering, provided that he/she has obtained an equivalent qualification or qualifications as approved by the Senate on the recommendation of the Faculty Board.

20. For a student to be deemed to have successfully followed the General Programme in Engineering, he/she shall have followed the courses to the satisfaction of the Vice Chancellor or exempted from the courses prescribed by Rules.

21. (a) A student shall be deemed to have successfully completed the General Programme in Engineering if he/she
    - i has been exempted from all the courses prescribed by Rules; or
    - ii has successfully followed the courses and reached the minimum standard required for the successful completion of the Programme, during the period of study, as prescribed by Rules; or
    - iii has been exempted from some of the courses prescribed by Rules and has successfully followed the remaining courses and reached the minimum standard required for the successful completion of the Programme, during the period of study, as prescribed by Rules.

    (b) A student shall be deemed to have provisionally completed the General Programme in Engineering if he/she
    - i has been exempted from the courses required for the provisional completion of the Programme as prescribed by Rules; or
    - ii has successfully followed the courses and reached the minimum standard required for the provisional completion of the Programme, during the period of study, as prescribed by Rules; or
    - iii has been exempted from some of the courses prescribed by Rules and has successfully followed the remaining courses and reached the minimum standard required for the provisional completion of the Programme during the period of study, as prescribed by Rules.

    (c) A student who has failed to successfully complete the General Programme in Engineering as in (a) above may be allowed to follow the courses in which he/she has not reached the minimum standard required for the successful completion of the Programme.

22. A Special Session may be conducted after completion of the final evaluation of the courses in the General Programme in each academic year.

    a) For a student to follow a course in the Special Session he/she should have satisfactorily followed the same course when it was offered during the same academic year.
    b) A student who fails to complete the General Programme, shall be allowed to follow up to a maximum of three courses in the Special Session subject to (a) above, provided that the grades accumulated by

the student will potentially allow the student to provisionally or successfully complete the General Programme in Engineering.

c) A student who has successfully or provisionally completed the General Programme in the same academic year and wishes to improve grades up to "C" grades shall be allowed to register for up to a maximum of three courses subject to (a) above, during the Special Session.

23. A student who has not qualified in a course by the end of the Special Session will be required to follow the course in a subsequent semester in which the course is offered in order to qualify in that course.

24. Any student who does not successfully complete the General Programme in Engineering within one academic year of entering the Faculty may successfully complete the General Programme in Engineering on accumulation of the required minimum grades.

25. Not withstanding the fact that he/she may otherwise be eligible, a student shall not follow any of the courses of the General Programme in Engineering after a period of three academic years from the time of admission to the Faculty, unless he/she has provisionally completed the General Programme in Engineering. However, a student who fails to meet this requirement may be permitted to follow any of the courses of the General Programme in Engineering with the special consent of the Senate granted on the recommendation of the Faculty Board.

SPECIALIZATION PROGRAMME IN ENGINEERING

26. The Specialization Programme in Engineering shall be of duration of three academic years and shall be offered as courses to a specified total number of credits under different fields of specializations as prescribed by Rules.

27. A student should have successfully or provisionally completed the General Programme in Engineering for he/she to be qualified to register for the Specialization Programme in Engineering.

28. Streaming of a student into a field of Specialization Programme is based on available positions under different fields of Specialization Programmes and his/her preference as well as the performance in the General Programme in Engineering as prescribed by Rules.

29. Where a prerequisite course or courses are prescribed for any course of the Specialization Programme in Engineering, a student shall be permitted to follow that course only if he/she has attained the minimum requirement for the prerequisite course or courses stipulated in Rules.
However, a student who has satisfactorily followed but not attained the minimum requirements stipulated for the prerequisite course or courses for a given course may be allowed to follow that course with special permission granted by the Dean, based on a written request.

30. For a student to be deemed to have successfully followed the Specialization Programme in Engineering, he/she shall have followed the courses prescribed by Rules to the satisfaction of the Vice Chancellor.

31. A student shall be deemed to have successfully completed the Specialization Programme in Engineering if he/she has
    a) successfully completed the General Programme in Engineering before the commencement or within a period of three academic years from the commencement of the Specialization Programme in Engineering during the period of study, and
    b) has successfully followed the courses and reached the minimum standard required for the successful completion of Programme, within five academic years from the commencement of the Specialization Programme in Engineering, as prescribed by Rules.

32. A student who has not completed a course as prescribed by Rules may register and follow the course in a subsequent semester in which the course is offered in order to complete that course.

33. A student, upon fulfilment of graduation requirements as prescribed by the Rules, shall apply to Dean of the Faculty of Engineering for the award of the degree of Bachelor of the Science of Engineering.

34. A student shall be deemed to be eligible for the award of the degree of Bachelor of the Science of Engineering with First Class Honours, Second Class Honours (Upper Division or Lower Division) or Third Class Honours if he/she has successfully completed the General Programme, and the Specialization Programme in Engineering within three academic years from the commencement of the Specialization Programme in Engineering and has secured the minimum required grade point average from the courses as prescribed by Rules.

35. Not withstanding the provisions of 34 above, a student who takes longer than three academic years from the commencement of the Specialization Programme in Engineering may be deemed to be eligible for the award of the degree of Bachelor of the Science of Engineering with Honours by the Senate on the recommendation of the Faculty Board.

36. A student who has successfully completed the Specialization Programme in Engineering but is not deemed eligible for a degree with Honours under the provisions of 34 above shall be eligible for the award of the degree of Bachelor of the Science of Engineering.

Special Considerations

37. Not withstanding the above provisions, each individual case may be dealt with on the basis of its own merit by the Faculty Board, subject to approval by the Senate.

-------- End (Regulations) ---------

RULES RELATING TO THE DEGREE OF BACHELOR OF THE SCIENCE OF ENGINEERING

1. Programme Duration

1.1. The programme shall be of four academic years duration in 8 semesters, with the General Programme in Engineering of one academic year comprising 2 semesters and a Special Session, and the Specialization Programme in Engineering of three academic years comprising 6 semesters and an industrial training course of total duration not less than 20 weeks.

1.2. Each semester shall be normally of 15 weeks' duration. The Special Session following the second semester of the General Programme shall be normally of 8 weeks' duration. The General Programme in Engineering may be preceded by a Foundation Term of 6 -10 weeks' duration.

2. Courses

2.1 One course credit is equivalent to 15 hours of lectures, with an hour of tutorial work or two hours of practical classes or assignments taken as equivalent to a lecture hour. The number of credits assigned to each course is in accordance with the total number of equivalent lecture hours associated with the course.

2.2. Each course shall be conducted within a single semester. However, certain courses may be allowed a longer duration by the Senate on the recommendation of the Faculty Board.

2.3. Students shall register for the courses they wish to follow in each semester from the courses offered in the relevant semester as recommended during the period announced for registration. The course selection may be changed during the add/drop period specified at the beginning of the semester. No change to course registration is allowed after the add/drop period except under special permission granted by the Dean.

2.4. A student once registered to a course in a semester will receive a grade for the course in his transcript at the end of the semester. Any registration for the same course at a later offering will be considered as repeating the course except where incomplete grade has been awarded as described in 4.1 below.

2.5. The recommended load of a student in a semester at the Faculty of Engineering is 18 credits and the maximum number of credits allowed is 24 credits in a semester.

2.6. To be considered to have satisfactorily followed a course, a student is required to have at least 80% attendance based on the total number of equivalent lecture hours of the course as specified in 2.1 above.

2.7. End of semester examinations shall be held during the second week following the end of each semester. End of Special Session examinations shall be held immediately following the end of the Special Session.

2.8. For a student to be eligible to be considered for a make-up examination for a scheduled examination in any course that he/she fails to attend for a valid reason he/she is required to submit a written request stating the reasons to the Dean as early as possible but not later than one week from the date of the examination.

2.9. Courses and course evaluations in the entire programme shall be conducted in the English medium.

2.10. A student may request with valid reasons for leave of absence from the program of study for the duration of a whole semester. The request shall be made in writing to the Dean prior to the commencement of the semester concerned.

3. Programme Contents

3.1. The General Programme in Engineering

3.1.1. The General Programme in Engineering shall comprise the mandatory courses shown in Table 3.1 with course credits as indicated therein. The courses are subject to change by the Faculty Board with the approval of the Senate. Any such change shall be announced to the students prior to the commencement of the General Programme.

Table A1.1 Courses in the General Programme

Course	Code	Credits
English I	GP 101	3
English II	GP 102	3
Mathematics I	GP 103	3
Mathematics II	GP 104	3
Computing	GP 106	3
Electricity	GP 108	3
Materials Science	GP 109	3
Engineering Mechanics	GP 110	3
Elementary Thermodynamics	GP 111	3
Engineering Measurements	GP 112	3
Fundamentals of Manufacture	GP 113	3
Engineering Drawing	GP 114	3
Total		36

Grades are awarded for all courses excluding English II (GP 102), which is offered on a pass/fail basis.

3.1.2. A student who has successfully completed the General Programme in Engineering by satisfying the requirements as given in Section 5 below or been exempted from the General Programme in Engineering shall be deemed to have earned an equivalent of 36 credits for the fulfilment of the requirements for the award of the degree of Bachelor of the Science of Engineering from the General Programme as set out in Sections 7 and 8 below.

3.1.3. Students who are eligible to follow courses offered during the Special Session are required to register to the courses during the period announced for registration at the beginning of the Special Session. No change to course registration is allowed after this period.

3.1.4. A student shall not be permitted to register or to have his/her performance evaluated in any course in the General Programme in Engineering after three academic years from the admission to the Faculty or in the event of him/her provisionally completing the General Programme in Engineering, three academic years from the commencement of the Specialization Programme in Engineering.

3.2. The Specialization Programme in Engineering

3.2.1. The Specialization Programme in Engineering shall comprise core, technical elective and general elective courses and a mandatory industrial training course, as prescribed and recommended by the Faculty Board and approved by the Senate. The courses are subject to variation by the Faculty Board with the approval of the Senate with at least one year's notice to the students of any such change in the core courses before it takes into effect.

Grades are awarded for all courses excluding Industrial Training course which is offered on a pass/fail basis.

3.2.2. The credit requirements from the selected Specialization Programme are given in Table 3.2 below.

Table A1.2 Credits requirements from core and technical elective courses and general elective courses in the Specialization Programme*

Credits for BSc Eng Degree				Credits for BSc Eng Degree with Class Honours			
Core & Technical elective courses	General elective courses	Industrial training course	Total	Core Courses & Technical elective courses	General elective courses	Industrial training course	Total
84	12	6	102	93	15	6	114

*Some changes are being introduced in Civil Engineering degree program with regard to the credit distribution

3.2.3. A student who has successfully completed the Specialization Programme in Engineering shall be deemed to have earned the required credits for the fulfilment of the requirements for the award of the degree of Bachelor of the Science of Engineering from the Specialization Programme as set out in Sections 7 and 8 below.

3.2.4. Students are required to select Technical and General Elective courses chosen from the list of courses recommended by the relevant department of study. A student is required to obtain a minimum of two credits from each subset of General Elective Courses in the following three categories prescribed and recommended by the Faculty Board and approved by the Senate:

Management and Economics
Arts and Humanities
Political and Social Sciences

3.2.5 A student shall not be permitted to register or to have his/her performance evaluated in any course after the lapse of five academic years from the commencement of the Specialization Programme in Engineering.

3.2.6 Students shall apply with their preferences to register for a Specialization Programme at the end of the General Programme. When number of students applied for a field of Specialization Programme exceeds the available positions in the Specialization Programme concerned, the priority will be given to students based on the total of the Grade Points of the courses in the General Programme except English II (GP 102) obtained in his/her first

attempt. When two or more students have the same total of the Grade Points, students with the most number of higher grades will be given priority.

4. Method of Assessment

4.1 Grade points shall be awarded for each course with grade points allocated on a four-point scale as shown in the table below. The table also shows the recommended conversion from percentage score to a grade where assessment for a course is expressed as a percentage score.

Marks	Grade	Points
> 85	A+	4.0
80 - 84	A	4.0
75 - 79	A-	3.7
70 - 74	B+	3.3
65 - 69	B	3.0
60 - 64	B-	2.7
55 - 59	C+	2.3
50 - 54	C	2.0
45 - 49	C-	1.7
40 - 44	D+	1.3
35 - 39	D	1.0
< 35	E	0.0

Normally, the minimum required grade to earn credit in any course shall be a C.
The maximum grade point accruing to a student repeating a course shall correspond to a grade C.
To be eligible to follow a course with prerequisites, a student should have a grade of D or above in every course that is stipulated as prerequisite.

Under exceptional circumstances, acceptable to the Faculty Board, the Dean may authorize awarding an "Incomplete" grade to a student who fails to comply with a compulsory requirement of a course based on a written submission supporting compelling reasons. An "Incomplete" grade will enable the student to complete the course concerned at a later date with the approval of the Dean.

4.2. The Grade Point Average (GPA) is the weighted average of the grade points secured by the student in the courses that are valid for calculating the GPA for the programme concerned and is calculated as follows:

$$GPA = \frac{\sum_{i=1}^{N} C_i \, g_i}{\sum_{i=1}^{N} C_i}$$

where C_i is the credit of the i^{th}course, g_i is the best grade point earned for the course and N is the total number of courses offered that are valid for the calculation of the GPA; and the GPA is rounded up to the nearest 0.05.

English II is not considered in the calculation of the GPA in the General Programme.
The General Elective courses and the Industrial Training course are not considered in the calculation of the GPA in the Specialization Programme.
For a student repeating a course, the best grade earned subject to a maximum of 'C', should be considered for the calculation of the GPA.

5. Requirements for Successful Completion of the General Programme in Engineering
A grade of "Pass" in English II (GP 102); and

either: (a) a minimum GPA of 2.00 in the mandatory courses excluding English II *(*GP 102), with a grade of D or above in one course, and grades of C or above in the remaining courses;

or: (b) a minimum GPA of 2.30 in the mandatory courses excluding English II *(*GP 102*)*, with grades of D or above in two courses and grades of C or above in the remaining courses.

6. Requirements for Provisional Completion of the General Programme in Engineering
A grade of "Fail" in English II (GP 102); and

either: (a) a minimum GPA of 2.00 in the mandatory courses excluding English II (GP 102), with a grade of D or above in one course, and grades of C or above in the remaining courses;

or: (b) a minimum GPA of 2.30 in the mandatory courses excluding English II (GP 102), with grades of D or above in two courses and grades of C or above in the remaining courses.

7. Requirements for the Award of the Degree of Bachelor of the Science of Engineering

a) Successful completion of the Specialization Programme within the stipulated period with a minimum GPA of 2.00.

b) Successful completion of mandatory training courses as prescribed by the Faculty Board with the approval of the Senate.

c) Securing minimum total of 132 credits excluding the credits from industrial training course but including the credits that accrue to the student on the successful completion of the General Programme in Engineering.

i. A student who has followed the prescribed courses with a combined total of 96 credits excluding credits from industrial training course in the Specialization Programme in Engineering may be deemed to have earned minimum of 96 course credits, provided that the grade in any of the courses is not below a D and the cumulative credit deficit (CCD), defined as follows, does not exceed 12.

ii. $CCD = \sum c_i d_i$ for all courses with grade of D, D+ or C-,

iii. Where c_i is the number of credits associated with a course in which the student has secured a grade of D, D+ or C-, and d_i is the deficit weightage, defined as 1 for a D, 2/3 for a D+ and 1/2 for a C-.

8. Requirements for the award of the Degree of Bachelor of the Science of Engineering with Honours

a) Successful completion of the Specialization Programme within the stipulated period with a minimum GPA of 2.00.

b) Successful completion of mandatory training courses prescribed by the Faculty Board with the approval of the Senate.

c) Securing a minimum total of 144 credits excluding the credits from the Industrial Training course but including the credits that accrue to the student on the successful completion of the General Programme in Engineering.

A student who has followed the prescribed courses with a combined total of 108 course credits excluding the credits from the Industrial Training course in the Specialization Programme in Engineering may be deemed to have earned minimum 108 course credits, provided that the grade in any of the courses is not below a D and the cumulative credit deficit (CCD), defined above under Section 7, does not exceed 12.

The grade point average calculated from the courses in the Specialization Programme excluding general elective courses and the industrial training course for the award of Honours are as follows:

First Class Honours:	GPA $\geq$ 3.70
Second Class Honours (Upper Division):	3.30 $\leq$ GPA $<$ 3.70
Second Class Honours (Lower Division):	3.00 $\leq$ GPA $<$ 3.30
Third Class Honours:	2.00 $\leq$ GPA $<$ 3.00

9. Claiming of the Degree

A student who has satisfied the requirements for the Award of the Degree of Bachelor of the Science of Engineering with or without Honours as specified in Sections 7 and 8 above shall claim the degree by submitting the duly completed degree claim form within the period announced in each academic year for claiming the degree.

A student is permitted to claim the total credits required under different categories specified in Section 3.3.2 either by claiming to the exact figure or to the nearest highest figure in a combination of courses acceptable to the Dean of the Faculty. The GPA is based on the total credit values of the courses claimed.

10. Special Considerations

Not withstanding the above provisions, each individual case may be dealt with on the basis of its own merit by the Faculty Board, subject to approval by the Senate.

---------- End (Regulations) ---------

ANNEXURE II

STUDENT GUIDE TO REGISTRATION AND COURSE COMPLETION

STUDENT GUIDE TO REGISTRATION AND COURSE COMPLETION

The students should conform to the Rules and Regulations of the Undergraduate Programme of the Faculty of Engineering given in Annexure I. Any clarification on the contents therein may be sought from the Dean or Assistant Registrar of the Faculty. Following section provide answers only to frequently asked questions.

a) The course selection may be changed during ADD/DROP period, after which no changes in registration are possible. The students who were unable to drop a course during the ADD/DROP period should follow the whole course and the grade will appear in the Academic Transcript.

b) After the ADD/DROP period the total recommended work load from the registered courses for the Semester is 18 credits and should not exceed 24 credits. The credits from TR400: Industrial Training Course which is normally conducted during the vacation is outside this limit.

c) The students who fail to satisfactorily follow the course will get a grade E for the particular course. Note: Students who have failed to satisfy 80% attendance requirement of a course are considered to have not satisfactorily followed the course.

d) Normally a grade of C is required to earn credit in any course. If the grade is poor (less than C) the course can be repeated in a subsequent semester provided that the timetable allows to fulfil the attendance requirement. However, the maximum grade awarded for a repeated course unit is a "C".

e) Only those who have a potential to Complete or Provisionally Complete the General Programme by registering to a maximum of 3 courses and obtaining credits from them are allowed to register for the Special Session of the General Programme. In order to be eligible to register to a course in Special Session of the General Programme, a student should have followed it satisfactorily in the Semester 1 or 2 of the same academic year.

f) Specified number of credits should be obtained from the general elective courses recommended by your Department. Also, a minimum of 02 credits should be earned from the courses of each of the three categories; Management & Economics, Arts & Humanities and Political & Social Sciences

g) Following a new elective course, the students have a chance of earning a grade as high as A+. Therefore, repeating an elective course which gives a maximum grade of C may not be productive.

h) Students can follow more technical/general elective courses than the minimum number required for successful completion of the degree. All the credits and grades of courses including repeated courses followed by a student will be shown in the academic transcript. However, a student can select the elective courses in which he/she has obtained the best grades to satisfy the GPA and credit requirements for the degree subject to the approval of the relevant Department.

i) The sum of the credits of the selected electives (both technical and general separately) may sometimes exceed the minimum requirement by 1 credit due to different credit values from 1 to 3. This is allowed.

j) The student can graduate with Class Honours if he/she completes the minimum graduation requirements within three years of entering the Specialization Programme in Engineering. Any student who has failed to complete the minimum graduate requirements within three years of entering the specialization programme in Engineering is not eligible to get Class Honours unless if he/she has been granted special permission.

k) The student should apply for graduation and demonstrate the completion of all requirements for graduation by filling the Degree Claim Form (DCF).

l) If a student falls ill while in residence, he/she should immediately get in touch with the Chief Medical Officer of the University Health Centre. If the student falls ill at home or elsewhere during sessions or examination time, his/her guardian should inform the Dean of the Faculty by a letter within one week stating the nature of illness, the name of the attending doctor etc.

m) If a student fails to attend an examination of a registered course due to illness or other exceptional reason and if he/she wishes to request for a makeup examination, he/she should make a request from the Dean of the Faculty for a makeup examination by a letter by the student himself or by a third person within one week of the examination of his/her absence with the valid reason for absence for consideration.

n) To be excused for absence from examinations, coursework etc. for medical reasons, the student should submit to the Dean of the Faculty a valid Medical Certificate conforming to the format of a medical certificate issued by a Government Hospital.

o) The medical certificate should be obtained from the Chief Medical Officer of the University or a District Medical Officer or, where treatment from a specialist is necessary, from a consultant specialist in the relevant field, or the Head of a Government Base Hospital, or the Medical Superintendent of a Provincial Ayurvedic Government Hospital. Under exceptional circumstances, the University Medical Board may accept medical certificates issued by a private hospital or by a registered private medical practitioner.

p) A student seeking to get his/her registration deferred at the time of registration should inform the University, giving reasons for such deferment, and obtain permission from the University for such deferment.

q) If a registered student is compelled to discontinue his/her course of study for any reason, he/she should notify the Dean of the Faculty as soon as possible to obtain permission to be away from the University. If a registered student of the University has abandoned his/her course of study without notifying the Dean, his/her request for readmission will not be entertained.

r) A request for absence, where granted, is for a maximum of one academic year, except on approved medical grounds. A request granted on medical grounds is for a maximum of two academic years. Readmission of the student is subject to the availability of a place in the Faculty at the time of re-admission. If a student fails to have his/her registration renewed at the beginning of each academic year as required, his or her name will be deleted from the class list of the Faculty, and the student will be informed accordingly.

ANNEXURE III

FINANCIAL ASSISTANCE AND AWARDS

FINANCIAL ASSISTANCE AND AWARDS

Financial assistance is normally provided to needy Sri Lankan undergraduates in the form of Mahapola Scholarships and other awards by individuals and organizations.

1 MAHAPOLA SCHOLARSHIPS

This is a national scheme introduced by the Government of Sri Lanka to financially support deserving Sri Lankan students in institutions of higher education. The Mahapola Scholarship Trust Fund set up for this purpose offers two categories of Scholarships:

1.1 ***Mahapola Higher Education Merit Scholarships*** awarded on the basis of merit.

1.2 ***Mahapola Higher Education Scholarships*** awarded to needy students in the form of bursaries.

The general conditions on which these scholarships are awarded are:

(a) Scholarship moneys are payable for only ten-months of the academic year.

(b) A student receiving a Mahapola Scholarship cannot benefit financially from any other scholarship, but the student has the option to choose the scholarship from which he/she may receive financial support.

(c) The Board of Trustees may withdraw the scholarship awarded to a student if his/her work, conduct or attendance is reported to be unsatisfactory by the University Grants Commission or if the student fails an examination at the first attempt.

2 ENDOWED ACADEMIC AWARDS

The following awards are available to students of the Faculty of Engineering. While merit is the sole criterion for the award of Medals, Prizes and Scholarships, financial need is an important consideration in the award of Studentships. The criteria to select the best suitable student for each award and studentship may be revised to suit the course unit system and the changes in syllabi.

2.1 Medals

(a) *The EOE Pereira Gold Medal* endowed by friends and well-wishers of Professor EOE Pereira and awarded to the most outstanding student graduating from the Faculty.

(b) *The Ceylon Electricity Board Gold Medal and Prize for Electrical and Electronic Engineering* endowed by the Ceylon Electricity Board and awarded to the student with highest Grade Point Average in the branch of Electrical and Electronic Engineering at the BSc Engineering Programme.

(c) *The IFS Gold Medal for Excellence in Computer Engineering* endowed by the Industrial and Financial Systems Ltd. and awarded to the student with highest Grade Point Average in the branch of Computer Engineering at the BSc Engineering Programme.

2.2 Prizes for Overall Performance

(a) *The Ananda Amarasinghe Memorial Prize* endowed by Messrs B Amarasinghe and AJ Edwards and awarded for the student obtaining the highest GPA at the end of second semester.

(b) *The Sri Lanka Tyre Corporation Prizes* awarded on the performance at the First & Second year Examinations to Second and Third Year students who are children of employees of the Sri Lanka Tyre Corporation.

(c) *The Ranjan Herath Gunaratne Prize* endowed by students of the Faculty and awarded for the student who has obtained the highest GPA in the examinations held during third and fourth semesters in the BSc Engineering Programme.

(d) *The EOE Pereira Prize* endowed by friends and well-wishers of Professor EOE Pereira and awarded for the student who has obtained the highest GPA in the examinations held during fifth and sixth Semesters in the BSc Engineering Programme.

(e) *The CA Hewavitharana Memorial Prize in Engineering* endowed by Mr WD Hewavitharana and awarded for the student obtaining the highest GPA in the examinations held during seventh and eighth semesters in the BSc Engineering Programme.

(f) *The Ceylon Development Engineering Prize for Civil Engineering* endowed by the Ceylon Development Engineering Co. Ltd. and awarded to the student with the highest GPA obtained in the Specialization Programme of BSc Engineering in the branch of Civil Engineering.

(g) *The Channa Lalith Maddumage Memorial Prize for Mechanical Engineering*, endowed by Mr DS Maddumage and awarded to the student with the highest GPA obtained in the Specialization Programme of BSc Engineering in the branch of Mechanical Engineering.

(h) *The Colombo Dockyard Prize for Production Engineering*, endowed by Colombo Dockyard Ltd. and awarded to the student with the highest GPA obtained in the Specialization Programme of BSc Engineering in the branch of Production Engineering.

(i) *The Bieco-Link Carbons Prize for Chemical Engineering* endowed by Bieco-Link Carbons (Pvt.) Ltd. and awarded to the student with the highest GPA obtained in the Specialization Programme of BSc Engineering in the branch of Chemical and Process Engineering.

2.3 Prizes for Performance in a Subject

(a) *The EOE Pereira Prize for Structures (i)* endowed by friends and well-wishers of Professor EOE Pereira and awarded to the student with the best performance in CE208.

(b) *The EOE Pereira Prize for Structures (ii)* endowed by friends and well-wishers of Professor EOE Pereira and awarded to the student with the best performance in CE307.

(c) *The T Sivaprakasapillai Prize for Industrial Engineering* endowed to the Engineering Alumni Awards Fund by Mr JB Dissanayake and awarded to the student with the highest average GPA obtained for the two courses PR408 and PR409.

(d) *The JB Dissanayake Prize for Industrial Training* endowed to the Engineering Alumni Awards Fund by Professor AS Balasubramaniam and awarded to the student with the highest Grade in the course TR400.

(e) *The EF Bartholomeusz Prize for Engineering Mathematics* endowed to the Engineering Alumni Awards Fund by Mr KK Gunawardana and awarded to the student with the highest GPA in Mathematics courses.

(f) *The HB de Silva Prize for Surveying* endowed to the Engineering Alumni Awards Fund by Dr AGKdeS Abeysuriya and awarded for the student with the highest Grade in CE203.

(g) *The A Thurairajah Prize for Geotechnics* endowed to the Engineering Alumni Award Fund by Mr PM Gunasekara and awarded for the student with the highest Grade in CE310.

(h) *The M Amaratunga Prize for Strength of Materials* endowed to the Engineering Alumni Awards Fund by Professor MP Ranaweera and awarded for the student with the highest Grade in CE201.

(i) *The Paul Prize for Electrical Power and Machines* endowed by friends and well-wishers of Professor RH Paul and awarded for the student with the highest GPA for two subjects EE304 and EE572.

(j) *The WMG Fernando Prize for Electronic Communications* endowed to the Engineering Alumni Awards Fund by Professor FVC Mendis and awarded for the student with the highest GPA for two subjects EE305 and EE512.

(k) *The JCV Chinnappa Prize for Energy Studies* endowed to the Engineering Alumni Awards Fund by Professor NE Wijeysundera and awarded for the student with the highest GPA for the subjects ME207, ME303, ME513, ME501 and ME512.

(l) The *LRL Perera* Prize for Thermodynamics endowed by Mr LRL Perera and awarded for the student with the highest GPA for two subjects ME303 and ME513.

(m) The *S Mahalingam* Prize awarded for the student with the highest GPA for the subjects ME201, ME205 and ME301.

(n) The *WP Jayasekara* Prize endowed by Mr Nihal Kularathne for the student with the highest Grade in EE549.

(o) The Sri Lanka Telecom prize endowed by Sri Lanka Telecom and awarded for the student with the highest GPA in subjects offered in Semesters 5 and 6 in the branch of Electrical and Electronic Engineering

(p) *MP Ranaweera* Prize for Finite Element Methods in Solid Mechanics awarded based on the performance in the subject CE307.

(q) *MP Ranaweera* Prize for Computer Aided Structural Design awarded based on the performance in the subject CE584.

(r) *Samantha Kularatne* prize for best performance in the first semester of the General Programme in Engineering.

2.5 Open Studentships

Table A3.1: Open studentships

	NAME OF THE STUDENTSHIP
1	Ananda Amarasinghe Memorial Trust
2	RH Gunaratne Memorial Scholaship Fund
3	M/S Ceylon Tobacco Co. Ltd Scholarship
4	EOE Pereira Studentship
5	RH Paul Studentship
6	Ceylon Oils and Fats Corporation Studentship
7	LRL Perera Fund
8	Colombo Dockyard Studentship
9	Sumitra Munasinghe Studentship
10	Eardly Perera Studentship
11	CL Maddumage Studentship
12	Siripala Jayasinghe Studentship
13	Engineering Jubilee Exhibition Distress Grant
14	Prof. WP Jayasekara Studentship
15	Prof. S Mahalingam Studentship
16	Sri Lanka Telecom Scholarship
17	N Wickramaratne Scholarship
18	Engineering Faculty Studentship
19	Gulamhussaina J Noorbhai Studentship
20	DS Gunasekara Studentship
21	LB Abeyratne Studentship
22	Engineering Faculty 1963/67 Batch Studentship (i)
23	NB Rambukkwella Studentship
24	Engineering Faculty 1963/67 Batch Studentship (ii)
25	Prof. TDA Samuel Studentship
26	Prof. Sanath Ranatunge Studentship
27	K Ramachandra Studentship

ANNEXURE IV

OUTLINE OF SYLLABI

OUTLINE OF SYLLABI

Notation: L - Lectures; T - Tutorials; P - Practical classes; A - Assignments; Proj - Project and related work.

COURSES FOR THE GENERAL PROGRAMME IN ENGINEERING

GP101 English I (3 credits)
Course Content: Language development, Communication through reading, Communication through listening, Communication through writing, Communication through speech (L20, A50=45).

GP102 English II (3 credits)
Course Content: Language development, Advanced grammar, Communication through reading, The use of techniques learnt during the foundation course in analysing the written discourse, Communication through listening, The use of techniques learnt during the foundation course in analysing the spoken discourse, Communication through writing: Writing of reports, proposals and articles, Communication through speech: communicative activities/presentations/projects/debates, Effective means of communicating with audience (L20, A50=45).

GP103 Mathematics I (3 credits)
Course Content: Real number system, its properties and the real axis, Functions of a single variable, 2-D co-ordinate geometry, 3-D Euclidean geometry, 3-D Euclidean co-ordinate geometry, Complex numbers, Functions of positive integers, Recurrence relation, Infinite series, Real power series, Special functions, Integration, Functions of several variables, Introduction to differential equations, (L36, A18=45).

GP104 Mathematics II (3 credits)
Course Content: Vectors, Matrix theory, Determinants, Transformations, Solution of simultaneous equations, Vector space, Characteristic value problems, Quadratic forms (L36, A18=45).

GP106 Computing (3 credits)
Course Content: Introduction to computing, Problem solving with mathematical packages (as a calculator), The fundamentals of algorithms, Introduction to high-level programming languages, Problem solving with programs, Scientific programming with a mathematical package (L25, T10, P20=45).

GP108 Electricity (3 credits)
Course Content: Measurements, Circuits, Electrostatics, Electromagnetism (L27, T6, P24=45).

GP109 Materials Science (3 credits)
Course Content: Introduction to the structure and properties of engineering materials, Principles underlying structure-property relationships, Phase equilibrium, Structure and properties of cement and timber, Properties and applications of polymers, ceramics and glasses, Properties and applications of composites, Mechanical testing of engineering materials, Laboratory testing practices (L &T 36, P&A18=45).

GP110 Engineering Mechanics (3 credits)
Course Content : Force systems, Analysis of simple structures, Work and energy methods, Inertial properties of plane and three-dimensional objects, Fluid pressure, Fluid statics, Particle kinematics, Planar rigid body kinematics, Particle kinetics, Planar rigid body kinetics, Laboratory work (L28, T11, P12=45).

GP111 Elementary Thermodynamics (3 credits)
Course Content : Fundamentals, The Zeroth Law and the First Law, Thermodynamic substances, Application of the First Law to closed systems, Application of the First Law to open systems, Air standard cycles, The Rankine cycle, The Second Law, Laboratory classes (L27, T9, P12, A6=45).

GP112 Engineering Measurements (3 credits)
Course Content: Introduction to engineering mesurements, Measurement of engineering parameters, Units and standards, Presentation of engineering information, Errors in measurements and error propagation, Sensors and Transducers, Design of Experiments, Dimensional Analysis (L&T30, P&A30=45).

GP113 Fundamentals of Manufacture (3 credits)
Course Content: Introduction to manufacturing industry, Introduction to manufacturing processes and safety measures, Machining: Casting: Welding, Metal forming and Forging, Manufacturing systems, Automobile technology, Printed circuit board (PCB) fabrication and soldering and related technologies (L20, T7,P36 = 45).

GP114 Engineering Drawing (3 credits)
Course Content: Fundamentals, Orthographic and isometric views, Engineering graphics, Freehand sketching, Introduction to drawing for civil and electrical engineering applications, Other: Classroom assignments (L11, P59, A9=45).

COURSES FOR THE SPECIALIZATION PROGRAMME IN ENGINEERING

Department of Chemical & Process Engineering

CP201 Chemical Engineering Fundamentals (3 credits)
Course Content: Concept of unit operations, Use of flow charts, Flow-chart representation of industrial processes, Chemical thermodynamics, Prediction of physical properties of substances and mixtures, Psychrometry and applications, Mathematical modelling of steady-state and transient-state processes using mass and energy balances, Mass and energy balances over chemical engineering processes, such as drying, humidification, distillation, evaporation and cooling towers. Flow-charting of industrial processes using computer software, Flow-sheeting of a selected industrial process with complete mass and energy balances, Laboratory exercises in mass and energy balance for pilot-plant units. (L&T30, P&A30 =45).

CP202 Separation Process Principles (3 credits)
Course Content: Equilibrium between phases. Equilibrium stage concept, cascades of stages, stage efficiency, applications in separation of components by binary distillation, absorption, stripping, extraction and leaching. Mass transfer: Diffusion, Theory of interface mass transfer Mass transfer coefficients, overall coefficients, and transfer units. Applications in absorption, extraction and adsorption. Simultaneous heat and mass transfer in gas-liquid contacting, and solids drying. Concept of continuous contacting equipment, Laboratory exercises (L&T30, P&A30 =45).

CP303 Reaction Engineering (3 credits)
Course Content: Kinetics of chemical and biochemical reactions. Kinetics of reversible, series and parallel reactions. Temperature dependence of rate constant. Design of batch, semi-batch, continuous stirred tank, and plug flow reactors with isothermal and non-isothermal operations. Reactor networks. Multiple reactions in reactor networks. Design of bioreactors. Design of reactors for catalyst induced reactions, and multiphase reactions. Computer simulation of reactors and reactor systems. Laboratory exercises for basic kinetic data, determination of rate expressions, and scale-up. (L&T30, P&A30 =45).

CP304 Process Equipment Design (3 credits) ***Prerequisites:*** **CP201, CP202**
Course Content: Designing of dryers, absorption and stripping columns, binary and multi-component distillation columns, adsorption columns, extractors, crystallisers, cooling towers, mixers, settlers, plate, packed and spray columns, and their operations. Energy requirements. Capacity and efficiency of contacting devices. Computational approaches in design. Design of a multi-component distillation column using spreadsheet. Use of packages for design of process equipment. (L&T30, P&A30 =45).

CP305 Energy Systems Design (3 credits) ***Prerequisite:*** **ME303**
Course Content: Boiling and condensation with industrial applications. Review of heat exchanger design and operations. Design of boilers, condensers, evaporators, burners and furnaces, and their operations. Use of psychrometric charts.Theory of air conditioning, Design of refrigerators and air conditioners. (L&T30, P&A30 =45).

CP308 Process Engineering Project & Seminar (3 credits)
Problem identification and project formulation; Search for, and retrieval of, information required such as literature survey; Identification and optimum utilisation of available resources; Project execution; Cost analysis; Socio-economic and ethical evaluations of the project; Analysis of political and environmental consequences, and safety evaluations (when applicable); Elements of technical report writing; Communicating the results of the project study with the outside world via a report, a web-page etc. Seminars by industrialists and/or industrial visits by students or student groups in relation to the projects undertaken. (P&A90 =45).

CP406 Industrial Safety and Health (3 credits)
Legislation.Industrial health and hygiene considerations. Personal safety. Toxicity and toxic release.Chemical hazards.Fire hazards.Explosion hazards.Chemical reaction hazards. Industrial hazards: confined entry, heat stress, etc. Storage and transport of hazardous materials. OSHAS 18001- Occupational Health and Safety Management Systems.Near miss management. Inherent-Passive-Active-Procedural (including work permits) risk management strategies. Accident investigation.Job safety analysis.Emergency response planning.Risk Analysis such as HAZOP, Fault tree diagrams, Event tree diagrams, interaction matrix and risk matrix. (L&T40, P&A10 =45).

CP407 Independent Study (3 credits)
In-depth study of a topic not available through other course work. Carefully planned, student initiated project carried out under supervision of a faculty member. (Co-supervision of project by a non-faculty member is recommended. Prior approval of Head of Department is mandatory). (P&A90 =45).

CP408 Basics in Process Engineering Design Project (3 credits) *Prerequisites*: CP304, CP305
Statement of the design of a chemical, food or other process industry; Market survey including an investigation to determine whether the product serves its functional purpose; Review of alternative processes; Literature survey; Review of available physical and chemical data. Plant location and site selection. Creation and synthesis of the final flow sheet; Overall material balance and thermal balances. Flow sheeting; Pictorial presentations; Presentation of stream flow rates; Layout drawings. Piping and instrumentation: P&I diagrams, valve selection, pump selection, blower selection, alarm and safety trips and mechanical design of piping systems. Introduction to computer aided drawings (L&T8, P&A74 =45).

CP409 Advanced Process Engineering Design Project (3 credits) *Prerequisite*: CP408
Process engineering design of a chemical, food or other process industry; Mechanical engineering outline design; Optimization of process design; Outline of control system design; Operability study including start-up and shut-down; Material selection; Design codes; Determination of capital and operating costs; Study of environmental and other hazards; Process equipment selection, specification and design; Safety and loss prevention; Mechanical design of process equipment; Costing and project evaluation; Utilities; Environmental considerations (waste management; noise; visual impact; legislation; environmental auditing). Selection of auxiliary equipment: conveyors, mixers and agitators, and process vessels (L&T4, P&A82 =45).

CP502 Advanced Fluid Mechanics (3 credits) *Prerequisite*: CE202
Course Content: Flow of viscous fluids and boundary layer flow. Compressible fluid flow. Computational fluid dynamics (CFD). (L&T30, P&A30 =45).

CP503 Industrial Process Technology (3 credits)
Course Content: Industries in Sri Lanka. Agro-processing technologies. Manufacturing technologies for food, consumer products, chemicals and pharmaceuticals. Petroleum refining technology. Petroleum products, polymer and plastic manufacturing technologies.Mineral and metallurgical processing technology.Other industrial process technologies, as appropriate.Industrial visits and report writing. (L&T30, P&A30 =45).

CP504 Biological Process Engineering (3 credits) *Prerequisite*: CP303
Course Content: Biological systems for the production of commercial goods and services: foods, drugs, chemicals, fuels, equipment, diagnostics, and waste treatment. Properties of microbial, plant and animal cells, and of enzymes used in bioprocess applications. Elementary aspects of molecular biology, biochemistry, and microbiology. Enzyme kinetics and associated reactor design. Cellular kinetics and associated reactor design. Sterilization.Downstream processing. Biochemical and biological constraints on mass transfer, heat transfer, mixing and rheology. Control of bioreactors. (L&T30, P&A30 =45).

CP505 Instrumentation and Measurement (3 credits)
Course Content: Introduction to the fundamental concepts of instrumentation and measurement. The components of instrumentation such as transducers, amplifiers and filters. Specific measurement techniques including mass spectrometry, spectroscopy, chromatography (gas, ion exchange, HPLC), electro-chemical probes (membrane electrodes), biosensors and remote sensor devices. Process Instrumentation.Data analysis and statistical treatment of data. Laboratory exercises. (L&T30, P&A30 =45).

CP506 Industrial Pollution Control System Design (3 credits)
Course Content: Air pollution control system design: Application of physical and chemical processes in the design of air pollution control systems such as mechanical collectors, filters, scrubbers, cyclone separators, explosion vents, relief valves, electrostatic precipitators, and others. Implication for design. Biological treatment processes for industrial effluent; stabilisation ponds, aerated lagoons, activated-sludge processes, trickling filters, rotating biological contactors, anaerobic reactors, facultative ponds and others. Implication for design. An overview of the physiochemical treatment methods.Design of selected pollution control equipment. (L&T30, P&A30 =45).

CP507 Process Engineering Research Project (3 credits)
The objective of the process engineering research project is to mathematically model a process, such as drying, heat exchanging or bio-digesting, and to experimentally verify the mathematical model. (A project proposal with the work plan and prior approval of the Head of the Department for the selected project proposal and the work plan is mandatory) (P&A90 =45).

CP508 Energy Technology for the Process Industry (3 credits) *Prerequisite*: ME303
Review of combustion, theory of thermal explosions, explosion limits. Premixed and diffusion flames; properties, theory, laminar flame structure, stability limits, flame propagation, shock waves, detonation. Spray combustion; properties, atomization, combustion of droplets. Fuels; solid, liquid, gaseous. classification, oxidation characteristics of fuels. Coal; characteristics, properties. Combustion of coal; particle ignition, flames, gasification of coal. Boilers, furnaces, burners,

efficiency of combustion. Renewable and alternative sources of energy, applications in Sri Lankan rural industry, solar drying. Biomass; biomass conversion, synthetic fuels. Energy conservation, cogeneration.Pollutants formation and control. (L&T34, P&A22 =45).

CP509 Petroleum Engineering (3 credits)
Petroleum geology, exploration, drilling operations and production.Crude oil classification; properties of petroleum products and their respective uses.Transportation of crude oil and gas.Storage of petroleum products.Refining and processing; different refining operations, preliminary processing of petroleum, thermal and catalytic processes, cracking, reforming and hydrogenation.Petroleum gases; properties, composition, separation and purification.Gas liquefaction, storage and transportation.Purification of petroleum products; lubrication oil refining.Petrochemical industry. Environmental health concerns. (L&T30, P&A30 =45).

CP511 Food Process Engineering (3 credits)
Introduction to food process technology. Fluid flow in food processing. Energy for food processing. Heat transfer in food processing; steady state heat transfer, thermal properties of food. Principles of food process design. Thermal processing; thermal process calculations, thermal process equipment. Refrigeration; refrigerants, vapour compression refrigeration, cooling and cold storage of foods. Freezing; freezing systems, freezing of foods, freezing time, frozen food storage, thawing. Food dehydration, evaporation. Raw material preparation, materials handling, mixing, separation, size reduction. Food packaging. Water supply and waste disposal. Hygiene and quality control in food processing industry. ISO22000-Food safety management system. HACCP (Hazard Analysis and Critical Control Points) (L&T30, P&A30=45)

CP512 Environmental Management Systems (3 credits)
Industry environmental interactions. Industrial pollution with examples. Impact of pollution on ecosystems. The need for pollution prevention. Environmental standards for emission of pollutants. Industrial effluent pollution in major process and chemical industries with special emphasis on Sri Lankan industries.Introduction to Cleaner Production (CP) and Green Productivity (GP) concepts.CP and GP methodologies. CP and GP tools such as product modification, raw material substitution, good house keeping, process control, eco mapping, fishbone diagram and Pareto diagram. Introduction to Life Cycle Assessment (LCA) and methods. Eco design concept. Tools for eco design. ISO 14000: components of ISO 14000, Implementation aspects and procedures. (L&T37, P&A16 =45).

CP513 Industrial Fluid Mechanics (3 credits)
Flow through porous media: particle fluid mechanics, fluidisation, and filtration. Pneumatic transportation. Transport of slurries. Design of fluidised beds, packed beds, filters, and pneumatic transport systems. Basic hydraulic/pneumatic power principles, fluid power symbols and diagrams, actuators, control valves, fluid preparation systems, contamination control, directional and pressure controls and applications. (L&T32, P&A26 =45).

CP514 Sustainability for Process Industry (S4PI) Work Camp (1 credit)
Concepts and practices of materials, energy, water and waste audits in an industrial environment (self study), Organize and carry out materials, energy, water and waste audits and other studies required to identify the causes of problems in relation to energy, environmental, materials, and safety issues in a chosen industry (Team work), Propose solutions to enhance resource productivity, occupational health and safety, and improve material sustainability by carrying out technical and economic analyses of plausible solutions (Field work= 2 weeks)

CP515 Modelling and Simulation of Simultaneous Transport Phenomena with MATLAB® and COMSOL Multiphysics® (3 credits) ***Prerequisite*****: EM203 or equivalent**

Mathematical modeling in a unified framework, Introduction to COMSOL Multiphysics ®, Analysis of numerical solutions of ODEs and PDEs and Computational laboratory sessions with MATLAB ® and COMSOL Multiphysics ® in solving case studies (L&T 15, P&A 60=45)

Department of Civil Engineering

CE201: Mechanics of Materials I (3 credits) ***Prerequisite*****: GP110**
Course Content: Introduction to mechanics of materials, Basic sectional properties, Derivation of simple bending formula for a prismatic beam and estimation of direct stresses induced by bending, Composite sections, transformed section approach, Calculation of deflection in statically determinate beams, Estimation of shear stress variation in a beam section, Derivation of torsion formula for circular shaft, Transformation of 2D stress and strain, 2D stress-strain relationship for isotropic linear elastic materials, Introduction to 3D stress-strain relationship for isotropic linear elastic materials, Buckling of ideal struts (L35, T7, A6 =45).

CE202: Fluid Mechanics I (3 credits) *for Civil, Chemical and Mechanical Engineering Groups*
Course Content: Kinematics of fluid flow, Dynamics of fluid flow, Laminar flow and turbulent flow, Dimensional methods, Hydraulic machines. (L36, T6, A6 =45).

CE204: Geomechanics (3 credits) ***Prerequisite*****: CE201**
Course content: Basic characteristics of soils, Elements of stress analysis, Permeability and seepage, Compressibility, Shear strength, Basic geology. (L41, T4 =45).

CE205: Engineering Hydrology (3 credits)
Course content: Hydrological processes, Hydrograph analysis, Frequency analysis, Groundwater hydrology.
(L35, T8, A4 =45).

CE207: Materials Science 1 (3 credits) *for chemical, Mechanical and Production Engineering Groups*
Course content: Important binary alloy systems, Elementary deformation theory, Plastic deformation of materials, Dislocation and deformation theory, Casting and solidification of metals, Strenghtening mechanisms and treatments, Physical metallurgy of steels, Heat treatment of steels, Corrosion and corroision prevention, Materials selection.
(L36, T4, A10 =45).

CE208: Structural Analysis (3 credits) ***Prerequisite*****: CE201**
Course Content: Introduction to modelling concept for structural analysis, Identification of the degree of static indeterminacy of structures and check for stability, Analysis of statically determinate structures, Combined effect of bending and axial forces, Development of influence lines for statically determinate structures, Muller-Breslau principle, Calculation of deflection of statically determinate structures, Identification of the degree of kinematic indeterminacy of structures, Analysis of statically indeterminate structures, Introduction to plastic analysis of beam and frame structures. (L38, T7 =45).

CE209: Building Construction (3 credits)
Course Content: Features of building construction projects, Building planning and principles of architecture, Construction materials and techniques, Building services, Estimation and quantity surveying, Introduction to other civil engineering projects, Group project. (L38, T1, P12 =45).

CE210: Engineering Surveying (3 credits)
Course content: Plane surveying, Levelling, Setting out, Surveying in special conditions, Geodetic surveying, Advanced surveying techniques and applications. (L28, T2, P30 =45).

CE 219: Civil Engineering Laboratory I (1 credit): ***Prerequisites:*** **CE201, CE202**
Development of experimental skills; Use of experimental procedures in material testing and in mechanics of fluids, performance of standard tests used in civil engineering and interpretation of their results, (P30 =15).

CE301 Mechanics of Materials II (3 credits) ***Prerequisite*****: CE201**
Course Content: Formulation of the general elasto-static problem, Governing equations and general principles, Analysis of stress & strain in 3D, Constitutive relations, Solution of plane stress/strain problems, Torsion of non-circular sections, Work and energy methods, Finite element formulation, Yield criteria. (L42, T3 =45).

CE302: Environmental Engineering (3 credits)
Course Content: Environmental sustainability, Water resources management, Water supply, Waste water treatment, Urban waste management, Design of wastewater management systems. (L33, T3, P16, A2 =45)

CE304 Fluid Mechanics II (3 credits)
Course Content:Potential flow; Euler equation, Irrotational motion, Superposition of plane flows, Methods of images, Circle theorem, Blasius theorem, Aerofoil theory; Hydraulic transients, Surge tanks, Water hammer; Navier-Stokes equation, Exact solutions, Laminar and turbulent boundary layers, Turbulence and diffusion processes, Convection-diffusion equation.(L39, T3, P6 =45).

CE305: Hydraulics (3 credits)
Course Content: Viscous flow, Hydraulic transients in pipes, Frictionless flow in open channel, Resistance in open channel flow, Sediment transport in open channels, Free surface flow computations. (L37, T6, A4 =45).

CE306: Design of Structures I (3 credits) ***Prerequisite*****: CE208**
Course Content: Design concepts, Limit state concept, Safety, serviceability, durability, fire resistance and other considerations, Physical and mechanical properties of structural steel and their classifications, Behaviour of structural elements, modes of failure, application of codes of practice, standards and specifications, Design of elements in steel structures, Robustness of structures, Design of a steel building using a code of practices, Introduction to design software, Basic principles of pre-stressed concrete, Preliminary design of pre-stressed concrete beams, Analysis of pre-stressed concrete members for the serviceability limit state and plotting of the Magnel diagram, Design of tendon profile and identification of debonding locations, Computation of pre-stress losses, Analysis of pre-stressed concrete for the ultimate limit state (L28, T2, A30 =45).

CE307: Finite Element Methods in Solid Mechanics (3 credits) ***Prerequisite*****: CE201**
Course Content: Introduction to approximate methods to solve basic engineering problems, Displacement based finite element formulation for truss structures, Displacement based finite element formulation for frame structures, Finite element formulation for 2D plane stress/strain problem, Introduction to general purpose finite element programs.
(L36, T4, A10 =45).

CE308: Geotechnical Design (2 credits) *Prerequisite*: CE310
Course Content: Geotechnical design using eurocode 7, Design for geohazards, Geological maps and plans (L15, P30=30)

CE309 Materials Science II (3 credits) *Prerequisite*: CE207
Course Content: Special steels, Metallurgy of cast iron, welding metallurgy, Joint design, Non-destructive testing, Mechanisms of fracture, Linear elastic fracture mechanics, Metallurgy of metal working processes (L26, T4, P30 =45).

CE310: Geotechnical Engineering (3 credits) *Prerequisite:* CE204
Course content: Stability of slopes, Lateral earth pressure & retaining walls, Shallow foundations, Deep foundations, Rocks, Site selection and site investigation, ground improvement, sheet piles, braced excavations. (L40, T4, P2 =45).

CE311: Hydraulic Engineering and Design (3 credits)
Course content: Coastal engineering, Irrigation engineering, Hydraulic structures (L26, T3, P32 =45).

CE312: Design of Structures II (3 credits) *Prerequisite:* CE208
Course Content: Mechanical properties of concrete and reinforcement, Limit states, durability, fire resistance and other prime considerations; partial factors of safety; loading, load transfer paths, critical loading arrangements, Elastic behaviour of uncracked and cracked reinforced concrete beams, tension stiffening; serviceability considerations such as deflection and crack width, Collapse of reinforced concrete structural elements, Unbraced frames and braced frames, Design of reinforced concrete structural elements, Design of a reinforced concrete multi-storey building, Application of draughting software for reinforced concrete structural drawings, Extension of reinforced concrete design and detailing concepts for water-retaining structure applications, Design of a reinforced concrete water-retaining structure (L29, T1, A30 =45).

CE316: Advanced Mechanics of Materials (2 credits): ***Prerequisite:*** **CE201**
Course content: Basic of general 3D elastostatic problem, governing equations and general principles, Analysis of stress and strain in 3D, constitutive relations, introduction to 2D approximations of 3D problem, Theory of plates and shells. (L27, T3 =30).

CE317: Civil Engineering Field Work (3 credits): ***Prerequisite:*** **CE210**
Course content: Survey field camp, Field exercises in irrigation engineering, Field exercises in environmental engineering, Geological field visit, Construction equipment training. (P90 =45).

CE318: Transportation and Highway Engineering (3 credits)
Course Content: Introduction to transportation engineering, Basic transportation planning and demand estimation, Highway construction materials, Highway designs, Highway maintenance, Traffic engineering, Traffic management (L38, T2, P10 =45).

CE319: Civil Engineering Laboratory II (1 credit): ***Prerequisites:*** **CE202, CE204**
Development of experimental skills; Use of experimental procedures in mechanics of materials, geotechnical and transportation engineering, hydraulic engineering; performance of standard tests used in civil engineering and interpretation of their results, (P30 =15)

CE320: Civil Engineering Laboratory III (1 credit): ***Prerequisites:*** **CE219, CE319**
Application of laboratory tests and experimental procedures in the solution of engineering problems. (P30 =15).

CE401 Mechanics of Materials III (3 credits) ***Prerequisite*****: CE301**
Course Content: Beams on elastic foundations, Theory of plates and shells, Finite element analysis of plates and shells, Theory of plasticity, Associated flow rule and limit analysis, Slip-line field theory, Mechanics of metal forming processes (L41, T4 =45).

CE402: Multi-Disciplinary Design Project (3 credits)
Course Content: Life of an infrastructure project, Project appraisal process - Identification and estimation of costs and benefits of projects, economic and financial analysis, EIA and TIA processes, safety and sustainability considerations, Social Assessment of projects, Professional ethics, Project financing (short-term / long-term), Multi-disciplinary design project (L14, T1, A60 =45).

CE403: Construction Management (3 credits): ***Prerequisite:*** **MA201**
Course Content: Project management, Construction management, Marketing aspects of construction industry, Industrial law and civil engineering contracts, acts and laws pertaining to construction industry in Sri Lanka, Procurement process, bidding and award of contracts, Site Layout planning, Site management (L42, T3 =45).

CE405: Civil Engineering Project I (3 credits)
Course Content: Problem identification; literature survey and review; technical feasibility, environmental and social impact study; safety and ethical considerations; detailed project formulation; technical report writing and oral presentation (L6, P78 =45).

CE406: Civil Engineering Project II (3 credits) ***Prerequisite:*** **CE405**
Course Content: Continuation of CE 405 (Civil Engineering Project I): Design of experimental rigs and/or development of analysis programme, Execution of investigation, Analysis of results, drawing logical conclusions, Oral presentation and preparation of a formal report, Writing of technical papers (P90 =45).

CE514: Ground Improvement and Geosynthetics (2 credits)
Course Content: Introduction to ground improvement and geosynthetics, Geosynthetics, Preloading, Soil stabilization, Stone columns, jet grouting, deep mixing, Other techniques of ground improvement. (L25, T3, A4 =30).

CE515: Geohazard Management (2 credits)
Course Content: Hazard management, Landslides, Earthquakes, Ground subsidence, salt water intrusion, Manmade hazards (L24, T3, A6 =30).

CE521: Advanced Geomechanics (2 credits) ***Prerequisite:*** **CE204**
Course Content: Stress-strain models of elasticity, non-linear, anisotropic and visco-elastic models, Theory of plasticity, elasto-plastic models, Limit analysis: bound theorems of plasticity and applications, Critical state soil mechanics, Cam-clay models of soil behavior, Dynamic behaviour of soils and rocks, Stress-strain behavior of rocks by mechanical and ultrasonic wave velocity methods, Analysis of geological structures (L25, T5 =30).

CE522: Foundation Engineering (2 credits) Prerequisite: CE310
Course Content: Special foundations, shallow foundations under inclined loads, foundations on slopes, Flexible design of foundations, Deep foundations, pile groups, laterally loaded piles, negative skin friction, piles in tension, Machine foundations, Foundations under difficult ground conditions, Improvement of existing foundations (L26, T4 =30).

CE523: Geotechnical Design and Construction (2 credits) Prerequisite: CE310
Course Content: Planning site investigation, Desk study and report, Site visit, Conceptual design, Detailed site investigation and report, Selection of optimal design, Design of foundations, retaining structures and slopes using computer software, Construction sequence, cost estimation. (L5, A50=30).

CE532: Highway Engineering and Design (2 credits): Prerequisite: CE318
Course Content: Introduction to highway planning and route planning, Pavement design, Highway construction material improvements, Highway construction techniques, Basic introduction to highway structures, Highway evaluation and maintenance, Introduction to computer applications in highway engineering, Highway design exercise (L22, T2, D12 =30).

CE533: Traffic Engineering (2 credits) Prerequisite: CE318
Course Content: Traffic flow characteristics and traffic flow theory, Theory of shock waves, queuing theory, Design of intersections, roundabouts and signalised intersections, Accident analysis and road safety, Design of pedestrian facilities
Parking analysis and facility design, Computer applications in traffic engineering. (L22, T2, D12=30).

CE534: Traffic Management (2 credits) Prerequisite: CE318
Course Content: Causes of urban traffic congestion: Congestion costing, Introduction to travel demand management, Traffic management: Electronic road pricing, ITS applications in traffic management, Parking management: Traffic safety: Case studies in travel demand management and urban traffic management. (L22, T2, P12=30).

CE535: Transportation Planning (2 credits): *Prerequisite:* CE318
Course Content: Transport surveys: Transportation planning process: Public mass transport, Air and maritime transport, Freight transport
Transport economics, Sustainability in transport, Energy and environment in urban transport, Non-motorised transport, planning of pedestrian and bicycle facilities, Transport and land use: (L20, T4, P12 =30).

CE542: Hydraulic Structures (2 credits): Prerequisite: CE311
Course Content: Dams and outlet works, Diversion and water conveyance structures, Storm water drainage, Coastal and harbor structures (L27, T2, A2 =30).

CE545: Coastal Engineering and Coastal Zone Management (2 credits) *Prerequisite:* CE311
Course Content: Coastal environment, Coastal and estuarine hydraulics, Nearshore coastal processes, Coastal and harbor structures, Coastal zone management in Sri Lanka. (L27, T2, A2 =30).

CE553: Irrigation and Drainage Engineering (2 credits) *Prerequisite:* CE311
Course Content: Planning of irrigation and drainage development, Water requirements/Delivery systems, Methods of irrigation, Irrigation structures, Irrigation water management, Introduction to computer applications, Drainage requirements and systems (L25, T4, A2 =30).

CE561: Integrated River Basin Management (2 credits) *Prerequisite*: CE205
Course Content: Basics of integrated river basin management, Status of water resources, Management of water resources, Decision support for planning and management, Policies and goals, Catchment conservation. (L22, T5, A6 =30).

CE568: Industrial Pollution Control (2 credits) *Prerequisite*: CE302
Course content: Introduction to industrial waste, Legal and policy aspects, In-plant waste management, Industrial wastewater management, Industrial solid waste management. (L24, T1, P4, A6 =30).

CE570: Water Supply and Wastewater Engineering (2 credits): *Prerequisite:* CE302
Course Content: Water supply, Advanced water treatment, Need for wastewater treatment, Advanced wastewater treatment processes, Energy optimization, Resources recovery and reuse. (L24, T2, A8 =30).

CE571: Environmental Health and Sanitation (2 Credits): *Prerequisite:* CE302
Course Content: Introduction to water supply and sanitation, Disease outbreaks, Identify hazards and hazardous events and assess the risks, Onsite and offsite sanitary treatment methods, Microbial source tracking, Water safety plans (WSP) and sanitation safety planning (SSP) (L26, T2, P2, A2=30).

CE586: Dynamics of Structures (2 credits)
Course Content: Role of dynamic analysis in structural engineering, Single degree of freedom system, Multi degree of freedom system, Vibration control of structures (L20, T5, A10 =30).

CE587: Design of Structures III (2 credits) Prerequisites: CE306 & CE312
Course Content: Bridge load assessment, Design of simply supported /continuous PC beam, Composite PC beam design, End block design, Design of prestressed concrete slabs, Design of water retaining structures, Design of masonry structures, Structural timber design including glued-laminated members and composite sections. (L15, T4, P2, A20 =30).

CE588: Construction Equipment and Material Management (2 credits): Prerequisite: CE403
Course Content: Material management, Construction equipment management, Construction technology, Case study. (L20, T4, A12 =30).

CE589: Sustainable Design and Construction (2 credits)
Course Content: Introduction to sustainable built environment and GreenSL rating system, Global environment issues, Thermal environment conditions for human occupancy, Water efficiency, wastewater treatment and rain water harvesting, Green energy, Indoor environmental quality and sick building syndrome, Recycling and reuse of waste, Landscaping in green building technology, Rectification of existing buildings: Industrial case studies (L15, T5, A20 =30).

CE591: Design of High-rise Buildings (2 Credits): Prerequisites: CE306 & CE312
Course Content: Configurations and behaviour of high-rise buildings, Review of design of gravity load resisting systems, Lateral load resisting systems, Building services applicable to high-rise buildings, Lateral load analysis; wind and

earthquakes, codes of practice, Comprehensive structural analysis and design, Use of computer software for modelling and analysis (L17, T3, A20=30).

CE592: Concrete Technology (2 Credits): Prerequisite: CE312
Course Content: Concrete as a composite, Types of cement, Chemical and mineral admixtures, Aggregate, Water, Concept of high-performance concrete, proportioning of concrete mixes, Properties of fresh and hardened concrete, Compliance criteria, Production of concrete, Durability of concrete, Assessment of working life, Special types of concrete and their applications, Testing of concrete in structures (L28, A4 =30).

CE593: Construction Planning (2 Credits): Prerequisite: MA201
Course Content: Advanced planning techniques and resource analysis, Optimization techniques, Computer applications in project planning, Introduction to project planning software, prepare the project schedule using a project planning software for the real-life project (L17, T3, A/P20 =30).

CE594: Computer Aided Structural Analysis and Design (2 Credits): Prerequisite: CE307
Course Content: Review of basis of finite element method, Finite element formulation of plates and shells, Finite element formulation of solid element, Modelling of structures using a commercial finite element programs, Analysis of finite element models for different loading conditions using a commercial finite element programs (L20, A 20 =30).

CE598: GIS and RS for Civil Engineers (2 Credits)
Course Content: Introduction to GIS and software, Spatial data structures and sources, GIS analysis functions and operations, Layouts, reports, graphs and data interoperability, Remote sensed data and image processing techniques, Introduction to geographic positioning systems (L14, T1, P26, A4 =30).

CE599: Disaster Management (2 Credits)
Course Content: Elements of disaster management, Risk assessment and management, Geological hazards, Coastal hazards, Hydrological and meteorological hazards, Anthropogenic hazards, Fire hazards, Application of GIS & RS in disaster management, Emergency management (L26, A8 =30).

New core courses offered by other departments to the Department of Civil Engineering

MA201: Engineering Management (3 credits) offered by Department of Engineeeeirng Management
Course Content: Multitasking role of an engineering manager, Introduction to management approaches, Organizatiional aspects, Legal aspects of management and commercial law, Social aspects of management, Economic aspects of management, Financial aspects of management, Principles of project management, Ethical aspects and professional responsibility, Group projects and assignments (L36, T4, A10 =45).

EM315: Numerical Methods for Civil Engineers (2 credits) offered by Department of Engineeeeirng Mathematics
Course Content: Error Analysis, Solution to nonlinear equaltions, Nuemerical Solutions to system of linear equations, Interpolation, Approximation and curve fitting, Numerical quadrature, Numerical solutions to ordinary differential equations, Finite difference method.

Department of Computer Engineering

CO221 Digital Design (3 credits)
Course Content: Introduction to digital logic, Number systems and digital logic, Combinational logic circuits, Modular design of combinational circuits, Sequential logic circuits and memory elements, Design of synchronous sequential circuits, Analysis and design of asynchronous sequential circuits, Digital circuit design and implementation. (L30, P16, A14 =45).

CO222 Programming Methodology (3 credits)
Course Content: Problem solving, Storing and naming data and operators, Control flow, Using standard library functions, Structured programming, Static allocation, References (pointers), Linked structures, Memory layout, Language tool-chains, Support tools. (L24, T8, P14, A12 =45).

CO223 Computer Communication Networks I (3 credits)
Course Content: Communication networks, Terminology, classification, and performance metrics, Network Design: Layered network architectures, Network applications and transport services, Packet-switching networks, Transmission over links and local area networks, Physical transmission fundamentals, Circuit-switching networks. (L30, T2, P22, A4 =45).

CO224 Computer Architecture (3 credits) *Prerequisites*: CO221, CO222
Course Content: Overview, Fundamentals of computer architecture, Computer arithmetic, CPU organization, Pipelining, Memory hierarchies, Interfacing and communication, Performance issues, Multiprocessors. (L29, T4, P14, A10 =45).

CO225 Software Construction (3 credits) *Prerequisite*: CO222
Course Content: Introduction of features of a selected language, Data collections (containers), Input/output, error handling and parsing textual formats, Declarative programming, Classes and objects, Event-driven programming, Concurrency and network clients, Code quality. (L25, T6, P20, A8 =45).

CO226 Database Systems (3 credits) *Prerequisites*: CO222, EM313
Course Content: Introduction to database systems, Data modelling, RDBMS concepts, Database query languages, Database programming techniques, Introduction to indexes and query optimization, Introduction to transaction processing, Database Project. (L31, T4, P12, A8 =45).

CO227 Computer Engineering Project (3 credits) *Prerequisites*: CO225, CO226
Course Content: Seminar on report writing, technical presentation skills, Software project in a group. (L5, A50 =45).

CO253 Introduction to Programming and Networking for Electrical Engineering (3 credits)
Course Content: Programming Concepts, Introduction to Programming, Language Basics, Introduction to Object Oriented Programming, Exceptions and Error Handling, Computer Networking (L30, P18, A12=45).

CO321 Embedded Systems (3 credits) *Prerequisite*: CO224
Course Content: Introduction to microcontrollers, Memory organization of microcontrollers, Programming of flash microcontrollers, I/O port configuration and programming interfaces, A/D converters and applications, Timer systems of microcontrollers, Applications of non-volatile memory, Industrial Applications, Student Project. (L31, P20, A8 =45).

CO322 Data Structures and Algorithms (3 credits) *Prerequisite*: CO225
Course Content: Running time and time complexity, Divide and conquer, Linear abstract data types, Hashing and the set ADT, Trees, Graphs, Greedy algorithms, Dynamic programming. (L30, P18, A12 =45).

CO323 Computer Communication Networks II (3 credits) *Prerequisite*: CO223
Course Content: An overview of communication networks, Network application design and network programming, Control-functionalities, Transport protocols, Packet-switching networks and routing, Transmission over links, multiple access protocols and local area networks, Physical transmission issues, Review: pig-picture of networking, trends and challenges, Student seminars. (L30, T2, P23, A3 =45).

CO324 Network and Web Application Design (3 credits) *Prerequisites*: CO223, CO225
Course Content: Review of Internet protocol stack, Network servers, Design of application protocols, I/O concurrency, Remote procedure calls, HTTP and HTML, Dynamic web content generation, Web frameworks, Browser scripting, Network application security, Deployment considerations. (L26, T4, P16, A14 =45).

CO325 Computer and Network Security (3 credits) *Prerequisite*: CO223
Course Content: Introduction, Symmetric key ciphers, Asymmetric key ciphers, Cryptographic hash functions, Cryptographic primitives and protocols, Protocol attacks and countermeasures, Computer security – Authentication mechanisms and protocols, Computer security – Access control, Network security – Identity and trust systems, Network security – Secure Communication, Usability, psychology, organisational security policy. (L30, T5, P10, A10 =45).

CO326 Computer Systems Engineering: Industrial Networks (3 credits) *Prerequisites*: CO321, EE386
Course Content: Introduction, Hardware Components for designing control systems, Designing simple digital systems using a standard PC, Designing I/O systems for standard PC, Development of control systems using microcontrollers, Communication for industrial control systems, Instrument automaton and development of test systems, PC based test, measurement and control modules and modular systems, SCADA and Industrial Automation Systems, Industrial automation project. (L34, P12, A10 =45).

CO327 Operating Systems (3 credits) *Prerequisite*: CO224, CO322
Course Content: Introduction, OS abstractions, Threads, Processes, Synchronization, File systems, IO subsystem, OS implementation methods, Self-study. (L31, P12, A16 =45).

CO328 Software Engineering (3 credits) *Prerequisites*: CO226, CO322, CO324
Course Content: Introduction, Lightweight processes, Requirements specification, Domain modelling, Implementation transition, Testing and contracts, Principled object-orientation, Architectural techniques, Software reengineering, Software Engineering Project. (L28, T3, P8, A20 =45).

CO421 Final Year Project I (3 credits)
Course Content: Project planning, literature review, implementation, evaluation, report writing, presentation of findings, project demonstration. (A90 =45).

CO422 Professional Practices (2 credits)
Course Content: Professionalism, Group Dynamics and Psychology, Communication Skills. (L25, A10=30).

CO423 Software Project Management (2 credits)
Course Content: Introduction to the subject, Project life cycle and organization, Team structures, The role of risk in the life cycle, Project Quality management, Application quality requirements, Process improvement models, Project Management topics. (L22, P6, A10=30).

CO424 Information Systems Management (2 credits)
Course Content: Introduction to Information Systems, Relationship between IS and the business, IS planning and budgeting, Acquiring information technology resources and capabilities, Risk management, Case study. (L20, A20=30).

CO425 Final Year Project II (3 credits)
Course Content: Project planning, literature review, implementation, evaluation, report writing, presentation of findings, project demonstration. (A90 =45).

CO502 Advanced Computer Architecture (3 credits) *Prerequisite*: CO224
Course Content: Fundamentals of computer design, Introduction to instruction level parallelism (ILP), Pipelined processors, Exploiting ILP with software approaches, Exploiting ILP with hardware approaches, Memory hierarchy design, Hardware description languages and simulation, Computer architecture and dependability, Special purpose processors. (L25,T5, P14, A16=45).

CO503 Advanced Embedded Systems (3 credits) *Prerequisite*: CO321
Course Content: Introduction to embedded systems, Custom single-purpose processors, General-purpose processors: software, Embedded system modelling: state machine and concurrent process models, Design technologies of embedded systems, Hardware/software co-design of embedded systems, Operating systems for embedded systems, Design example, System on a Chip (SoC). (L&T30, P&A30=45).

CO504 Hardware Software Co-design (3 credits) *Prerequisites*: CO222, CO224
Course Content: Introduction to hardware/software co-design, Mapping applications to architecture, System partitioning, Design space exploration, Interface synthesis, Estimation, System simulation, Execution time analysis, Performance analysis. (L29, T4, P18, A6 =45).

CO513 Advanced Computer Communication Networks (3 credits) *Prerequisite*: CO323
Course Content: An overview of communication networks, Multimedia network applications and protocols, Quality of service, Broadcast and multicasting routing, Multi-protocol label switching (MPLS) and Generalized MPLS, Wireless and mobile networks, Network security, Network management. (L30, T2, P15, A11 =45).

CO514 Optical Communication Networks (3 credits) *Prerequisite*: CO323
Course Content: An overview of communication networks, Optical transmission fundamentals and issues, IP traffic over WDM optical networks, Synchronous optical networks (SONET)/Synchronous digital hierarchy (SDH), WDM optical networks: optical circuit switching (OCS), WDM optical networks: optical packet switching (OPS), WDM optical networks: optical burst switching (OBS), Optical access networks, Other technologies, trends, and challenges. (L30, T7, A16=45).

CO521 Compilers (3 credits) *Prerequisite*: CO322
Course Content: Introduction, Programming tools: Lexical analysis, Semantic analysis, Static semantics, Code generation, Miscellaneous topics. (L&T30, P&A30=45).

CO523 Programming Languages (3 credits) *Prerequisite*: CO322
Course Content: Introduction. Imperative languages: Object oriented languages, Functional languages, Logical languages, Concurrent languages. (L&T27, P&A36=45).

CO524 Parallel Computers and Algorithms (3 credits) *Prerequisite*: CO327
Course Content: Parallel architecture, Interconnection networks, Designing parallel programmes, Performance modelling, Programming paradigms, Message passing interface, Multithreading, Parallelising numerical algorithms, Parallelising non-numerical algorithms,, State of the art. (L30, P8, A22 =45).

CO526 Advanced Operating Systems (3 credits) *Prerequisite*: CO327
Course Content: Introduction to operating system design, Introduction to microkernel, Microkernel based systems, Managing virtual memory, Process Management, File Systems, Threads, System calls, I/O handling, Security, Research topics. (L30, P&A30 = 45).

CO527 Advanced Database Systems (3 credits) *Prerequisite*: CO226
Course Content: Data storage and indexing structures, Query Optimization and database tuning, Transaction Processing, Database security, Distributed Databases, Object databases and Object-relational databases, other data models, Data models for advanced applications. (L32, T6, P12, A2 =45).

CO528 Applied Software Architecture (3 credits) *Prerequisite*: CO328
Course Content: Introduction to applied software architecture, Basic of software architecture, Web application architectures, Service oriented architectures, Enterprise architectures, Product architectures, Mobile application architectures, Cloud architectures. (L31, P12, A16 =45).

CO541 Artificial Intelligence (3 credits) *Prerequisite*: CO222
Course Content: Introduction, Artificial intelligence programming, Knowledge representation and inference, Expert systems, Search, Natural language processing, Vision, Dealing with uncertainty, Role of neural networks and fuzzy logic in AI, Applications of AI. (L&T38, P&A14 =45).

CO542 Neural Networks and Fuzzy Systems (3 credits)
Course Content: Introduction to fuzzy systems, Fuzzy relations, Extension principle , Fuzzy inference, Fuzzy non-linear simulation, Fuzzy applications , Artificial neural networks (ANN), Learning in ANN, The perceptron, Back propagation algorithm, Hopefield model, Memory type paradigms, Fuzzy neural networks applications (L&T33, P&A24=45).

CO543 Image Processing (3 credits)
Course Content: Introduction, Digital image fundamentals, Image enhancement in the spatial domain, Image enhancement in the frequency domain, Colour image processing, Image compression, Pattern recognition in image processing. (L&T35, P&A20 =45).

CO544 Machine Learning and Data Mining (3 credits) *Prerequisite*: CO322
Course Content: Introduction, Input, Output, Basic algorithms, Evaluation and credibility, Real machine learning algorithms, Data preparation for knowledge discovery. (L&T40, P&A10 =45).

CO551 Theory of Computation (3 credits)
Course Content: Preliminaries, Finite automata, Regular expressions and properties of regular sets, Context-free grammars (CGF) and properties of context-free languages (CFL), Pushdown automata, Turing machines, Undecidability, Complexity theory, Intractable problems. (L&T37, P&A16 =45).

CO552Game Theory and Markov Decision Processes (3 credits) *Prerequisite*: EM202
Course Content: Introduction to game theory, Mixed Strategies, Expected Payoffs, Nash Equilibrium and Nash's Theorem, 2-Player Zero-Sum Games, and The Minimax Theorem, Linear Programming, Simplex Algorithm, LP Duality Theorem, Computing Solutions for General Finite Strategic Games, Games in Extensive Form, Games of Perfect Information, Games on Graphs, Simulation, Markov Decision Processes and Stochastic Games, Selfish Network Routing, Congestion Games, and the Price of Anarchy, Auctions and Mechanism Design, Reachability and safety games, Buchi and coBuchi Games. (L35, T10,A10 =45).

Department of Electrical and Electronic Engineering

EE201 Network Analysis (3 Credits)
Course Content: Review of DC circuits, First-order circuits, Second-order circuits,Sinusoidal steady state analysis, Laplace transformand network analysis, Two-port networks. (**L&T43, A4 = 45**).

EE251 Principles of Electrical Measurements (3 Credits)
Course Content: Fundamentals of Electrical Measurements**,** Review of ac. signal parameters**,** Measurement of ac signals**,** Comparison methods**,** Shielding and Earthing**,** Noise elimination techniques, Resonance methods**,** Sensors and transducers, Electrical Measurement Laboratory, Mini project (**L&T30, A&P 30 =45**).

EE252 Electronic Devices and Circuits (3 Credits)
Course Content: Basic Semiconductor Physics**,** Diodes**,** Bipolar Junction Transistor**,** Junction Field Effect Transistors**,** MOS Field Effect Transistors**,** Amplifiers**,** Feedback Amplifiers**,** Switching Circuits, Electronic Laboratory (**L&T35, A&P 20 =45**).

EE253 Digital logic Design (3 Credits)
Course Content: Representation of information, Boolean algebra, Boolean function simplification, Combinational logic design, Special logic circuits, Combinational logic design with Medium Scale Integrated (MSI) circuits, Electrical considerations of logic gates, Latches and Flip-flops, Design of sequential logic circuits, Register Transfer Level (RTL) design of circuits, Programmable logic devices, Fault diagnosis and testing (**L&T33, A&P 24 =45**).

EE254 Electronic Instrumentation (3 Credits)
Course Content: Operational Amplifiers, Op-Amp Applications, Basic signal conversion, Analogue to Digital Conversion techniques, Sample and Hold circuit, Digital to Analogue Conversion, Computer interfacing and Data acquisition (DAQ) systems, Software and Hardware tools for instrumentation, Advanced instruments, Digital Oscilloscope, Instrumentation laboratory, Mini project (**L&T30, A&P 30 =45**).

EE255 Electric Power (2 Credits)
Course Content: Electromagnetic Energy conversion, Transformers, Electrical Installations and loads, Lighting (**L&T21 A&P 18 =30**).

EE256 Power and Energy (2 Credits)
Course Content: Three phase Systems, Measurement of Power/Energy, Introduction to Power Systems, Renewable energy, Tariff and Demand Side Management (**L&T24, A&P12 =30**).

EE257 Signals and Systems (3 Credits)
Course Content: Fundamental Concepts of Signals & Systems, Fourier Series, Fourier Transform, System Function of LTI systems, Stability of LTI systems, Frequency Response of LTI systems (**L&T41, A&P8 =45**).

EE280 Introduction to Electrical Engineering I (3 Credits)
Course Content: AC circuits, Electrical machines, Motors and control, IEE wiring regulations and building wiring systems. (**L&T33, P24=45**)

EE281 Introduction to Electrical Engineering II (3 Credits)
Course Content: Oscilloscope, Two terminal semiconductor devices, Bipolar junction transistors, Operational amplifiers, logic circuits. (**L&T33, P&A24**)

EE282 Network Analysis for Computer Engineering (3 Credits)
Course Content: Review of DC circuits, First-order circuits, Second-order circuits, Sinusoidal steady state analysis, Laplace transform and network analysis, Two-port networks (**L45=45**)

EE285 Electronics I (3 Credits)
Course Content: Diodes, Bipolar junction transistor, amplifiers, Operational amplifier (OPAMP), OPAMP applications, Junction field effect transisitor (JFET), Metal oxide semiconductor (MOS) field effect transistor, Electronic Laboratory (**L&T33, P&A24 = 45**)

EE320 Electromagnetic Theory (2 Credits)
Course Content: Review of vector calculus, Electrostatics, magnetostatics, Time varying fields, Plane waves. (**L&T30 = 30**)

EE322 Embedded Systems Design (3 Credits); Prerequisites: EE253, CO253
Course Content: Introduction to embedded computing, Microprocessor/Microcontroller Architecture, Embedded processors, Memory Architectures, I/O ports, Multitasking, Task scheduling, Embedded systems analysis and verification, Embedded system modeling techniques, Embedded systems laboratories, Embedded systems mini project,. (**L&T27, P&A36 = 45**).

EE325 Digital Signal Processing (3 Credits); Prerequisites: EE257
Course content: Introduction, Time domain analysis, z-transform, Discrete time systems, Stability of discrete time systems, Frequency domain analysis, IIR and FIR filter design, spectral estimation (**L&T40, P&A10 = 45**).

EE358 Electrical Machines (3 Credits); Prerequisites: EE255, EE256
Course Content: Overview, DC machines (brushed), AC Machine basics, Synchronous machines, Three-phase induction machines, Single phase induction motors, Induction generators. (**L&T39, P&A12 = 45**).

EE351 Electronic Circuits (3 Credits); Prerequisites: EE252
Course Content: Large signal amplifiers, High-frequency response of Amplifiers, Oscillator Circuits, Active Filters, Digital Logic Circuits, Power Semiconductor Devices, Application of Power Devices and Power Conversion Circuits (**L&T39, P12 = 45**).

EE352 Automatic Control (3 Credits); Prerequisites: EE 257
Course Content: Basics, System modelling, Modelling of Practical systems, Time domain analysis, Frequency domain analysis, Controller design in continuous domain (**L&T26, P&A8 = 30**).

EE353 Discrete Time Control Systems (3 Credits); Prerequisites: EE 352, EE325, EE358
Course Content: Introduction to Discrete Time Control Systems, Stability of Discrete Time Control Systems, Continuous time approximations of controllers, Discretization of analog controllers, Discretization of Control Systems, Direct digital controller design, State-space design methods, State observers, Practical issues (**L&T38, P&A14 = 45**).

EE354 Power Engineering (3 Credits): Prerequisites: EE 358
Course Content: Review of Synchronous Machine, Operational Features of Synchronous Machines, Synchronous generators in power system, Induction generators in power system, Load flow studies, Fault analysis (**L&T32, P&A26 = 45**)

EE355 Applied Electromagnetics (3 **Credits); Prerequisites: EE320**
Course Content: Transmission lines, Antennas, Wave guides, Microwave components and sources, Fiber optics (**L&T40, P10 = 45**).

EE356 Electronic Product Design and Manufacture (3 Credits)
Course Content: Product Design and Development, Product design process, Estimating power supply requirement (Power supply sizing), Power supply protection devices, Noise consideration of a typical system, Noise in electronic circuit, Measurement of noise, Grounding, Shielding and Guarding, Signal integrity issues, PCB designing, Product testing, Enclosure sizing & supply requirements & materials for enclosure and tests carried out on enclosure, Thermal management and its types, Advanced topics in electronic product design and manufacture, electronic product design mini project (**L&T30, P&A30 = 45**).

EE357 Communication Systems (3 Credits); Prerequisites: EE201, EE257
Course Content: Review of Signals and Systems, Signal Transmission, Linear Modulation, Exponential Modulation, Pulse Code Modulation (PCM), Base Band Modulation, Introduction to Digital Carrier Wave Modulation, Introduction to Multi-Carrier Modulation and MIMO Systems (**L&T39, P&A12 = 45**).

EE380 Electrical Power and Machines (3 Credits)
Course content: Electric power energy, Transformers, Direct current machines, Induction machines,Synchronous machines. (**L&T36, P18 = 45**)

EE386 Electronics II (3 Credits); Prerequisites: EE285
Course content: Data Conversion circuits, Diode logic circuits, BJT logic families, MOS logic families, Storage elements, Design parameters and issues, Interfacing logic families, Active filters, Oscillators, circuit modelling and simulation, Electronic Laboratory (**L&T33, P24 = 45**)

EE387 Signal Processing (4 credits); Prerequisites: EE282, EM302
Course content: Fundamental concepts of signals, Time domain processing of signals, Fourier series, Fourier Transformation, Frequency domain analysis of discrete-time signals, Transfer function, Frequency domain processing of signals (**L&T52, P&A16 = 60**)

EE401/EE512 Communication Theory (3 Credits); Prerequisites: EE 357
Course content: Probability and random variables, Random process, Gaussian process, Performance of communication Systems in noise, Introduction to information theory. (**L&T42, A6 = 45**).

EE402/EE501 Advanced Control Systems (3 Credits); Prerequisites: EE352, EE353
Course content: Introduction to System identification, Non-parametric methods, parametric methods, Analysis of common non-linearities, Describing functions, Discrete Time Controller designs for practical systems in Electrical and Electronic Engineering, Real-time Implementation (**L&T36, A&P18 = 45**).

EE403/EE559 Integrated Analog Electronic Circuits (3 Credits); Prerequisites: EE252, EE351
Course Content: Analysis of transistor differential amplifier, Analog integrated sub-circuits and biasing, Analysis of frequency response, Application specific integrated circuits, Design considerations. (**L&T35, P&A20 = 45**).

EE404/EE572 Electric Power Systems (3 Credits); Prerequisites: EE354
Course Content: Components of power system, Transient and over voltage phenomena, Power system protection, Economic operation and markets, Power system stability, Power system planning and reliability, power system control and modelling. (**L&T39, P&A12 = 45**).

EE405 Undergraduate Projects I (3 Credits)
Course content: Self studies, scheduled working hours, Contact hours with supervisors (**A90 = 45**).

EE406 Undergraduate Projects II (3 Credits)
Course content: Self studies, scheduled working hours, Contact hours with supervisors (**A90 = 45**).

EE511 Antennas and Propagation (3 credits) Prerequisite: EE320, EE355
Course Content: Antenna basics, Antenna Arrays, Microstrip anntennas, Matching Techniques, Propagation of radio waves, Noise characterization, Space wave propagation (VHF, UHF, and microwave link analysis and design), Ionospheric and surface wave propagation. (**L&T39, P12 =45**).

EE514 Data Communications (3 credits) Prerequisites: EE357
Course Content: Overview, Protocol architecture, Data transmission, Guided and wireless transmission, Signal encoding techniques, Digital data communication techniques, Data link control, Multiplexing, Circuit switching and packet switching, Routing in packet switched networks, Congestion control in switched data network. (**L&T36, P18 = 45**).

EE 518 Digital Communication (3 credits) Prerequisite: EE512 or EE401
Course Content: Basic band data transmission, Digital band pass modulation, Error control coding, Introduction to information theory. (**L&T40, P&A10 = 45**).

EE 522 Telecommunication & Wireless Systems (3 Credits) Prerequisite: EE357
Course Content: Switching & signalling, Teletraffic engineering, Optical fiber communication systems, Wireless channel characterization, principles of mobile communication, Diversity and multi-antenna techqniques, Spread spectrum and multi-carrier systems, wireless communication standards (L&T41, P&A8 = 45).

EE538 Electrical Machines and Drive Systems (3 Credits) Prerequisite: EE358, EE352, EE354
Course Content: Introduction to steady-state and dynamic performance of DC Motor drives, Introduction to AC drives, Introduction to vector control basics-through induction machines, Stepper motor drives (**L&T39, P&A12 = 45**)

EE539 Nonlinear and Multivariable Systems (3 Credits) Prerequisite:EE352 or ME306
Course Content: Fundamental concepts and representing non-linear systems, Stability, instability and limit cycles, Controlling non-linear systems, Fundamental concepts and representing multivariable systems, Performance analysis of multivariable systems, Introduction to controlling MIMO systems (**L&T39, P&A12 = 45**).

EE540 Nanotechnology for Electrical and Electronic Engineering Applications (3 credits) Prerequisites: EE201, EE252, EE352
Course content: Introduction, Technologies for the Nanoscale, Nanoscale Manufacturing,Nanoscale Materials and Structures, Characterization, Electronic Nanodevices, Magnetic Nanodevices, MEMS and NEMS, Photonic Nanodevices, Societal, Health and Environmental Impacts. (**L&T40, P&A10 = 45**).

EE554 Microwave Techniques (3 credits) Prerequisite: EE320 and EE355
Course Content: Overview of microwave systems, subsystems and components, Transmission line theory, Two port parameters, Micro-strip lines and striplines, Design of a micro-strip components, Microwave amplifiers, Microwave oscillators, Microwave mixers, Microwave switching devices, Computer aided design (CAD) of microwave circutis, (**L&T30, P30 = 45**).

EE561 Industrial Instrumentation (3 credits) Prerequisites: EE251, EE254
Course content: Supervisory control and data acquisition systems (SCADA), Principles of data acquisition (DAQ) systems, State estimation techniques in instrumentation, Sensor fusion, Sensor networks, Smart sensors, Intellignet instruments (**L&T30, P&A30 = 45**).

EE575 Power Electronic Applications and Design (3 credits) Prerequisite: EE351
Course Content: Introduction and review of fundamentals, Principle of operation of selected applications, Utility interactions and harmonic mitigation, Modelling, Simulation, Controller design, Design considerations, Construction of a laboratory prototype and performance verification. (**L&T36, P&A18 = 45**).

EE576 High Voltage Engineering (3 credits) Prerequisite: EE255, EE256
Course Content: Generation high voltages, Measurements of high voltages, Breakdown phenomena, High voltage tests, Lightning phenomena, Insulation co-ordination (**L&T36, P&A18 = 45**).

EE580 Introduction to Biomedical Engineering (3 Credits) Prerequisites: EE252 or EE281 or EE285
Course Content: Introduction, Introduction to engineering aspects of molecular and cellular principles, physiology and organ systems, Bioelectromagnetism, Modeling of cardiac system, measurements, ECG, Bioinstrumentation, Biomaterials, Biomechanics, Electrical safety and regulation, Mechanical and electric models for ventilation, respiration and blood pressure measurement, Biomedical Imaging Systems. (**L&T36, P&A18 = 45**).

EE 587 Digital Systems Design and Synthesis (3 credits) Prerequisites: EE322 or CO321
Course Content: Review of digital systems, Hardware description languages and behavioural synthesis of digital systems, Behavioural synthesis data strurctures and algorithm, Synthesis and design space, Schedulling algorithms – constructive, allocation and binding algorithms, Interconnect allocation and optimization, Tranformational/iterative approaches, Test synthesis for digital systems, related topics, Digital synthesis laboratory (**L&T30, P&A30 = 45**).

EE 592 Modern power systems (3 Credits) Prerequisites: EE572 or EE404
Course Content: Coordinated operation of the power system, power transmission optimization, HVDC transmission, Fle4xible ac transmission systems, Reactive power compensation, power quality, Harmonics and filters, Smart grid and smart metering, Computer based project (L&T36, P&A18 = 45).

EE594 Industrial Robotics and Automation (3Credits); Prerequisites: EE352 or ME306
Course Content: Industrial automation systems and applications of robotics, Rigid motions and homogeneous transformations, Forward kinematics, Inverse kinematics, velocity kinematics, Path and trajectory planning fundamentals, Fundamentals of industrial automation, Sensors, actuators and controllers, Communication systems in automation, Automation software and hardware, Supervisory control and data acquisition systems and distributed control systems (**L&T39, A12 = 45**).

EE593 Advanced Signal Processing (3 credits); Prerequisites: EE257, EE325
Course Content: Introduction, Basics of stochastic signal processing, Wiener filter, Eigen analysis and performance surface, iterative algorithms for optimization, adaptive signal processing techniquesL LMS algorithm, Transform domain approaches, Recent advances in signal processing (**L&T39, A12 = 45**).

EE595 Machine Intelligence and Smart Systems (3 credits) Prerequisites: EM314, EM201
Course content: Introduction, Reasoning and automated decision making, Multidimensional Feature Spaces, Supervised learning, Unsupervised Learning, Advanced Concepts in Learning, Sequential Pattern Mining, Recent Trends and developments of Smart Systems (L37, P16=45)

EE596 Image and Video Coding (3 credits) Prerequisites: EE257, EE325
Course content: Introduction, Principles of digital signal compression, Basic coding techniques for still images and video sequences, Image coding Standards, Video coding Standards, Emerging and Future Video Coding Technologies, Image/video quality evaluation, Packet video transmissions, Robustness of video coders, Error resilience in video coders (L32, T2, P22=45)

Department of Engineering Mathematics

EM201 Mathematics III (3 credits)
Course Content: Introduction, Different types of differential equations and solutions, Modelling with differential equations, First order differential Equations, Differential equations with constant coefficients, Linear differential equations, Solutions in series, Laplace transformations, System of ordinary differential equations, Numerical solutions to ODEs, Concept of probability, Discrete probability distributions. (L36, T9 =45).

EM202 Mathematics IV (3 credits)
Course Content: Functions of several variables, Partial derivatives double and triple integration, Vector fields and operators, Orthogonal curvilinear coordinates, Integrals and integral theorems, Constrained optimisation of functions of several variables, Continuous probability distributions, Sampling distributions, Estimation and confidence intervals, Hypothesis testing. (L36, T9 =45).

EM 203 Numerical Methods for Chemical and Process Engineering (3 credits)
Course Content:Introduction to computing software, Introduction to numerical methods: Error analysis, Numerical solutions to systems of linear equations, Numerical solutions to non-linear equations, Numerical calculus, Numerical solutions to ordinary differential equations, Numerical solutions to partial differential equations, Assignments/Projects in chemical & process engineering (L&T32, A&P26 =45).

EM308 Complex Analysis (2 credits) *Prerequisites*: EM201, EM202
Course Content: Introduction to analytic functions, Complex integration, Complex series, Theory of residues, Conformal mappings. (L26, T4 =30).

EM309 Industrial Statistics (3credits)*Prerequisites*: EM201, EM202
Course Content: Descriptive statistics, Point estimation and interval estimation, Testing of hypotheses, Regression analysis, Analysis of variance. (L24, T21 =45).

EM310 Operations Research 1 (3 credits) *Prerequisites*: EM201, EM202
Course Content: Formulation of models, Linear programming, Network analysis, Dynamic programming, Queuing theory, Inventory models, Simulation. (L36, T9 =45).

EM311 Mathematical Modelling (2 credits) *Prerequisites*: EM201, EM202
Course Content: Introduction to models of physical systems and phenomena, Basic concepts in stochastic processes, System identification methods, Optimisation methods, Project. (L20, T10 =30).

EM312 Fourier Analysis (3 credits) *Prerequisites*: EM201, EM202
Course Content: Orthogonal and orthogonal functions, Function space, Approximation of functions, Fourier series, Harmonic analysis, Solution of ordinary differential equations and partial differential equations using Fourier series, Fourier integral transform, Inverse Fourier integral transform, Fast Fourier transform methods, Laplace transform and inverse Laplace transform. (L30, T9, A12 =45).

EM313 Discrete Mathematics (3 credits)
Course content: Fundamentals, Combinatories, Graph theory, Algorithms, Prepositional calculus, Mathematical models for computing machines. (L36, T9 =45).

EM314 Numerical Methods (3 credits)
Course content: Introduction, Solutions to systems of linear equations, Solutions to non-linear equations, Interpolation, Approximation and curve fitting, Numerical calculus, Numerical solutions to ordinary differential equations, Introduction to numerical solutions to partial differential equations. (L31, T4, A20 =45).

EM315 Numerical Methods for Civil Engineers (2 credits)
Course content: Error analysis, solutions to non-linear equations, Numerical solutions to systems of linear equations, Interpolation, approximation and curve fitting, Numerical solutions to ordinary differential equations, Numerical solutions to partial differential equations (L26, T4 = 30)

EM501 Operations Research II (2 credits) ***Prerequisite:*** **EM310**
Course Content: Computational difficulties, Interior point algorithms, Heuristic programming, Multiple criteria optimisation, Integer programming. (L24, T6 =30).

EM502 Optimisation (3 credits)
Course Content: Single variable optimisation, Algorithms, Multivariable optimisation, Algorithms, Constrained optimisation algorithms, Non- conventional optimisation algorithms. (L30, T6, P18 =45).

EM503 Graph Theory (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Introduction, Trees, Graph colouring and matching, Graph algorithms, Applications. (L24, T6 =30).

EM504 Evolutionary Algorithms (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Introduction, Genetic algorithm, Numerical optimisation, Evolution strategies, Evolution programs. (L24, T6 =30).

EM506 Design of Algorithms (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Efficiency of algorithms, Analysis of algorithms, Data structures, Greedy algorithms, Searching and sorting algorithms, Computational complexity, Applications. (L24, T6=30).

EM507 System Simulation (2 credits)
Course Content: Motivation for simulation of systems, Review of systems of non-linear differential and difference equations, Numerical methods for solving differential equations, Review of basic methods, Errors and efficiency in computational algorithms, Development of simulation software, Computing engines, Introduction to some simulation packages (SIMULINK, REGSIM, SIMNON etc.) (L25, T5 =30).

EM508 Symbolic Mathematics (2 credits)
Course Content: Introduction to computer algebra systems (MAPLE, MATHEMATICA etc.), Symbolic computation, Mathematical algorithms for symbolic computation, Examples and applications to topics in undergraduate mathematics. (L25, T5 =30).

EM509 Stochastic Processes (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Basic concepts, Markov chains, Poisson processes, Renewal processes, Queuing models. (L25, T5 =30).

EM510 Decision Theory (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Development of methods for decision making, Utility theory, Decision trees, Decision models under risk and uncertainty, Forecasting and time series analysis, Reliability. (L27, T3 =30).

EM511 Regression Analysis (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Simple linear regression, Matrix approach for linear regression, Polynomial regression, Multiple linear regression, The examination of residuals, Selecting the 'best' regression equation, Model validation, Use of dummy variables in regression. (L24, T6 =30).

EM512 Sampling Theory (1 credit) ***Prerequisites:*** **EM201, EM202**
Course Content: Simple random sampling, Ratio estimators, Stratified random sampling, Systematic sampling, Cluster sampling. (L15 =15).

EM513 Design and Analysis of Experiments (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Fully randomised design, Randomised block design, Incomplete block design, Latin squares and related designs, Introduction to factorial designs, 2^k and 3^k factorial designs. (L24, T6 =30).

EM514 Partial Differential Equations (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Types of partial differential equations, Initial and boundary value problems, Analytical solutions, Method of separating, variables, Laplace transformation method, Fourier transformation method, Numerical solutions, Finite difference techniques, Crank Nicholson method, Method of characteristics. (L25, T5 =30).

EM515 Eigen Function Methods for Differential Equations (2 credits)
Course Content: Sets of functions, Adjoint and hermitian operators, The Sturm-Liouville equations, Legendre, Bassel, Simple harmonic, Hermite, Laguerre and the Chebyshev equations, Superposition of eigenfunctions, Green's function, Gamma and beta functions (L25, T5 =30).

EM516 Advanced Engineering Dynamics (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Introduction, History and development of various branches of mechanics, Vibrating systems, Damped motion and small oscillations, Varying mass, Introduction to Lagrangian and Hamiltonian mechanics. (L24, T6 =30).

EM517 Nonlinear Dynamical System (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Discrete and continuous dynamical systems, Invariant sets, Stability, Chaos, Fractals. (L25, T5 =30).

EM518 Advanced Numerical Methods (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Introduction to numerical methods, Solutions to systems of linear equations, Solutions to non-linear equations, Interpolation, Approximation and curve fitting, Numerical calculus, Numerical solutions to ordinary differential equations, Numerical solutions to partial differential equations. (L24, T4, P4 =30).

EM519 Introduction to Finite Element Method (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Elements of calculus of variations, Numerical discretisation, Weighted residual approximations, Finite element concepts. (L24, T4, P4 =30).

EM520 Solar Radiation (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Measurement and instrumentation, Physical and statistical modelling, Distribution of solar radiation over Sri Lanka. (L15, T5, A20 =30).

EM521 Integral Equations (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Obtaining an integral equation from a differential equation, Types of integral equations, Operator notation and existence of solutions, Closed form solutions, Neumann series. (L15, T7, A16 =30).

EM522 Tensors (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: Cartesian tensors of different orders, Non-Cartesian tensors, Relative tensors. (L16, T8, A12 =30).

EM523 Calculus of Variations (2 credits) ***Prerequisites:*** **EM201, EM202**
Course Content: The Euler-Lagrange equations, Constrained variations, General eigen value problem. (L15, T6, A18 =30).

Department of Manufacturing and Industrial Engineering

PR204 Product Design and Development (3 credits)
Course Content: Motivation or Need Stage and Design Brief; Concept Design; Embodiment Design; Detail Design, Documentation, and Development; Ergonomics; Material Selection. (L30, T1, P3, A25 =45).

PR205 Machining Technology (3 credits)
Course Content: Introduction to Traditional and Non-Traditional Machining Techniques; Metal Cutting; Mechanics of Machining; Lathe Operations and Milling Operations; Abrasive Machining; Tool Life, Wear and Failure; Machining Economics; Introduction to NC Technology. (L29, T5, P18, A4 =45).

PR206 Manufacturing Planning and Control (3 credits); *Prerequisites:* EM201
Course Content: Introduction to Hierarchical Planning and Control; Strategic Planning; Tactical Planning; Tactical and Operational Planning and Control; Group Project. (L36, T4, P6, A4 =45).

PR303 Machine Tool Engineering (3 credits)
Course Content: Machine tool types; Machine frames; Requirements, Design and analysis, Functional elements of machine tools; Automation of Machine Tools. (L26, T6, P9, A4 =45).

PR311 Production Engineering for Mechanical Engineers (3 credits)
Course Content: Introduction to Production Engineering; Material Properties for Manufacture; Metal Forming Processes; Metrology; Quality Control; Fundamentals of Casting; Welding. (L32, T6, P14 =45).

PR314 Manufacturing Automation (3 credits); *Prerequisites:* EE280, EE281
Course Content: Sensors and Actuators; Technology of Manufacturing Automation; Programmable Devices; Manufacturing System Integration. (L30, T4, P20, A2 =45).

PR315 Manufacturing Systems (3 credits); *Prerequisites:* PR206
Course Content: Integrated Manufacturing Systems; Advanced Topics in Planning and Control; Shop Floor Control Systems; Introduction to Lean Manufacturing Systems; Performance Evaluation of Manufacturing Systems. (L36, T4, P9, A1 =45).

PR316 Forming Processes (3 credits); *Prerequisites:* CE201, CE207
Course Content: Revision of Materials and their Properties for Metal Forming; Metal Forming Processes; Bulk Forming Processes; Sheet Metal Forming; Powder Forming; Casting of Metals; Forming and Shaping of Non-Metals. (L32, T5, P12, A4 =45).

PR317 Quality and Reliability Engineering (3 credits)
Course Content: Variability; Quality Engineering; Metrology; Reliability of Machines; Reliability of Processes. (L31, T5, P15, A3 =45).

PR404 CAD/CAM (3 credits); *Prerequisites:* PR204
Course Content: CAD/ CAM; Geometry/ Mathematical Representation; Graphical Data Representation; FEM/ Modeling and Analysis; Software. (L29, T4, P18, A6 =45).

PR408 Industrial Engineering and Decision Sciences (3 credits)
Course Content: Linear, Integer and Mixed Integer Programming; Dynamic Programming; Decision Theory; Introduction to Project Management; Queuing Theory and Modeling; Introduction to Multi Criteria Decision Making; Introduction to Non-Conventional Optimization Techniques. (L38, T6, A2 =45).

PR409 Management Principles and Economics (3 credits)
Course Content: Overview of Management Thought; Organizational Behaviour; Strategic Management Basics for Engineers; Basic Human Resources Management for Engineers; Occupational Health, Safety, and Professional Ethics; Basic Economics for Engineers. (L40, A10=45).

PR410 Manufacturing Engineering Project I (3 credits)
Course Content: Project Planning, Literature Review, Design and Development of Solution, Report Writing, Presentation of Findings, Project Demonstration. (L5, A80 =45).

PR411 Manufacturing Engineering Project II (3 credits); *Prerequisites:* PR410
Course Content: Project Planning, Literature Review, Design and Development of Solution, Report Writing, Presentation of Findings, Project Demonstration. (L5, A80 =45).

PR503 Control of Discrete Event Dynamics Systems (3 credits); Prerequisites: EM202, ME306
Course Content: Introduction to Discrete Event Dynamic Systems: Control of DEDS; Logical DEDS Models; Non-Stochastic Timed Models; Stochastic Models; Petri Nets. (L38, T2, P6, A6 =45).

PR506 Manufacturing Processes (3 credits)
Course Content: Physical Properties of Material; Forming and Shaping Processes; Surface Treatment; Coating, Texturing; Competitive Aspects of Manufacturing. (L33, T12, P3, A3 =45).

PR509 Plant Layout and Plant Management (3 credits)
Course Content: Plant Location Decisions; Information Collection for Layout Design; Layout Design; Material Handling System Design; Facility Systems; Industrial Case Study. (L35, T5, A10 =45).

PR510 Manufacturing Technology III (3 credits)
Course Content: Computer Integrated Manufacturing Systems, Non-traditional Machining Processes; Machining; Design and Manufacture of Moulds; Abrasive Machining and Finishing Operations. (L30, T5, P16, A4 =45).

PR513 Modeling and Control of Mechatronic Systems (3 credits)*; Prerequisites:* ME306
Course Content: s-domain and z-domain; Computer Controlled Systems; Modeling of Mechatronic Systems; Design Method for Discrete Time Controllers; Implementation of Controllers. (L29, T8, P12, A4=45).

PR515 Financial and Management Accounting for Engineers (3 credits)
Course Content: Introduction to Financial Accounting; Financial Statements and Financial Reporting; Valuation of Future Cash Flows; Capital Investment Decisions; Introduction to Management Accounting. (L40, T3, A4=45).

PR516 Sustainable Manufacturing (3 credits)
Course Content: Sustainability as a Science; Product Design for Sustainability; Processes and Measures for Sustainability; Future Directions of Sustainable Manufacturing; Case Study. (L38, P6, A8=45).

PR517 Lean Manufacturing (3 credits)
Course Content: Introduction to Lean Manufacturing; Foundations of Lean Thinking; Lean Manufacturing Techniques; Quality Conscious Manufacturing; Total Productive Maintenance; Human Factor in Lean Manufacturing; Extensions of Lean Manufacturing and Future Challenges. (L35, T5, P3, A7 =45).

PR518 Performance Evaluation of Manufacturing Systems (3 credits); *Prerequisites:* PR315
Course Content: Simulation of Manufacturing Systems; Markov Chain Models of Manufacturing Systems; Queuing Models of Manufacturing Systems. (L33, T3, P3, A15 =45).

PR519 Robotics and Autonomous Systems (3 credits); *Prerequisites:* ME 306, PR 513
Course Content: Introduction to Robotics and Autonomous Systems; Manipulator Kinematics; Manipulator Dynamics; Trajectory Planning; Autonomous Mobile Robots; Manipulator Control. (L33, T4, P16 =45).

PR520 Introduction to Nanotechnology (2 credits)
Course Content: Definitions for Nanoscience/Nanotechnology, Nanoscale Properties and behavior, Types of Nanomaterials and Characterization, Nanomaterial Synthesis, Ethics and Limitations. (L21, P3, A15 =30).

PR521 Additive Manufacturing (3 credits)
Course Content: Classification of Additive Manufacturing (AM) Processes, Generalized AM Processes, Types of AM Technologies, Design for AM, Software Issues, Related Technologies, Future Trends (L33, P15, A9 =45).

Department of Mechanical Engineering

ME211 Mechanics of Machines (3 credits)
Course Content: Kinematics of simple machines, General dynamics, Particle motion in 3D, Machine elements, Power transmission units. (L33, T3, P9, A9=45)

ME202 Mechanical Engineering for Civil Engineers (3 credits)
Course Content: Kinematics of simple machines, General dynamics of simple mechanisms, Internal combustion engines, Air compressors. (L32, T8, P10 =45).

ME213 Computer Aided Drafting and Solid Modeling (3 credits)
Course Content: Drawing conventions, Sectional views, Freehand sketching of a selection of machine components, Drawing of solid objects, Drawing of assembled objects, Computer Aided Solid Models, 3D sketches, Engineering Graphics. (L11, A68=45)

ME205 Tribology and Power Transmission Elements (3 credits)
Course Content: Friction in machine elements; Bearings and lubrication, wear: Geometry of toothed gearing; Cams and their geometry; theories of lubrication; Contact: rolling element bearings and gears. (L36, T4, P10 =45).

ME207 Applied Thermodynamics I (3 credits)
Course Content: Air standard cycles: the dual combustion cycle and gas turbine cycle; mean effective pressure; Combustion; Internal combustion engines; Air compressors. (L32, T8, P10 =45).

ME210 Thermodynamics for Electrical and Electronic Engineers (2 credits)
Course Content: Application of the first and second laws of Thermodynamics to processes, and power and refrigeration cycles. Heat transfer and their application.Thermodynamic properties of pure substances, and single and multi-phase mixtures.Industrial psychrometry and air conditioning. (L23, T4, P6 =30).

ME209 Machine Design I (3 credits) ***Prerequisites:*** **ME211, ME213**
Course Content: Principles and methodology, Assembly drawing of a simple mechanism, Velocity and acceleration diagram for a linkage mechanism, Design and different forms of stress, Design of a machine element, Design of a simple device, Design project. (L6, P60, A18 =45).

ME301 Vibration (3 credits)
Course Content: Vibration of systems with single degree of freedom, Vibration of systems with two degrees of freedom, Vibration absorbers & types of damping, Transient vibration, Experimental methods, Torsional and flexural vibration of systems with several degrees of freedom, Rotor balancing; Balancing of machines. (L33, T4, P16 =45).

ME302 Machine Design II (3 credits) ***Prerequisite*****: ME209**
Course Content: Design project I: design of a simple machine or sub-assembly; Design project II: problem identification, approach to solution, ergonomic and feasibility considerations, the use of standards, codes and manuals; Optional design (group project). (L6, P36, A42 =45).

ME303 Applied Thermodynamics II (3 credits) ***Prerequisite*****: ME207**
Course Content: Steam power plant performance, Refrigerators and heat pumps, Heat transfer, Gas mixtures psychrometrics and Air conditioning. (L30, T6, A18 =45)

ME306 Control Systems (3 credits)
Course Content: Introduction; Modelling: purpose, formulation of differential equations, linear systems, non-linear models and linearisation; Simulation of dynamical systems; Feedback control systems; Introduction to control strategies; Stability analysis of linear systems; Frequency domain representation; Stability analysis in frequency domain; Design and compensation of feedback control systems; Implementation issues in controllers. (L32, T9, P8 =45)

ME309 Mechanical Engineering Individual Project (3 credits)
Course Content: Goal-oriented individual project: planning and preliminary report; Project work; Seminar presentation; Formal report. (A90 =45).

ME406 Mechanical Engineering Group Project I (3 credits)
Course Content: Identifying a problem, forming a project proposal, conducting a literature survey, analysis of the problem, evaluation of possible solutions with their weaknesses, technical and economic feasibility study, environmental and social impact study, safety and ethical considerations, detailed project formulation and management, Design of experimental rigs/models, oral presentation and preparation of a technical report.. (L2 A 86 =45).

ME407 Mechanical Engineering Group Project II (3 credits); ***Prerequisite:*** **ME406**
Course Content: Continuation of ME 406 – Fabrication of experimental rigs/models, execution of investigation; analysis of results; drawing logical conclusions; oral presentation and preparation of a technical report; writing of technical papers. (L2 A 86 =45).

ME501 Heat Transfer (2 credits) ***Prerequisite:*** **ME 303**
Course Content: Conduction: general equations, steady-state conduction and transient heat conduction; Convection: forced and free convection, thermal boundary layer, Reynolds analogy, dimensional analysis and applications; Radiation; Combined modes of heat transfer & heat exchangers. (L26, T4 =30).

ME502 Ergonomics (2 credits)
Course Content: Introduction: theory of ergonomics, ergonomics and safety, ergonomic methods and intervention; Productivity enhancement and ergonomics, ergonomics in design, case studies; Project. (L19, T3, A16 =30)

ME503 Composite Materials (2 credits) ***Prerequisite:*** **CE309**
Course Content: Classification and definitions; Fibres and matrices: types and architecture; Fibre-matrix interface; Geometric aspects: micro-mechanics and macro-mechanics of composites; Laminates; Mechanical properties of composites. (L30 =30).

ME505 Advanced Control Engineering (2 credits) ***Prerequisite*****: ME306**
Course Content: Introduction to state-space: state-space representation of dynamic systems, state-transition matrix, time response, characteristic values; Transformations & canonical forms; Design of state-variable feedback systems: controllability and observability, pole placement, linear observers; Linear Quadratic Optimum Control. (L15, T8, A14 =30).

ME506 Digital Systems Engineering (2 credits) ***Prerequisite*****: ME306**
Course Content: Introduction to digital control systems: z-transforms, analysis of discrete time systems, D/A and A/D circuits; Discrete systems in state-space: controllability and observability in sampled systems; stability tests for discrete-data systems; time domain and z-domain analysis; Digital simulation, design of discrete-time control systems. (L16, T5, A18 =30).

ME508 Automobile Engineering (2 credits) ***Prerequisite*****: ME202 or ME207**
Course Content: Introduction: history, engine types & engine components; Gas exchange processes & in-cylinder charge motion: combustion, thermochemistry of fuel-air mixtures, engine heat transfer; Cooling systems; Engine friction & lubrication; IC engine performance; Design & operating parameters; Emissions & pollution: environmental issues; Dynamic analysis of IC engines; Advanced technology vehicles; Automatic valve timing, continuously varying transmission systems; Future vehicles, hybrid vehicles. (L26, P8 =30).

ME509 Non-linear Control Systems (2 credits) ***Prerequisite*****: ME306**
Course Content: Introduction; Lie brackets and linearisation schemes; phase plane analysis; The describing function method, design of non-linear control systems, Lyapunov stability; Bang-Bang control, sliding mode control, avoidance of chattering. (L18, T8, A8 =30).

ME511 Advanced Vibration Theory (2 credits) ***Prerequisites:*** **ME301**
Course Content: Modal analysis of vibratory response to force and displacement excitation; Energy methods; Receptance methods; Self-excited vibrations, dynamic instability; Three-dimensional motion, gyroscopes and other practical applications; (L25, T5 =30).

ME512 Energy Technology (2 credits) ***Prerequisite:*** **ME303**
Course Content: Non-renewable energy: fossil fuels and products and industrially manufactured gaseous fuels; Non-renewable energy, nuclear energy; Renewable energy conversion technologies; Heat transfer in heat exchangers, boilers and condensers; Waste heat recovery; Energy planning and management (L30 =30).

ME513 Applied Thermodynamics III(2 credits) ***Prerequisite:*** **ME303**
Course Content: Gas turbine plants; Air conditioning and Refrigeration; Turbomachinery; Fundamentals of automobile engineering; Thermodynamic relations; Laboratory projects: steam power plant, absorption refrigeration (L23, T4, P&A6 =30).

ME514 Maintenance Management (2 credits)
Course Content: Introduction to maintenance & maintenance management, Concepts of planned, Maintenance planning & control, Implementation techniques & condition monitoring, Use of computer packages, Case studies. (L19, T3, A16 =30)

ME515 Mechatronics (3 credits)
Course Content: Introduction and overview: Applied Electronics; Sensors actuators and signals; Computer applications in mechatronic systems; Artificial intelligent in mechatronic systems: Design of mechatronic systems. (L35, P16, A4 =45).

ME518 Rigid Body Mechanics (3 credits)
Kinematics and Kinetics of a Particle in 3D inertial and moving frames, Kinematics and Kinetics of 3D Rigid Bodies, Parmeterization of rigid body motion, Conservation Principles, Applications Kinematics and dynamic equations of robotic manipulators, and mobile robots; precession of a heavy top; behavior of the Foucault pendulum; operating principle of a classical gyroscope and its applications; and operating principle of MEMS gyroscopes. (L32, T3, A20 =45).

ME520 Computer Aided Modeling and Finite Element Analysis (3 credits) ***Prerequisite*****: ME213, ME301, ME303**
Course Content: Solid Modeling of Complex Mechanical Geometrie, Finite Element and Stiffness Methods, Isoparametric formulations, Development of plane stress and plane strain stiffness equations, Three dimensional stress analysis, Thermal system analysis, Structural dynamics (L25, T2, P25, A11 =45).

GENERAL ELECTIVE COURSES (Subject to periodic revision)

CP551 Sustainable Development (3 credits)
Course Content: Components of sustainable development: environment, economy and society. Games and group discussions to introduce the need for sustainable development in today's world.Concepts of economic development and human development.Economic development indices and their critique.Human development index and its critique.Discussion on sustainable development indices.Group discussion on economic development, and the impact on public health and environment.Group discussion on climate change and development, and other environmental and ecological related issues in today's world.Science, technology, innovations and sustainable development. Energy and transport for economic development and human development, and their impact on sustainable development. Industrial and service sector and their impact on sustainable development. Use of fertilizers and pesticides, green revolution and agricultural biotechnology in the agricultural sector, and their impact on sustainable development. Globalization and its impact on sustainable development. Information and communication technology and its impact on sustainable development. Sustainable development project execution, report writing and assessment. (L&T30, P&A30 =45).

EF501 The Engineer in Society (2 credits)
Course Content: Evolution of Industry and its Future. Energy sources and the impact of their use on society. Environmental issues, assessing industrial impact on the environment and on society. Sustainable development and engineering sustainability. Issues in engineering safety. The workforce and human relations. Issues of fundamental rights and human rights. Legal liabilities and legal responsibilities to society. Professional codes of conduct. (L25, A10 =30).

EF505 Management in Practice with Case Studies (3 credits)
Course Content: Business and its environment, Evolution of management. Principles of management. Functions of management. Human potential management. Motivation and organizational culture. Management information system. Crisis management, Change management, Conflict resolution. Social responsibility and managers. Reports and presentations. (L35, T7, P6 =45).

EF509 Engineer as an Entrepreneur (3 credits)
Course Content: Market and marketing. Forming of a company: Preparation of project proposal, working schedule, and budgeting. Plan implementation. Loan schemes. Service providers. ISO9000. ISO14000. Structure of organizations and laws governing them. Law governing the formation of a company. Getting registered. Memorandum of Association.Environmental regulations. Duty structure of Sri Lanka, Insurance, Management: Acquisition of technology. Technology transfer. Awareness of appropriate technology. Planning.Expansion and extension. Financial Activities: Financial handling. Financial statement. Quality Assurance. Statistics applied to industrial data. Leadership skills and development of management skills. (L38, T1, A12 =45).

EF510 Technology and Economic Development (3 credits)
Course Content: Introduction to technological evolution and its impact on economy and development. Role of technology in economic development. Technology, development and environment. Economic of natural resources – basic principles. Economics of environmental pollution – issues and instruments. Role of green technology in sustainable economic development. Assessment of economic damage caused by degraded environment induced by technology. Case studies in eco-friendly development projects. Reports and Presentations on the field visits. (L27, T10, P6, A10 =45).

EF511 Social Project (2 credits)
Course Content: The student shall work alone or in a small group on a theme selected by the student (or the group of students) under the general guidance of a supervisor (or supervisors). The theme will include a social objective, and the mode of study of the theme can be wide-ranging, such as a photographic exposition of poverty, a documentary movie on the social cost of development projects, a televised show of human right violations of people live by the dumping ground, a multimedia presentation on a selected social theme, and a report on union activities towards uplifting of a selected group of people. A project proposal, with the theme of the project clearly defined, its objective clearly stated, and the methodology of the project carefully laid down by the student (or the group of students), must be submitted to the supervisor (or supervisors) before the commencement of the project. (Proj60 =30).

EF513 Introduction to Music (2 credits)
Course Content: Classical Indian and Western systems. Important musicians including great composers of both systems and their work. Musical instruments of Western and Indian systems. Trends in Sri Lankan music. Practical in instrumental or vocal music. (L18, P20, A4 =30).

EF516 Painting and Sculpture (2 credits)
Course Content: Introduction to painting and sculpture. Understanding the human body, nature painting & sculpture. Main traditions of the West and the East.Traditional Sri Lankan painting and sculpture. Aesthetic, social and anthropological aspects of painting & sculpture. Computer graphics. (L16, P24, A4 =30).

EF519 Written English for Communication (1 credit)
Course Content: Communication through writing: introduction to communication, effective communication, technical communication and objective communication. Official correspondence: letters for job application, curriculum vitae, and other official letters. Technical writing: research proposals, abstracts, feasibility reports, project reports etc. (L10, A10 =15).

EF520 Effective Communication in English through Speech (1 credit)
Course Content: Presentation skills: how to make a good presentation; organization of facts, structure, time management, effective contact with audience, good manners etc. Interviews: Preparation, points to note and to avoid. Effective speech: accepted ways of oral communication at formal level; meetings, telephone conversations, greeting, departing etc. Dialogue and general communication: general communication at informal level, talking on general topics, and conversation with peers. (L7, Proj13, A3 =15).

EF521 Intellectual Property (1 credit)
How to commercialize research and development work by by acquiring Intellectual Property Rights (IPR)
(L12, A6 = 15)

EF522 Sri Lankan Technology (3 credits)
Course Content: Introduction and overview: Sri Lankan technology of ancient time. Technology under European powers and under British.Post-independent and contemporary technology in Sri Lanka.Technology in Sri Lanka for the future. Irrigation Systems, Water Management Systems, Soil Management Systems.Building Structures and Architecture.Technology in Sri Lankan cottage industry. Statues and Images, Castings and coins. (L35, A20 =45).

EF524 Business Law (3 credits)
Course Content: Introduction: Legal System of Sri Lanka; Sources of Law; Structure of Counts; Difference between civil law and criminal law. Law of contracts. Sale of Goods, Bill of Exchange, Law of Agency. The law relating to partnerships. Company Law. Constitution of Sri Lanka.Intellectual property. (L33, T7, P10 =45).

EF526 Marketing and Financial Management (3 credits)
Course Content: The role of marketing, organization and society, Fundamentals of Marketing, Product Life Cycle and Consumer Behaviour.Marketing Mix and Production Mix.Corporate Marketing Strategy.Issues in Market Segmentation and Target Market.Marketing communications.General Financial Management and pricing approaches.Financial Management Decision on Financing, Investing, and Dividend. Capital Budgeting. Working Capital Management.Financial Institution. Financial Statement Analysis, Ratio Analysis.(L30, P20, A10 =45).

EF528 Introduction to Digital Art (3 credits)
Course Content: Desk Top Publishing Tools / Graphic Design (with emphasis on use of Adobe PhotoShop). Introduction to Digital Animation.Web Design using Macromedia packages. Linking Web Design to Graphic Design and Digital Animation.Multimedia presentation. Impact of digital revolution on the society.(L30, P16, A14 =45).

ANNEXURE V

ENGINEERING EDUCATION AND UNIVERSITY OF PERADENIYA

"Scientists study the world as it is, engineers create the world that never has been."

– Theodore von Karman

ENGINEERING EDUCATION AND UNIVERSITY OF PERADENIYA

THE NATURE OF ENGINEERING

Engineering has been described as the art of the practical application of scientific principles to "directing the great sources of power in nature for the use and convenience of man". It involves men, money, material, machine and energy and "requires above all the creative imagination to innovate useful applications of natural phenomena". It also has the character of a never-ending search for "newer, cheaper, better means of using natural sources of energy and materials to improve man's standard of living and to diminish labour".

EVOLUTION OF ENGINEERING EDUCATION

Academic training of engineers, as we know it today, took a long time to gain recognition and acceptance due to resistance from within the profession as well as from the universities. Even in Britain, the cradle of the Industrial Revolution, the official history of the Institution of Electrical Engineers (1871 - 1971) records that "the traditional English road to a professional career [in the nineteenth century] did not lie through a university but through apprenticeship: 'learning by doing'. For the solicitor this meant an articled clerkship; for the doctor, 'walking the wards'; for the civil engineer pupilage in the drawing office and on the site; for the mechanical engineer 'going through the mill'. 'Premium apprentices' heading for a professional career, were marked off from apprentices on the way to becoming skilled tradesmen by the fees that their parents paid and by the expectation that they would study in their spare time. Engineering employers as a rule were apt to be scornful of academic achievements and young men who had them might find it politic to keep them hidden. The idea that engineers might qualify by examination was far, very far indeed, from the minds of mid-century employers although Sir John Rennie, a most eminent civil engineer, said as early as 1867, speaking of his own profession, that qualification by examination was 'the only method by which it can take rank among the learned professions".

In the mid-nineteenth century the proposal to teach engineering in the universities in Britain also ran into opposition from some conservative academics who felt that engineering was far too empirical to be "a proper department in which a degree should be conferred". Radical changes in thinking have taken place since then. In today's complex technological society, graduate engineers form an overwhelming majority of the membership of the professional engineering institutions all over the world. It has been predicted that before long an engineering degree will be a basic requirement for the Corporate Membership of such bodies.

ENGINEERING EDUCATION IN SRI LANKA: A BRIEF HISTORY

In the development of British colonial territories, the teaching of medicine was generally given priority over other forms of tertiary education. This policy led to the establishment in 1870 of a Medical College in Colombo as an "elementary school" for training medical assistants. The College began to expand rapidly and by 1888 it was sufficiently well developed for its LMS (Licentiate of Medicine and Surgery) to be recognised by the General Medical Council of Great Britain. Thus it had become a college for training fully qualified doctors. In 1874, a Council of Legal Education (later Law College) was created to produce lawyers. In a similar development a Technical School was founded in Colombo in

1893 to train sub-professional engineering personnel. It was renamed the Ceylon Technical College in 1933. Unfortunately, the colonial authorities did not have a clear policy on technical education, and in consequence the college went through many vicissitudes being nearly downgraded to an Industrial School at one stage.

Fortunately, engineering education received a welcome stimulus from an unexpected quarter. This was the Ceylon University College, which had been founded in 1921 to prepare students for the University of London's external degrees in Arts and Science. In 1923 the college announced a scheme to award two scholarships every year to promising Science graduates to follow Engineering degree courses in Britain and practical training thereafter. This was to prove a significant step in producing engineering graduates, some of whom would, in due course, rise to the highest levels in the profession and in academia. The Government ended the Engineering Scholarship Scheme in 1932, after a total of 20 awards had been made.

In the meantime, the Ceylon Technical College, where the main activity was the preparation of students for the Associate Membership Examinations of the three major professional institutions in Britain, was being developed steadily. In 1942 it was able to reach University College rank when it received provisional recognition from the University of London to prepare students for its external degree in Engineering. Owing to the prevailing wartime conditions the requirement of an inspection of the teaching facilities was waived.

On 1 July 1942 the University of Ceylon –the first university in the country– was established by the amalgamation of the Ceylon University College and the Ceylon Medical College. At the inception there were four faculties: Arts, Oriental Studies, Science and Medicine. Although the need for Engineering was recognized, planning was deferred owing to the shortage of funds in the stringent wartime economy. The availability of degree courses at the Ceylon Technical College was also another reason for lowering the priority of Engineering. However, in December 1949 a crisis erupted at the Ceylon Technical College when the University of London made known its intention of reconsidering the provisional recognition in view of some serious shortcomings in the college. This development caused great concern, as continued recognition appeared to be in doubt. The government responded to the crisis by requesting the University of Ceylon to set up a Faculty of Engineering by 1 July 1950. Ill prepared though it was, the University accepted the challenge and with this decision the degree courses at the Ceylon Technical College were wound up.

THE FACULTY OF ENGINEERING

The permanent home of the new Faculty was to be in the residential campus in Peradeniya, but until the buildings were ready it had to be located in Colombo. For the time being, therefore, it had to make use of the laboratory facilities at the Ceylon Technical College, supplementing them with its own equipment. It had three departments of study: Civil Engineering, Electrical Engineering and Mechanical Engineering.

The site for the Engineering complex was a 6-hectare block on the left bank of the Mahaweli River across which a bridge was built for access to the rest of the Campus. The entire project was planned by the staff of the Faculty and the University architects without any significant expatriate expertise. The laboratories, classrooms, library and other facilities were designed for quick and easy access, and ample provision was made for future expansion. When the project was completed in 1964 the move from Colombo took place. The facilities had a floor area of about 18,500 square metres, and 11,200 square metres have been added since then.

In 1942, when degree courses commenced at the Ceylon Technical College, the number of professional engineers in the country was estimated to be around 210, and 104 graduated in the period 1942-50 when the College had its link

with the University of London. On the basis of these figures the intake of freshmen to the Faculty in 1950 was fixed at 25. This figure was steadily increased over the years, reaching 150 in 1964, the year of the move to Peradeniya. On requests from the UGC the intake was raised to 250 in 1978 and is currently 415. From its inception in 1950 to 1971, when a second Faculty of Engineering was opened at Katubedde, this Faculty was the only source of supply of graduate engineers in the country. During the period 1950-53 when the Faculty undertook the task of completing the instruction of Ceylon Technical College undergraduates affected by the termination of the degree courses, 92 graduated with the University of London degree. The University of Ceylon's BScEng degree was first awarded in 1953, and in the period 1953-2007, 8956 students have obtained this degree.

Steady expansion and diversification of the Faculty have taken place since the move to Peradeniya and there are now eight departments of study: Civil Engineering, Electrical and Electronic Engineering, Manufacturing and Industrial Engineering, Mechanical Engineering, Chemical and Process Engineering, Engineering Mathematics, Computer Engineering and Engineering Management. The number of professorial chairs in the Faculty is eleven – three each in Civil Engineering, and Electrical & Electronic Engineering, two in Mechanical Engineering and one each in Engineering Mathematics, Production Engineering and Chemical Engineering.

The Faculty offers a full-time undergraduate programme leading to the degree of Bachelor of the Science of Engineering (BScEng). This is of four-years duration, the first year being common to all students and the last three years devoted to specialization in one of the branches of engineering. Coursework (laboratory, design and field work), projects and industrial training form an essential part of the undergraduate course. The undergraduate programmes of the past, with an examination at the end of each academic year, have been replaced by programmes based on the Semster System with effect from 2002, with continuous assessment and examinations held every semester. There are examinations at the end of each Semester. The students seeking Honours are required to follow additional courses of study in the final two years.

The Faculty offers postgraduate programmes leading to Postgraduate Diploma in specialized fields of Engineering (PGDip), degrees of Master of the Science of Engineering (MScEng), Master of Philosophy (MPhil) and Doctor of Philosophy (PhD).

In spite of having to contend with many difficulties similar to those experienced by the universities of other developing countries, the Faculty provides an academic environment of the highest quality and has maintained a gratifying record of teaching, research and public service, the traditional functions of institutions of higher education. Research done in the Faculty has been published at home and abroad, while its consultancy and laboratory services have been provided over the years to private and public sector establishments in the country.

WOMEN IN ENGINEERING

In Sri Lanka there have never been legal barriers to women aspiring to higher education, and from the very beginning they were free to seek entry to any department of study in the Medical, Law, Technical and University Colleges. But the traditional conservatism that prevailed in the early years stood in the way of professional careers, and many of them opted for courses in the Arts and the Humanities. These attitudes began to change in the post-war milieu and women began to spread out into all other fields. The Faculty of Engineering which had been regarded as the proud preserve of men, admitted its first woman undergraduate in 1960 and she went on to specialize in Civil Engineering. Since then the pace has quickened, and the numbers have been increasing steadily. Women engineers have now become well established in the profession, and some have risen to important positions at home and abroad.

THE UNIVERSITY OF PERADENIYA

The University of Ceylon, the first university in the country, was established in 1942 under the Ceylon University Ordinance (No. 20 of 1942) as a unitary, residential and autonomous corporation. The seat of the university was to be Peradeniya, to which it moved in 1952. With the passage of time the demand for higher education kept increasing, and more universities of different characters were created. In 1967 the government decided to separate the two wings of the University of Ceylon to create two independent universities. After this bifurcation, the Peradeniya wing was named University of Ceylon, Peradeniya. In 1972 there was a complete reorganization of the university system by the University of Ceylon Act No. 1 of 1972, which was passed in January 1972. All the existing universities were merged into a single monolithic University of Ceylon, administered from Colombo. The original universities became constituent campuses, and Peradeniya was given the name University of Ceylon, Peradeniya Campus. When Parliament adopted a Republican Constitution later in 1972, the country's name was changed to Sri Lanka, and this university became known as University of Sri Lanka, Peradeniya Campus. Another reorganization of the University system took place in 1978. By the University Act No. 16 of 1978 (passed in December 1978), the pre-1972 administrative system was restored, creating separate Universities enjoying self-governing powers, under the overall direction of the University Grants Commission. This Act conferred on this university the name of University of Peradeniya. Although many changes have taken place in the administrative structure of the university, it still retains its residential character. The original planning of the campus was based on an estimated student population of 1,000, however, at present there are about 10,000 students on roll, well in excess of the available residential capacity. An expansion of the residential facilities is now going on, and progress will depend on the availability of funds. With its nine faculties – Agriculture, Allied Health Sciences, Arts, Dental Sciences, Engineering, Management, Medicine, Science and Veterinary Medicine & Animal Science – Peradeniya remains the largest and the oldest university in the country.

Note: Rules, regulations and other particulars pertaining to the undergraduate programme have been extracted from the respective original documents approved by the Senate of the University of Peradeniya. In case of any discrepancy, the original documents shall prevail over the information presented in this handbook.