

# **BEng (Hons) Civil Engineering - E410 (Under Review)**

## **1. Aim**

The aim of the degree programme is to provide students with a sound knowledge and understanding of the subject of Civil Engineering and the potential to practise in a range of contexts, with an awareness of their responsibilities to society and the environment. Graduates should be capable of becoming a professional civil engineer in governmental, industrial and commercial organisations worldwide, follow a postgraduate route or apply the skills they have learnt in a range of other careers.

## **2. Objectives**

The course has been designed to enable students to:

- solve civil engineering problems in practice by applying fundamental knowledge of mathematics, science, and engineering and by using modern engineering techniques, skills and tools, particularly recognising the role that computers play in engineering;
- identify, formulate and solve civil engineering problems, particularly the planning, design, construction and operation of systems, components or processes that meet specified performance, cost, time, safety and quality needs and objectives;
- obtain a broad education necessary to understand the impact of civil engineering solutions in a global, societal and environmental context consistent with the principles of sustainable development;
- design and conduct experiments and to analyse and interpret data within the various civil engineering disciplines;
- function and communicate effectively both individually and within multidisciplinary teams;
- obtain a solid understanding of professional and ethical responsibility and a recognition of the need for and ability to engage in life-long learning; and
- experience an academic environment that facilitates and encourages learning and retention.

### 3. General Entry Requirements

As per General Entry Requirements for Admission to the University for Undergraduate Degrees.

### 4. Programme Requirements

Credit in Chemistry at SC/'O' Level.

2 GCE 'A' Level Passes in Mathematics and one of the following subjects: Physics, Physical Science, Engineering Science, Physics with Chemistry, Design & Technology (Technology).

### 5. Minimum Requirements For Award of Degree

<u>Modules (see Section 9)</u>	<u>Credits</u>
Humanities & Management	3
Basic Sciences & Mathematics	12
Engineering core	100
Electives	15
<b>TOTAL</b>	<b>130</b>

- For the degree award all core modules prescribed by the department must be completed.
- Industrial and vacation training must be completed satisfactorily for the award of the degree.

Note: Students who are unable to complete the BEng programme would be considered for the award of a **Diploma in Civil Engineering** provided that they attain a minimum of 61 credits as follows:

<u>Modules (as specified in Section 10)</u>	<u>Credits</u>
Humanities & Management	3
Basic Sciences & Mathematics	3
Engineering core	46
Others	3
Project	6
<b>TOTAL</b>	<b>61</b>

**6. Programme Duration**

	<b>Normal (Years)</b>	<b>Maximum (Years)</b>
Degree:	4	7

**7. Assessment**

As per University regulations on assessment (c.f. section 2.7).

Modules (if any) to be assessed jointly will be indicated prior to delivery of the modules.

Students will have to take failed core modules in the next corresponding semester. In case the number of failed core modules exceeds three, the student will have to compulsorily take at least three failed core modules in the next corresponding semester.

**8. Modules of Special Nature**

A student can take a maximum of 9 credits of Self-Study Subjects and Independent Study, subject to approval of the Department.

**9. List of Modules – BEng (Hons) Civil Engineering**

<b><u>CORE MODULES</u></b>		<b>Hrs/Wk</b>	<b>Credits</b>
		<b>L+P</b>	
<b>BASIC SCIENCES &amp; MATHEMATICS</b>			
MATHS 1111(1)	Mathematics 1	D.E.	3
MATHS 1211(1)	Mathematics 2	D.E.	3
CIVE 2110(3)	Probability & Statistics	3+0	3
CIVE 2210(3)	Numerical Methods	3+0	3
<b>ENGINEERING</b>			
CIVE 1101(1)	Engineering Materials	3+1	3.5
CIVE 1102 (1)	Engineering Perspectives	1+2	2
CIVE 1107(1)	Surveying 1	3+1	3.5
CIVE 1104(1)	Fluid Mechanics 1	3+1	3.5
CIVE 1105(1)	Introduction to Structures	3+1	3.5
CIVE 1206(1)	Building Construction & Drawing	3+1	3.5

CIVE 1207(1)	Surveying 2	3+1	3.5
CSE 1010e(1)	Introduction to Information Technology	O.E.	3
CIVE 1205(1)	Structural Analysis 1	3+1	3.5
CIVE 1200(1)	Vacation Training	-	0
CIVE 2118(3)	Engineering Geology	2+0	2
CIVE 2104(3)	Structural Analysis 2	3+1	3.5
CIVE 2111(3)	Environmental Engineering 1	3+1	3.5
CIVE 2106(3)	Concrete Technology	3+1	3.5
CIVE 2109(3)	Highway & Traffic Engineering	3+1	3.5
CIVE 2218(3)	Geotechnical Engineering 1	2+1	2.5
CIVE 2202(3)	Structural Design 1	3+1	3.5
CIVE 2211(3)	Fluid Mechanics 2	3+1	3.5
CIVE 2213(3)	Civil Engineering Management 1	3+0	3
CIVE 2209(3)	Highway Engineering	3+0	3
CIVE 3102(5)	Structural Design 2	3+1	3.5
CIVE 3103(5)	Structural Analysis 3	3+0	3
CIVE 3104(5)	Fluid Mechanics 3	3+0	3
CIVE 3105(5)	Environmental Engineering 2	3+0	3
CIVE 3118(5)	Geotechnical Engineering 2	2+1	2.5
CIVE 3113(5)	Economics for Engineers	3+0	3
CIVE 3200(5)	Industrial Training	-	0
CIVE 4114(5)	Structural Design 3	3+0	3
CIVE 4118(5)	Geotechnical Engineering 3	3+0	3
CIVE 4010(5)	Design Project	0+6	3
CIVE 4000(5)	Research Project	-	12

#### **HUMANITIES & MANAGEMENT**

COMS 1010(1)	Communication Skills	D.E.	3
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#### **ELECTIVES**

##### **ENGINEERING**

CIVE 2214(3)	Introduction to GIS	2+2	3
CIVE 2215(3)	Building Services	3+0	3
CIVE 4003(5)	Civil Engineering Mgt. 2	3+0	3

CIVE 3107(5)	Integrated Infrastructure Planning and Development Pt 1	3+0	3
CIVE 4004(5)	Water Resources	3+0	3
CIVE 4005(5)	Environmental Sanitation	3+0	3
CIVE 4009(5)	Traffic Engineering	3+0	3
CIVE 4007(5)	Hydraulics	3+0	3
CIVE 4008(5)	Structural Analysis 4	3+0	3
CIVE 4006(5)	Environmental Management	3+0	3
CIVE 4014(5)	Town & Country Planning	3+0	3
CIVE 4015(5)	Structural Design 4	3+0	3
CIVE 4016(5)	Wastewater Engineering	3+0	3
CIVE 4017(5)	Civil Engineering Mgt. 3	3+0	3
CIVE 4018(5)	Geotechnical Engineering 4	3+0	3
CSE 1020(1)	Computer Programming	2+2	3
<b>HUMANITIES &amp; MANAGEMENT</b>			
	General Education Module	3+0	3

**NOTE:**

Students are allowed to choose any elective module contained in GEMs list available at the Faculty's Office. However, the offer of the electives would be subject to availability of resources and existence of a critical mass of demand for the modules. Students are requested to contact their Course Adviser before entering any module under the GEMs in their module registration form.

**10. List of Modules - Diploma in Civil Engineering**

<b><u>CORE MODULES</u></b>		<b>Hrs/Wk</b>	<b>Credits</b>
		<b>L+P</b>	
<b>BASIC SCIENCES &amp; MATHEMATICS - ONE OF THE FOLLOWING</b>			
MATHS 1111(1)	Mathematics 1	D.E.	3
CIVE 2110(3)	Probability & Statistics	3+0	3
<b>ENGINEERING</b>			
CIVE 1101(1)	Engineering Materials	3+1	3.5
CIVE 1102(1)	Engineering Perspectives	1+2	2

CIVE 1107(1)	Surveying 1	3+1	3.5
CIVE 1104(1)	Fluid Mechanics 1	3+1	3.5
CIVE 1105(1)	Introduction to Structures	3+1	3.5
CIVE 1206(1)	Building Construction & Drawing	3+1	3.5
CIVE 1207(1)	Surveying 2	3+1	3.5
CSE 1010e(1)	Introduction to Information Technology	O.E.	3
CIVE 1205(1)	Structural Analysis 1	3+1	3.5
CIVE 1200(1)	Vacation Training	-	0
CIVE 2111(3)	Environmental Engineering 1	3+1	3.5
CIVE 2106(3)	Concrete Technology	3+1	3.5
CIVE 2109(3)	Highway & Traffic Engineering	3+1	3.5
CIVE 2218(3)	Geotechnical Engineering 1	2+1	2.5
CIVE 2202(3)	Structural Design 1	3+1	3.5
CIVE 2000D(3)	Project	-	6

#### **HUMANITIES & MANAGEMENT**

COMS 1010(1)	Communication Skills	D.E.	3
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#### **11. List of Level 4 Electives**

CIVE 4003(5)	Civil Engineering Mgt. 2	3+0	3
CIVE 3107(5)	Integrated Infrastructure Planning and Development Pt 1	3+0	3
CIVE 4004(5)	Water Resources	3+0	3
CIVE 4005(5)	Environmental Sanitation	3+0	3
CIVE 4006(5)	Environmental Management	3+0	3
CIVE 4007(5)	Hydraulics	3+0	3
CIVE 4008(5)	Structural Analysis 4	3+0	3
CIVE 4009(5)	Traffic Engineering	3+0	3
CIVE 4014(5)	Town & Country Planning	3+0	3
CIVE 4015(5)	Structural Design 4	3+0	3
CIVE 4016(5)	Wastewater Engineering	3+0	3
CIVE 4017(5)	Civil Engineering Mgt. 3	3+0	3
CIVE 4018(5)	Geotechnical Engineering 4	3+0	3

## 12. Programme Plan - BEng (Hons) Civil Engineering

LEVEL 1							
Semester 1				Semester 2			
Code	Module	Hrs/Wk L+P	Credits	Code	Module	Hrs/Wk L+P	Credits
<b>CORE</b>				<b>CORE</b>			
CIVE 1101(1)	Engineering Materials 1	3+1	3.5	CIVE 1206(1)	Building Const. & Drawing	3+1	3.5
CIVE 1102(1)	Engineering Perspectives	1+2	2	COMS 1010(1)	Communication Skills	D.E.	3
CIVE 1107(1)	Surveying 1	3+1	3.5	CIVE 1207(1)	Surveying 2	3+1	3.5
CIVE 1104(1)	Fluid Mechanics 1	3+1	3.5	CSE 1010e(1)	Introduction to IT	O.E.	3
CIVE 1105(1)	Introduction to Structures	3+1	3.5	CIVE 1205(1)	Structural Analysis 1	3+1	3.5
MATHS 1111(1)	Mathematics 1	D.E.	3	MATHS 1211(1)	Mathematics 2	D.E.	3
				CIVE 1200(1)	Vacation Training	-	0
LEVEL 2							
<b>PREREQUISITE: A student cannot carry forward more than 4 failed (Grade E and F) Level 1 CIVE core modules</b>							
Semester 1				Semester 2			
Code	Module	Hrs/Wk L+P	Credits	Code	Module	Hrs/Wk L+P	Credits
<b>CORE</b>				<b>CORE</b>			
CIVE 2118(3)	Engineering Geology	2+0	2	CIVE 2218(3)	Geotechnical Engineering 1	2+1	2.5
CIVE 2104(3)	Structural Analysis 2	3+1	3.5	CIVE 2202(3)	Structural Design 1	3+1	3.5
CIVE 2111(3)	Environmental Engineering 1	3+1	3.5	CIVE 2211(3)	Fluid Mechanics 2	3+1	3.5
CIVE 2106(3)	Concrete Technology	3+1	3.5	CIVE 2213(3)	Civil Engineering Mgt. 1	3+0	3
CIVE 2109(3)	Highway & Traffic Eng.	3+1	3.5	CIVE 2209(3)	Highway Engineering	3+0	3
CIVE 2110(3)	Probability & Statistics	3+0	3	CIVE 2210(3)	Numerical Methods	3+0	3
<b>ONE ELECTIVE FROM</b>							
				CIVE 2214(3)	Introduction to GIS	2+2	3
				CIVE 2215(3)	Building Services	3+0	3
				CSE 1020(1)	Computer Programming	2+2	3
					General Education Module		3

**LEVEL 3****PREREQUISITE: A student cannot carry forward more than 5 failed (Grade E and F) Level 1 & 2 CIVE core modules****Semester 1**

Code	Module	Hrs/Wk L+P	Credits
<b>CORE</b>			
CIVE 3102(5)	Structural Design 2	3+1	3.5
CIVE 3104(5)	Fluid Mechanics 3	3+0	3
CIVE 3105(5)	Environmental Engineering 2	3+0	3
CIVE 3118(5)	Geotechnical Engineering 2	2+1	2.5
CIVE 3103(5)	Structural Analysis 3	3+0	3
CIVE 3113(5)	Economics for Engineers	3+0	3

**ELECTIVE**

One Level 4 Elective 3

**Semester 2**

Code	Module	Hrs/Wk L+P	Credits
<b>CORE</b>			
CIVE 3200(5)	Industrial Training	-	0

**LEVEL 4****PREREQUISITE: A student cannot carry forward more than 2 failed (Grade E and F) Level 1, 2 & 3 CIVE core modules****Semester 1**

Code	Module	Hrs/Wk L+P	Credits
<b>CORE</b>			
CIVE 4000(5)	Research Project Pt 1	-	-
CIVE 4010(5)	Design Project Pt 1	-	-
CIVE 4118(5)	Geotechnical Engineering 3	3+0	3
CIVE 4114(5)	Structural Design 3	3+0	3

**ELECTIVES**

Two Level 4 Electives 6

**Semester 2**

Code	Module	Hrs/Wk	Credits
<b>CORE</b>			
CIVE 4000(5)	Research Project Pt 2	-	12
CIVE 4010(5)	Design Project Pt 2	-	3

**ELECTIVE**

One Level 4 Elective 3



### **13. Outline Syllabus**

This outline syllabus is not prescriptive and is intended to serve as a guide only.

Note: Pre-requisite (PR); Pre-requirement (PQ).

#### **CIVE 1101(1) - ENGINEERING MATERIALS (L/P - 3.5)**

Properties of Materials - Hydraulic and Bituminous Binders; Plastics; Glass; Ceramics and Composite Materials. Materials Science - Crystal Structure; Plastic Deformation; Properties and Behaviour of Materials.

#### **CIVE 1102(1) - ENGINEERING PERSPECTIVES (L/P - 2)**

The student will be introduced to the different branches of civil engineering and be given an assignment which involves the fields of engineering: architecture/aesthetics, surveying, geotechnics, structures, building, fluid mechanics, water resources, environment, traffic, materials, etc. The aim is to understand how different engineering specialists interact.

#### **CIVE 1104(1) - FLUID MECHANICS 1 (L/P - 3.5)**

Properties of Fluids. Hydrostatics. Stability of floating bodies. Basic Law of Continuous Media. Continuity. Introduction to Thermodynamics.

#### **CIVE 1105(1) - INTRODUCTION TO STRUCTURES (L/P - 3.5)**

Structures, Structural Behaviour and loading. Section Properties. Forces in structure. Tension and Compression. Torsion. Shearing Force and Bending Moment. Stresses in Beams and Columns. 2-D Stresses and Strains.

#### **CIVE 1107(1) - SURVEYING 1 (L/P - 3.5)**

Principles of Surveying. Control and Detailed Survey. Adjustments. Aerial Photography.

#### **CIVE 1200(1) - VACATION TRAINING (P - 0)**

Students will have to satisfactorily complete 3 weeks of practical work in land surveying, electrical installation and workshop practice.

#### **CIVE 1205(1) - STRUCTURAL ANALYSIS 1 (L/P - 3.5)**

Slope and Deflection of Beams. Moment-Area Method. Moment Distribution. Analysis of Pinned Jointed Frames. Struts. Use of Software.

**CIVE 1206(1) - BUILDING CONSTRUCTION & DRAWING (L/P - 3.5)**

Building Codes and Zoning. Types of Structures and Structural Elements. Site Preparation and Layout. Introduction to Architecture. Building Construction Drawing and Computer Aided Drafting.

**CIVE 1207(1) - SURVEYING 2 (L/P - 3.5) (PQ: CIVE 1107(1))**

Theory of Errors and Survey Adjustments. Control Surveys. Optical and Electronic Distance Measurement.

**CIVE 2104(3) - STRUCTURAL ANALYSIS 2 (L/P - 3.5) (PQ: CIVE 1205(1))**

Arches. Virtual Work and Energy Methods. Moving Loads and Influence Line. Plates and Shell Theory. Frames and Subframe Analysis. Use of software.

**CIVE 2106(3) - CONCRETE TECHNOLOGY (L/P - 3.5)**

Constituent Materials. Properties of Fresh and Hardened Concrete. Concrete Mix Design and Quality Control.

**CIVE 2109(3) - HIGHWAY & TRAFFIC ENGINEERING (L/P - 3.5)**

Highway Planning. Traffic Studies and Surveys. Geometric Design and Setting Out. Earthwork Calculations. Road Design.

**CIVE 2110(3) - PROBABILITY AND STATISTICS (L - 3)**

Probability; descriptive statistics; distributions; estimation; central limit theorem; confidence intervals; significance tests; regression on one explanatory variable; multiple regression; categorical data; use of EXCEL for statistical calculations, Design of Experiments and Sampling Strategies.

**CIVE 2111(3) - ENVIRONMENTAL ENGINEERING 1 (L/P - 3.5)**

Water Quality. Measurement of Water Characteristics. Water Quality Standards for Specific Purposes. Components of Water Demand. Unit Operations and Processes used in Water Treatment.

**CIVE 2118(3) - ENGINEERING GEOLOGY (L - 2)**

General Geology. Geology of Mauritius. Site investigation: objectives and methods of subsurface exploration. Engineering classification and physical properties of soils.

**CIVE 2202(3) - STRUCTURAL DESIGN 1 (L/P - 3.5)**

Reinforced Concrete Design. Singly reinforced, continuous, L and T - Beam design. One and two way spanning solid slab design. Short, slender, braced and unbraced columns. Short braced column design. Pad footing design. Design Project.

**CIVE 2209(3) - HIGHWAY ENGINEERING (L - 3) (PQ: CIVE 2109(3))**

Design, Construction and Maintenance of Highways: Aims of Highway Engineering, Pavement Design, Highway Construction Materials, Highway Maintenance.

**CIVE 2210(3) - NUMERICAL METHODS**

Numerical Solution of Linear Equations; Techniques of numerical integration; Gauss-Legendre formulae; Techniques for solving first-order initial-value ordinary differential equations; Euler Method; Runge-Kutta Methods; Second order initial-value ordinary differential equations; Instability in numerical schemes; Applications.

**CIVE 2211(3) - FLUID MECHANICS 2 (L/P - 3.5) (PQ: CIVE 1104(1))**

Energy and Momentum Principles and Applications. Pipe Flow. Dimensional Analysis. Hydrodynamics.

**CIVE 2213(3) - CIVIL ENGINEERING MANAGEMENT 1 (L - 3)**

Structure of the Construction Industry. Planning and Programming. Estimating and Tendering. Contract Procurement. Civil Engineering and Building Quantities. Specifications. Site Management.

**CIVE 2214(3) - INTRODUCTION TO GIS (L/P - 3)**

Data structures, spatial referencing, geographic data processing and reporting, and GIS as a decision making tool. Applications of GIS in civil engineering, planning and the environment.

**CIVE 2215(3) - BUILDING SERVICES (L - 3)**

Mechanical and Electrical Services installed in Buildings: Procurement, Installation, Maintenance and Management.

**CIVE 2218(3) - GEOTECHNICAL ENGINEERING 1 (L/P - 2.5)**

Compaction. Permeability and Seepage. Principles of Effective stress. Basic mechanics of soils. One-dimensional consolidation theory. Shear strength of soils.

**CIVE 3102(5) - STRUCTURAL DESIGN 2 (L/P - 3.5) (PQ: CIVE 2202(3))**

Steel Design. Design of columns in simple construction, with bending moments. Column base plate design. Bolted and welded connections. Trusses. Bracing. Design Project.

**CIVE 3103(5) - STRUCTURAL ANALYSIS 3 (L - 3) (PQ: CIVE 2104(3))**

Yield Line Analysis of Slabs. Strip Method of Slab Analysis. Flexibility (Matrix) Method. Instability of Frames. Use of softwares.

**CIVE 3104(3) - FLUID MECHANICS 3 (L/P - 3) (PQ: CIVE 2201(3))**

Boundary Layer Theory. Steady Uniform and Non-Uniform Open Channel Flow. Introduction to Hydrology.

**CIVE 3105(3) - ENVIRONMENTAL ENGINEERING 2 (L/P - 3)**

Wastewater Characteristics. Environmental Impacts of Wastewater Discharge. Estimation of Wastewater Flows and Design of Wastewater Collection System.

**CIVE 3107(5) - INTEGRATED INFRASTRUCTURE PLANNING AND DEVELOPMENT PART 1 (L - 3)**

Importance of Infrastructure Planning and Management. Systems Approach to Infrastructure Planning. Primary and Secondary Effects of Infrastructure Development. Spatial Organisation and Multipurpose Infrastructure Planning. Regional Infrastructure Development. Issues in Infrastructure Management. Social Aspects.

**CIVE 3113(5) - ECONOMICS FOR ENGINEERS (L - 3)**

Introduction to different branches of economics. Microeconomics: Supply and Demand Analysis. Monopoly and competition. Macroeconomics: National Income Accounting, Multiplier Effect, Open and closed economies. Engineering economics. Investment appraisal techniques. Resource and environmental economics. Welfare economics. Indifference curves.

**CIVE 3118(5) - GEOTECHNICAL ENGINEERING 2 (L/P - 2.5) (PQ: CIVE 2218(3))**

Stress paths. Engineering properties and behaviour of rocks. Bearing capacity and settlement analysis. Shallow and deep foundations.

**CIVE 3200(5) - INDUSTRIAL TRAINING (P - 0)**

Students will be attached to a firm for a period of at least 20 weeks. The objective is to provide the student with the opportunity to apply theoretical knowledge to solve real world problems in civil engineering and to function within the organisational structure of the firm. Students have to perform satisfactorily in this module before qualifying for the award of the degree.

**CIVE 4000(5) - RESEARCH PROJECT (P - 12) including 15 hours of lectures on Research Concepts and Methods**

Student will work on an individual research-oriented project. The project will involve the student in a critical review of the literature, in defining the problem and preparing a research methodology. The student will be trained to develop skills in the collection, evaluation and presentation of information, develop communication skills by writing a concise, clear and accurate report, and use the most appropriate visual aids to make oral presentations of the research findings.

**CIVE 4003(5) - CIVIL ENGINEERING MANAGEMENT 2 (L - 3) (PQ: CIVE 2213(3))**

Project Life Cycle, Conception, feasibility, implementation. Feasibility, Appraisal. Work Breakdown Structure. Network Analysis, Use of project management software. Budgeting. Operational estimating and cash flow. Quality, Quality Assurance, ISO9001. Construction Management, Tracking of project in terms of time and cost, Earned value analysis and cost variance.

**CIVE 4004(5) - WATER RESOURCES (L - 3)**

Hydrology and Water Resources; Groundwater flow; Surface Runoff; Rainfall-Runoff modelling and Flood Frequency analysis; Water abstraction and storage works; Water resources.

**CIVE 4005(5) - ENVIRONMENTAL SANITATION (L - 3)**

Water related diseases and control measures. Urban water drainage. Solid (domestic and hazardous) waste management: sources, handling, treatment processes and disposal methods.

**CIVE 4006(5) - ENVIRONMENTAL MANAGEMENT (L - 3)**

Environmental Legislation. Environmental Impact Assessments. Environmental Norms (ISO 14000). Environmental Management Systems and Implementation. Environmental Compliance and Monitoring.

**CIVE 4007(5) - HYDRAULICS (L - 3) (PQ: CIVE 3104(3))**

Unsteady Flow in Bounded and Unbounded Systems. Rotodynamic Machines. Hydraulic Structures.

**CIVE 4008(5) - STRUCTURAL ANALYSIS 4 (L - 3) (PQ: CIVE 3103(5))**

Stiffness (Matrix) Method. Instability of Trusses. Plastic Theory. Introduction to Dynamics. Use of softwares.

**CIVE 4009(5) - TRAFFIC ENGINEERING (L - 3) (PQ: CIVE 2109(3))**

Traffic Analysis and Forecasting. Design for Highway Traffic. Traffic Control and Management.

**CIVE 4010(5) - DESIGN PROJECT (P - 3)**

Student will work in a team to solve a civil engineering problem involving analysis in areas of structural engineering, fluid mechanics, geotechnical engineering, environmental engineering highway and traffic engineering and materials, to select a design solution from a critical assessment of alternatives, to use relevant codes and standards for a detailed design of the selected option, to produce main working drawings using CAD packages and to defend the solution during an oral presentation.

**CIVE 4014(5) - TOWN & COUNTRY PLANNING (L - 3)**

National, regional and local planning. The origins of planning in Mauritius. Planning procedures, preparation of plans for development and development control. Planning Legislations and organisations.

**CIVE 4015(5) - STRUCTURAL DESIGN 4 (L - 3) (PQ: CIVE 3103(5))**

Advanced Reinforced Concrete: Water Retaining Structures – joints, reinforcement details and design methods. Slab Design – flat, stair and waffle slabs. Retaining Walls. Failure of Structures.

Pre-stressed Concrete: Principles and methods of pre-stressing. Bending and shear. Simple and continuous beams.

**CIVE 4016(5) - WASTEWATER ENGINEERING (L - 3) (PQ: CIVE 3105(3))**

Wastewater treatment plant design: Primary, Secondary and Tertiary treatment operations/processes. Handling, treatment and disposal of wastewater sludge. On-site sanitation systems. Wastewater reuse and recycling.

**CIVE 4017(5) - CIVIL ENGINEERING MANAGEMENT 3 (L - 3) (PQ: CIVE 2213(3))**

Tender documents and Contract Documents. FIDIC Contract, Obligations and Liabilities of Client, Contractor and Engineer. Standard Forms of Contract. Contract Administration. Site organisation, office records, price increases, extras and claims, instructions, supervision and correspondence. Risk Management. Law of Contract and Tort, general and Mauritian laws.

**CIVE 4018(5) - GEOTECHNICAL ENGINEERING 4 (L - 3) (PQ: CIVE 4118(5))**

Critical state soil mechanics. Finite element methods. Application of softwares in geotechnical engineering design.

**CIVE 4114(5) - STRUCTURAL DESIGN 3 (L - 3) (PQ: CIVE 3102(5))**

Composite Construction Design: Design Procedure. Steel beam design in composite section for conditions during construction. Composite section at ultimate and serviceability limit states. Design of shear connectors. Transverse Reinforcement in concrete flange of composite section. Masonry Design: Materials, Design of vertically and laterally loaded walls. Shear Walls. Reinforced Masonry. Design Project.

**CIVE 4118(5) - GEOTECHNICAL ENGINEERING 3 (L - 3) (PQ: CIVE 3118(5))**

Earth pressure theory. Design of retaining structures. Slope stability. Ground improvements.

**COMS 1010(1) - COMMUNICATION SKILLS**

Writing skills, non-verbal communication, modes of speech delivery and presentation aids, speeches, perception and listening skills, business and technical writing.

**CSE 1010e(1) - INTRODUCTION TO INFORMATION TECHNOLOGY**

IT and Computers; Stepping in the Computer; Input and Output Devices; Secondary Storage; Programming; Systems Software; Applications Software; Systems Development; Computer Networks; The internet; Computer Security; Software Utilities; Issues and Trends in IT.

**CSE 1020(1) - COMPUTER PROGRAMMING**

Basic types; arithmetic & logical operators and expressions; decision and loop structures; arrays (one-dimensional and two-dimensional); functions; value and reference parameters; files: creation, opening, writing, closing; introduction to structures data types.

**MATHS 1111(1) - MATHEMATICS 1 (PR: A-LEVEL MATHEMATICS)**

Calculus of one and several variables. Polar coordinates. Complex numbers. Hyperbolic functions. Limits. Ordinary differential equations.

**MATHS 1211(1) - MATHEMATICS 2 (PR: A-LEVEL MATHEMATICS)**

Matrix Algebra: Matrices and determinants. Solution of linear systems of equations. Eigenvalues and eigenvectors. Infinite Series: Comparison test and Ratio test for non-negative series. Vector Algebra: Scalar and vector products, triple products. Vector equations. Vector Analysis: Gradient, divergence and curl. Line and multiple integrals. Green's theorem in the plane, Divergence theorem and Stokes' theorem.