The University of the West Indies, Mona
Faculty of Science and Technology

School of Engineering

UNDERGRADUATE INFORMATION GUIDE

Regulations & Syllabus

2014-15
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission Statement</td>
<td>1</td>
</tr>
<tr>
<td>Dress code and conduct</td>
<td>2</td>
</tr>
<tr>
<td>Staff Listing</td>
<td>3-6</td>
</tr>
<tr>
<td><strong>SECTION 1: General Information</strong></td>
<td></td>
</tr>
<tr>
<td>Programmes of study</td>
<td>7</td>
</tr>
<tr>
<td>Academic Quality Assurance</td>
<td>7</td>
</tr>
<tr>
<td><strong>SECTION 2:</strong> Undergraduate Regulations</td>
<td>8</td>
</tr>
<tr>
<td>Classification of Degree</td>
<td>9</td>
</tr>
<tr>
<td>Grade Point Average (GPA) Requirements</td>
<td>10</td>
</tr>
<tr>
<td><strong>SECTION 3: Undergraduate Course listings and descriptions</strong></td>
<td>11-13</td>
</tr>
<tr>
<td><strong>BSc in Civil Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>Course Listing</td>
<td>11-13</td>
</tr>
<tr>
<td>Course Descriptions</td>
<td>14-21</td>
</tr>
<tr>
<td><strong>BSc in Computer Systems Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>Course Listing</td>
<td>22-23</td>
</tr>
<tr>
<td>Course Descriptions</td>
<td>24-28</td>
</tr>
<tr>
<td><strong>BSc in Electronics Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>Course Listing</td>
<td>29-31</td>
</tr>
<tr>
<td>Course Description</td>
<td>32-41</td>
</tr>
</tbody>
</table>
MISSION STATEMENT

The mission of the Mona School of Engineering is to be the provider of a world class quality education in engineering and research and development programmes in support of Caribbean business, industry and infrastructure; with its graduates, staff and facilities being at the forefront in propelling growth, development and innovation in the region.
DRESS CODE AND CONDUCT

Students must at all times conduct and present themselves in a manner in keeping with the nature of the Engineering Profession, and as directed by the Department in which the student is registered. In particular, due to Occupational Health and Safety issues in the laboratories, PRESCRIBED LABORATORY ATTIRE WOULD BE ENFORCED AT ALL TIMES. Any student who is not appropriately attired SHALL NOT BE ALLOWED ENTRY in any Laboratory or Workshop.

Student ID cards MUST be clearly displayed at all times when on UWI premises. Student ID cards are also required to facilitate all transactions in the Faculty/University.

Food and drink SHALL NOT be brought into classrooms or laboratories.
STAFF LISTING:

DEPUTY DEAN

Aiken, Paul
BSc, MPhil (Physics) UWI; MSc, PhD (Electrical Engineering), Columbia University, New York;
Senior Member IEEE, Former Snr R&D Eng. Intel;
Senior Lecturer & Director of Mona School of Engineering;
Ext: 2204, Office: 977 1924

ADMINISTRATIVE STAFF

Stephenson, Suchetta
Senior Administrative Assistant
Ext: 2204

Gray, Shanique
Administrative Assistant
Ext: 2204

Williams, Tena
Customer Service Representative
Ext: 2204

TECHNICAL STAFF

Falconer, Lindon
Electronics Engineer
BSc (electronics, Comp Sci), MSc (Digital Tech),
UWI, Mona. Former Snr Eng. Digicel
Projects and Laboratories Coordinator
Ext: 2204

Brown, Errol
Senior Electronics Technologist
Inventory and PCB constructions
Ext: 2204

Brooks, Joseph
Senior Electronics Technologist
Equipment calibration and lab Tech
Ext: 2204

Thompson, Gowan
Electrical and Workshop Technician
Ext: 2204

ACADEMIC STAFF

PROFESSOR

Imbert, Clement (secondment)
FoE: St Augustine Campus
BSc (Eng) (UWI), MSc Tech (Brunel), PhD (UWI)
FAPETT, MASME
(Materials Technology & Manufacturing Processes)

Latchman, Haniph (visiting professor)
University of Florida
BSc (Eng) (UWI), D,Phil, Oxford (Electrical Engineering)
(Control systems, communications and computer networks)

Shrivastava, Gyan (secondment)
FoE: St Augustine Campus
MTech, MSc, PhD, DIC, CEng, MICE
(Civil and environment Engineering)

SENIOR LECTURERS

Aiken, Paul
BSc, MPhil (UWI), MSc, PhD (Columbia U)
(Electronics/ Electrical Engineering)
Ext: 2204, Office 977 1924

Brown, Noel
PhD, Queens University
Industry: JenTech Consultants
Coordinator, Civil Engineering
Ext: 2204, Office 977-1924

Coore, Daniel
PhD, MIT
Department of Computing
(Computer Systems Engineering)
Ext: 2814

**Morris, Halden**
PhD, TVET
FHE - School of Education -TVET
(Engineering Profession and Ethics)

**Mugisa, Ezra**
PhD
Head, Department of Computing
(Software Engineering)
Ext: 2815

**Myers, Leary**
PhD, Howard University
Department of Physics
(Electronics Devices)
Ext: 2274

**LECTURERS**

**Beckford, Carl**
PhD
Department of Computing
(Discrete Maths)
Ext 2815

**Clarke, Leo**
MPhil, UWI
Department of Physics
(Embedded Systems, Digital Circuits)
Ext: 2274

**Coy, Andre**
PhD, Sheffield University
Department of Physics
(Wireless communications, DSP, Signals and Systems)
Ext: 2274

**Edward, Kert**
PhD
Department of Physics
(Medical Physics & Optics)
Ext: 2274

**Ferguson, Eyton**
MSc
Department of Computing
(Object Oriented Programming)
Ext: 2815

**Fokum, Daniel**
PhD, Kansas State University
Department of Computing
(Wireless Networks and Communications)
Ext 2815

**Gaynor, Paul**
MSc
Department of Computing
(Embedded Systems and Architectures)
Ext: 2815

**Henry, Tania**
PhD, Yale University
Mona School of Engineering
(Materials and Nano Engineering)
Ext: 2405

**Mansingh, Gunjan**
PhD, UWI
Department of Computing
(Database)
Ext 2815

**McMorris, Nicolas**
PhD, University of Delaware
Mona School of Engineering
(Civil Engineering)
Ext: 2405
**Spence, Kirk**
PhD, LSU
Mona School of Engineering
(Computer Systems Engineering)
Ext: 2405

**Taylor, Ashley**
PhD, Illinois State University
Department of Computing
(Operating Systems and Animation)
Ext: 2815

**Thomas, Omar**
PhD, University of Florida
Mona School of Engineering
(Civil Engineering)
Ext: 2405

**Falconer, Lindon**
MSc, UWI
Electronics Unit
(Embedded Systems and Robotics)
Ext: 2204

**Fletcher, Maurice**
PhD
Engineering Consultant
(Engineering & Project management)
Ext: 2204

**Lawrence, Vin**
BSc (Civil Eng, UWI); PhD (Queens University)
Industry: CEO JenTech Consultants
(Civil Engineering)

**Lee, Martel**
MSc
Industry: Civil Engineer
(Building Services)
Ext: 2204

**Lyle, Ervin**
MSc
Industry: Automation Consultant
(Industrial Automation and Controls)
Ext: 2204

**Mangaroo, Basil**
Engineering
Department of Chemistry- Senior Engineer
(Machine Shop and Graphics)

**Palmer, Richard**
PhD, UWI (Pending)
Department of Mathematics
(Engineering maths)

**Preston, Sophia**
Attorney
Senior Council

**PART-TIME LECTURERS**

**Alberga, Brian**
MSc, Professional Engineer
Industry: JenTech Consultants
(Building Service Engineering)

**Barrett, Raphael**
MBA
Industry: Consultant
(Engineering Economics and Accounts)

**Dennis, Haile**
MSc
ICENS
(Nuclear Power Engineering)

**Ellis, Noel**
MSc
Industry: Aviation
(Telecommunication)
Ext: 2204
(Engineering Management - Business Law)

**Raggie, Kamla**
MSc; PE
Industry: JenTech Consultants
(Geotechnical Engineering & Soil Mechanics)

**Rannie, Richard**
MA, Arch, Caribbean Sch of Architecture
Industry: Architect, Semiotics Ltd
(Engineering Graphics)

**Smith, David**
BSc (Civil Eng, UWI); PhD
Industry: Smith Warner International
(Mechanics of Fluids 1)

**Thomas, Lowell**
MSc,
Electronics Engineering
(Power Plant Instrumentation)
Ext: 2204
SECTION 1 - GENERAL INFORMATION

1.1 Programmes of Study
The Faculty of Science and Technology at the UWI Mona Campus currently offers a 3-year programme of study leading to a BSc. in the following engineering programmes: Civil Engineering, Computer Systems Engineering and Electronics Engineering. Each BSc programme is divided into Levels 1, 2 and 3 and is conducted over three (3) academic years; each year consisting two (2) semesters. The first year (level 1) of the Electronics Engineering and Computer Systems Engineering are identical (except for one course) and students may transfer from one programme to the other after completing the first year.

1.2 Academic Quality Assurance
Quality assurance systems are aligned with that of the UWI Faculty of Engineering at St Augustine, Trinidad where they are well defined and linked to programme outcomes and individual course learning outcomes. The Faculty of Engineering, St Augustine will oversee the adherence to the guidelines set by the accrediting agencies.
Each BSc Engineering programme at Mona will apply for separate international accreditation as soon as they are eligible to do so (after graduating the first cohort).

SECTION 2 - UNDERGRADUATE REGULATIONS

2.1 CLASSIFICATION OF DEGREE
(a) BSc degrees in the School of Engineering are awarded in the following classes based on the final Grade Point Average (GPA) and the overall performance of the graduating students throughout the programme:
   i. First Class Honours
   ii. Second Class Honours (Upper Division)
   iii Second Class Honours (Lower Division)
   iv. Pass
2.2 QUALIFICATIONS FOR ADMISSION TO BSc. ENGINEERING PROGRAMMES

Applications for entry into programmes offered by the Mona School of Engineering will normally be considered if applicants have met the following criteria:

a. In addition to fulfilling general requirements for admission into the Faculty of Science and Technology, applicants for the 3-year engineering programmes must have passes in both units of Mathematics and Physics at CAPE or Cambridge/London Advanced level; or passes in PHYS0411, PHYS1412, PHYS0421, PHYS0422, MATH0100 and MATH0110, normally with a GPA no less than a 2.5; or equivalent qualification from a community college, CASE, UTECH or another university.

b. Applicants with a Diploma in Electrical or Electronics engineering (or equivalent) and a minimum GPA of 2.5, may be eligible to matriculate into Level 2, but may be required to do prescribed Level 1 course(s).

2.3 GPA REQUIREMENTS

Grade Point Average (GPA) requirements are consistent with that of the Faculty of Engineering, UWI St. Augustine. Upon completion of the required courses for the degree, candidates must possess a GPA of 2 or greater in order to satisfy the graduation requirements.

The GPA (or quality points) for this Engineering option is calculated from ALL COURSES from Level 1 to Level 3 that constitute the candidate’s degree. The actual GPA will determine the class of degree received. More detailed guidelines are available in the Faculty Regulation Handbook A. The GPA for Engineering is shown in Table 1 and the Classification of Degree in Table 2. The class of degree shall be determined from a weighted GPA computation.

<table>
<thead>
<tr>
<th>Table 1:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade (range)</td>
<td>GPA</td>
<td>Grade (range)</td>
<td>GPA</td>
<td>Grade (range)</td>
</tr>
<tr>
<td>A+ (90-100)</td>
<td>4.3</td>
<td>B+ (70 - 74)</td>
<td>3.3</td>
<td>C+ (55 – 59)</td>
</tr>
<tr>
<td>A (80 - 89)</td>
<td>4.0</td>
<td>B (65 – 69)</td>
<td>3.0</td>
<td>C (50 – 54)</td>
</tr>
<tr>
<td>A- (75 – 79)</td>
<td>3.7</td>
<td>B- (60 – 64)</td>
<td>2.7</td>
<td>F1 (45 – 49)</td>
</tr>
</tbody>
</table>
Table 2:

<table>
<thead>
<tr>
<th>Degree Class</th>
<th>Cumulative GPA</th>
<th>Degree Class</th>
<th>Cumulative GPA</th>
<th>Degree Class</th>
<th>Cumulative GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>3.6 and above</td>
<td>Upper 2nd</td>
<td>3.00 – 3.59</td>
<td>Lower 2nd</td>
<td>2.50 – 2.99</td>
</tr>
</tbody>
</table>

**Weighted GPA**

Weighted GPA is the average determined by applying weights of 10%, 30% and 60% for levels 1, 2 and 3 courses (except for the 6 credit final year project(s)), respectively. The compulsory 6 credit final year project shall account for 20% of the total weighted GPA.

**Other Regulations**

Students must be guided by all other rules and regulations of the Faculty of Science and Technology as outlined in Faculty Handbook - A. ([http://myspot.mona.uwi.edu/fpas/](http://myspot.mona.uwi.edu/fpas/))

**SECTION 3- UNDERGRADUATE COURSE LISTINGS & DESCRIPTIONS**

**Definition Course Codes:**

- COMP  - Computer Science (Mona)
- CVNG  - Civil Engineering (St. Augustine)
- ECNG  - Electrical and Computer Engineering (St Augustine Campus)
- ELNG  - Electronics Engineering (Mona)
- ENGR  - Faculty of Engineering (St. Augustine)
- ELET  - Electronics (Mona)
- FOUN  - Foundation Courses
- GEOM  - Geomatics and Geoinformatics (St Augustine)
- MGMT  - Management Studies (Mona)
- MATH  - Mathematics
- PHYS  - Physics (Mona)

**Note:** The letter ‘E’ or ‘C’ preceding the credit allocation indicates Examination by Written Papers or by Course Work, respectively.
3.1 B.SC. IN CIVIL ENGINEERING

Coordinator: Dr Noel Brown (JenTech Consultants)

We intend to apply for international Accreditation during the Academic year 2016-17, after the first cohort completes this programme. The current programme is adopted from the St Augustine campus which is accredited by the Joint Board of Moderators (JBM)

Students are required to complete a minimum of 101 credits for the award of the BSc in Civil Engineering.

Programme Structure and Content
(E = Examination, C = Coursework, and the numeral after E or C = Number of Credits)

COURSE LISTING
LEVEL 1 (all courses are compulsory)

<table>
<thead>
<tr>
<th>Semester 1: 17 Credits</th>
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</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
</tr>
<tr>
<td>CVNG1005</td>
</tr>
<tr>
<td>CVNG1009</td>
</tr>
<tr>
<td>CVNG1010</td>
</tr>
<tr>
<td>ELNG1101</td>
</tr>
<tr>
<td>ENGR1000</td>
</tr>
<tr>
<td>MATH1180</td>
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</table>

<table>
<thead>
<tr>
<th>Semester 2: 20 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
</tr>
<tr>
<td>CVNG1000</td>
</tr>
<tr>
<td>CVNG 1001</td>
</tr>
<tr>
<td>CVNG 1002</td>
</tr>
<tr>
<td>CVNG1007</td>
</tr>
<tr>
<td>CVNG 1011</td>
</tr>
<tr>
<td>CVNG 1012</td>
</tr>
<tr>
<td>CVNG1008</td>
</tr>
</tbody>
</table>

LEVEL 2 (all courses are compulsory)

Year - Long Courses (Semesters 1 and 2): 7 Credits

<table>
<thead>
<tr>
<th><strong>Course Code</strong></th>
<th><strong>Course Title</strong></th>
<th><strong>Number of Credits</strong></th>
</tr>
</thead>
</table>

## CVNG 2003
Civil Engineering Design II C3

## CVNG 2006
Structural Design I C4

### Semester 1: 13 Credits

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG 2001</td>
<td>Structural Mechanics</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 2008</td>
<td>Soil Mechanics I</td>
<td>E2</td>
</tr>
<tr>
<td>CVNG2010</td>
<td>Civil Engineering Management</td>
<td>E3</td>
</tr>
<tr>
<td>MATH 2230</td>
<td>Engineering Mathematics II</td>
<td>E3</td>
</tr>
<tr>
<td>GEOM 2015</td>
<td>Geomatics for Civil &amp; Environmental</td>
<td>E2</td>
</tr>
<tr>
<td></td>
<td>Engineers</td>
<td></td>
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</table>

### Semester 2: 12 Credits

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG2005</td>
<td>Mechanics of Fluids II</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 2009</td>
<td>Soil Mechanics II</td>
<td>E2</td>
</tr>
<tr>
<td>CVNG 2011</td>
<td>Engineering Hydrology</td>
<td>E3</td>
</tr>
<tr>
<td>MATH 2240</td>
<td>Statistics</td>
<td>E2</td>
</tr>
<tr>
<td>GEOM 2017</td>
<td>Geoinformatics for Civil &amp; Environmental Engineers</td>
<td>E2</td>
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</table>

### LEVEL 3

#### YEAR-LONG (SEMESTERS 1 & 2): 12 Credits

<table>
<thead>
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<th>Course Code</th>
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<th>Number of Credits</th>
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<tbody>
<tr>
<td>CVNG 3014</td>
<td>Civil Engineering Design Project</td>
<td>C6</td>
</tr>
<tr>
<td>CVNG 3015</td>
<td>Special Investigative Project</td>
<td>C6</td>
</tr>
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</table>

### LEVEL 3

#### Semester 1: 14 Credits

<table>
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<th>Number of Credits</th>
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<tr>
<td>CVNG 3002</td>
<td>Structural Analysis</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3003</td>
<td>Structural Design II</td>
<td>C2</td>
</tr>
<tr>
<td>CVNG 3005</td>
<td>Foundation Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3007</td>
<td>Environmental Engineering I</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3009</td>
<td>Highway Engineering</td>
<td>E3</td>
</tr>
</tbody>
</table>
Semester 2: 6 Credits

Choose TWO (2) of the following options, subject to the approval of the Head of Department:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG 3001</td>
<td>Structural Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3004</td>
<td>Structural Dynamics</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3006</td>
<td>Environmental Geotechnics</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3008</td>
<td>Environmental Engineering II</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3010</td>
<td>Transportation Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3011</td>
<td>Pavement Design &amp; Management</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3013</td>
<td>Coastal Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR 3001</td>
<td>Natural Hazards Management</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG 3017</td>
<td>Offshore Geotechnical Engineering</td>
<td>E3</td>
</tr>
</tbody>
</table>

Course Descriptions

CIVIL ENGINEERING

LEVEL: 1
SEMESTER: 1
COURSE CODE: CVNG 1000
COURSE TITLE: MECHANICS OF SOLIDS
NUMBER OF CREDITS: E3
Course Description: Simple static forces, stress, strain. Hardness, impact & temperature effects. Two-dimensional stress and strain, torsion, combined stresses. Statically determinate beams and plane frames. Bending theory and moment, shearing, force, slope, deflexion, moment-area.

LEVEL: 1
SEMESTER: 1
COURSE CODE: CVNG 1005
COURSE TITLE: SCIENCE OF MATERIALS
NUMBER OF CREDITS: E3
Course Description: Fundamental structure, properties and behavior of other major materials used in Civil Engineering; concrete, asphalt, timber, soil, rock, paints, polymers, adhesives, composite materials; Durability and deterioration; Hazardous materials, classification and handling.

LEVEL: 1
SEMESTER: 1
COURSE CODE: CVNG 1009
COURSE TITLE: ENGINEERING GRAPHICS
NUMBER OF CREDITS: C3
Course Description: Sketching as communication of design ideas: types of drawings; components of drawing; drawing standards; plans, sections, elevations, perspectives, projections, isometrics; introduction to typical production drawings of Civil Engineering components; fundamentals of using AUTOCAD for civil engineering design drawings.
COURSE CODE: ELNG 1101
COURSE TITLE: PHYSICS FOR ENGINEERS
NUMBER OF CREDITS: 3
Course Description: This is a Calculus-based course covering the basic laws and phenomena in electricity and magnetism, oscillation and waves, rotational mechanics and modern Physics. It revises and expands on selected areas of the CAPE Physics content so as to reinforce and expand the student’s understanding of the fundamental concepts and their application to solving engineering problems.

LEVEL: 1
SEMESTER: 1
COURSE CODE: ENGR1000
COURSE TITLE: INTRODUCTION TO ENGINEERING
NUMBER OF CREDITS: 3
Course Description: An introduction to the following: historical development of engineering; Formation of the engineer; Roles and functions of engineers and professional organizations; Creative and critical thinking; Technical Communication; Ethics; Liability; Safety; Legal forms of association; Contracts, Company law; Intellectual property; Engineering economics and business operations; infrastructure; energy systems and economics, environment and sustainable development; approaches to design. Field trips to local industries are an integral part of the course.

LEVEL 1
SEMESTER: 1
COURSE CODE: MATH1180
COURSE TITLE: ENGINEERING MATHEMATICS 1
NUMBER OF CREDITS: 3

LEVEL 1
SEMESTER: 2
COURSE CODE: CVNG 1001
COURSE TITLE: MECHANICS OF FLUIDS I
NUMBER OF CREDITS: 3

LEVEL: 1
SEMESTER: 2
COURSE CODE: CVNG 1002
COURSE TITLE: CIVIL ENGINEERING DESIGN I
NUMBER OF CREDITS: 3
COURSE DESCRIPTION: Concept of design and its contribution to the quality of life; Civil Engineering Design, the role of geomatics, the environment, and scientific laws in design; Introduction to the design of buildings and Civil Engineering Infrastructure, site appraisal; Risk and vulnerability in design; Health and safety in Civil
Engineering Design, environmental impact assessment; Civil Engineering drawing, CAD techniques, introduction to GIS techniques. (Coursework)

LEVEL: 1  
SEMESTER: 2  
COURSE CODE: CVNG 1007  
COURSE TITLE: INTRODUCTION TO GEOTECHNICAL ENGINEERING  
NUMBER OF CREDITS: C2  
COURSE DESCRIPTION: The course starts with a general description of typical geotechnical works. The main issues and timescales for these works are discussed, and the roles and responsibilities of the geotechnical engineer working as part of an engineering team are discussed. The characterization of soil is introduced, in terms of particle sizes and shapes, plasticity, consistency, and strength. Some practical activities involved in the preparation of ground are described. The student is given an introduction to the design issues associated with all of the typical geotechnical works.

LEVEL: 1  
SEMESTER: 2  
COURSE CODE: CVNG 1010  
COURSE TITLE: INFORMATION TECHNOLOGY FOR ENGINEERS  
NUMBER OF CREDITS: E2  
COURSE DESCRIPTION: Numerical analysis methods – f(x)=0; integration; solutions of differential equations, introduction to computer programming – flow charts; algorithms; variables, types, storage, scope; sequence, branch, loop; graphical output; introduction to using MATLAB for numerical analysis.

LEVEL: 1  
SEMESTER: 2  
COURSE CODE: CVNG 1011  
COURSE TITLE: GEOLOGY  
NUMBER OF CREDITS: E3  
COURSE DESCRIPTION: Fundamental geology for Civil Engineers: The Rock Cycle Structure and geological history of the Earth, surface geological processes, structural geology, geologic maps and their interpretation. Engineering geology - topics and concepts: Principles of rock mechanics, engineering properties of rocks, the stability of slopes and cuttings, industrial rocks and minerals, hydrogeology, geotechnical investigation, engineering seismology, dams and reservoirs. Field trips, tutorial sessions.

LEVEL: 1  
SEMESTER: 2  
COURSE CODE: CVNG 1012  
COURSE TITLE: CIVIL ENGINEERING LAW  
NUMBER OF CREDITS: E2  
COURSE DESCRIPTION: An introduction to the different legal systems. The impact of law on the delivery of engineering goods and services; Law and the construction sector. The making of law and the courts; litigation. The elements of contract law and relation with the construction sector. Types of contracts; Different procurement systems; Standard form building contracts (specifications codes of practice; Standards, statutes and local government regulations); The elements of the Law of Tort, disputes and conflict resolution methods; professional associations, codes of ethics, professional liability; Construction claims; Different forms of business organizations; Business law and the company act; Health and safety legislation; Environmental law; Introduction to intellectual property; Confidentiality of information; Warranties and indemnity.; Introduction to international law.

LEVEL: 1  
SEMESTER: 2  
COURSE CODE: CVNG 1008  
COURSE TITLE: BUILDING SERVICES ENGINEERING  
NUMBER OF CREDITS: E4  
COURSE DESCRIPTION: The course aims to provide an introduction to, and a basic understanding of the scientific principles underlying the major environmental issues related to the built environment. The module also incorporates knowledge of design techniques and issues relating to the internal ‘indoor’ environment.
LEVEL: 2
SEMESTER: YEAR-LONG
COURSE CODE: CVNG 2003
COURSE TITLE: CIVIL ENGINEERING DESIGN II
NUMBER OF CREDITS: C3
PREREQUISITES: CVNG1002 CIVIL ENGINEERING DESIGN I
COURSE DESCRIPTION: Innovation and creativity in conceptual design; sustainability; health and safety; investigative procedures. The use of analysis, synthesis and optimisation in design; project planning, networks and graphs. Design of embankments, dams; drainage design; route location and alignment design of roads; assessment of natural hazard impacts and environmental impacts.
(Coursework)

LEVEL: 2
SEMESTER: YEAR-LONG
COURSE CODE: CVNG 2006
COURSE TITLE: STRUCTURAL DESIGN I
NUMBER OF CREDITS: C4
PREREQUISITES: CVNG 1000 MECHANICS OF SOLIDS
COURSE DESCRIPTION: Conceptual design of structures; structural design of steel, reinforced concrete, timber and masonry structures, use of construction materials in design.
(Coursework)

LEVEL: 2
SEMESTER: 1
COURSE CODE: CVNG 2001
COURSE TITLE: STRUCTURAL MECHANICS
NUMBER OF CREDITS: E3
PREREQUISITES: CVNG 1000 MECHANICS OF SOLIDS
COURSE DESCRIPTION: Introductory concepts, equilibrium and compatibility, statical determinacy; compatibility of deformations, flexibility method applied to simple flexural systems; analysis of beams (flexure, shear, thin-walled sections); compression members, strain energy and related theorems. Analysis of beams (asymmetrical bending); simple plastic theory (hinges, mechanism, equilibrium diagram method, redistribution of bending moments, moment capacity, fundamental theorems of plastic collapse), approximate methods of analysis; influence lines for statically determinate systems.

LEVEL: 2
SEMESTER 1
COURSE CODE: CVNG 2005
COURSE TITLE: MECHANICS OF FLUIDS II
NUMBER OF CREDITS: E3
PREREQUISITES: CVNG 1001 MECHANICS OF FLUIDS I
COURSE DESCRIPTION: Rotational and irrotational flow; potential flow. Euler and Navier-Stokes equations. Bernoulli theorem, Reynolds stresses, lift and drag, curved flow, vortices. Open channel flow, energy and momentum principles, critical depths, hydraulic jump, backwater curves, surges, resistance to flow, waves, model analysis, sediment transport.

LEVEL: 2
SEMESTER: 1
COURSE CODE: CVNG 2008
COURSE TITLE: SOIL MECHANICS I
NUMBER OF CREDITS: E2
PREREQUISITE: CVNG 1007 INTRODUCTION TO GEOTECHNICAL ENGINEERING
COURSE DESCRIPTION: Calculations for various different measures of particle packing and density are developed, culminating in Terzaghi’s Fundamental Principle of Effective Stress. The theory of elasticity is applied to soils, and practical calculations are developed for short-term elastic settlements of various types of foundation. Concepts of different types and timescales for stress, deformations, and strength are developed. Terzaghi’s Theory of Primary Consolidation is introduced.

LEVEL: 2
SEMESTER: 1
COURSE CODE: MATH 2230
COURSE TITLE: ENGINEERING MATHEMATICS II
NUMBER OF CREDITS: 3
PREREQUISITES: MATH1180
COURSE DESCRIPTION: Vector calculus: parametric curves and arc length, review of partial differentiation, vector fields, line integrals and double integrals, Green’s theorem, surface integrals, triple integrals and Divergence theorem. Laplace transforms: definition and existence of Laplace transforms, properties of Laplace transforms (linearity, inverse transform, shift formulae, Laplace transform of derivatives), applications and further properties of Laplace transforms (solving differential equations, convolution and integral equations, Dirac’s delta function, differentiation of transforms, Gamma function). Fourier series: definitions, convergence, even and odd functions, half range expansions. Partial differential equations: definitions, heat equation (derivation, solution by separation of variables, insulated ends as boundary conditions, nonhomogeneous boundary conditions), wave equation (derivation, solution by separation of variables), Laplace’s equation in Cartesian and polar coordinates.

LEVEL: 2
SEMESTER: 1
COURSE CODE: GEOM 2015
COURSE TITLE: GEOMATICS FOR CIVIL & ENVIRONMENTAL ENGINEERS
NUMBER OF CREDITS: 3
PREREQUISITE: NONE

LEVEL: 2
SEMESTER: 2
COURSE CODE: CVNG 2009
COURSE TITLE: SOIL MECHANICS II
NUMBER OF CREDITS: E2
PREREQUISITES: CVNG 2008 SOIL MECHANICS II
COURSE DESCRIPTION: Starting from the principles developed in the previous course Soil Mechanics 1, an introduction is presented to the procedures, stages, and approaches of a geotechnical job. After recalling Darcy’s Law, calculations are developed for aquifers, pumping from wells, and more generally the flow of water through soils and its effects on compositional and mechanical stability. The ideas of limit equilibrium and mechanisms are introduced and used to analyze the stability of slopes. Some aspects of landslide stabilization and avoidance are also covered.

LEVEL: 2
SEMESTER: 2
COURSE CODE: CVNG 2010
COURSE TITLE: CIVIL ENGINEERING MANAGEMENT
NUMBER OF CREDITS: E3
PREREQUISITES: NONE
COURSE DESCRIPTION: Introduction to management theory; human resource management, leadership, corporate strategy, communication, conduct of meetings; Management Information Systems (MIS); resolution of engineering ethics, Civil Engineering case studies, resources and reasoning methods; Civil Engineering project management, networks and graphs, quality management; Facilities Management, maintenance management, managing Health and Safety; Introduction to Management Accounting and Financial Management.

LEVEL: 2
SEMESTER: 2
COURSE CODE: CVNG 2011
COURSE TITLE: ENGINEERING HYDROLOGY
NUMBER OF CREDITS: E3
PREREQUISITE: CVNG 2005 MECHANICS OF FLUIDS II
COURSE DESCRIPTION: The water resource system, meteorology, hydrologic cycle, hydro-meteorologic measurements and instrumentation, hydrologic statistics, rainfall and run-off, unit hydrographs, low flows, impoundment reservoirs, reservoir safety, groundwater flow, flow to wells, seawater intrusion, and contaminant transport.

LEVEL: 2
SEMESTER: 2
COURSE CODE: MATH 2240
COURSE TITLE: STATISTICS
NUMBER OF CREDITS: 2
PREREQUISITES: MATH1180
COURSE DESCRIPTION: Statistics and probability; frequency distribution, frequency polygons and histograms; introduction to probability: basic axioms; conditional probability, Bayes theorem, mutual independence; introduction to random variables; probability distribution, Bernoulli trials, the binomial distribution and the Poisson distribution; probability density and mass functions of a continuous random variable; expectation and variance; the exponential and normal distributions; distributions of sample means; point estimates; confidence intervals; statistical inference - tests of significance; linear regression.

LEVEL: 2
SEMESTER: 2
COURSE CODE: GEOM 2017
COURSE TITLE: GEOINFORMATICS FOR CIVIL & ENVIRONMENTAL ENGINEERS
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: The principles of Geoinformatics techniques and their applications for typical problems in Civil and Environmental Engineering. Basics of aerial and satellite imageries; extraction of graphical and numerical data. Integrated approach for addressing Civil and Environmental Engineering problems using Geoinformatics.

LEVEL: 3
SEMESTER: YEAR-LONG
COURSE CODE: CVNG 3014
COURSE TITLE: CIVIL ENGINEERING DESIGN PROJECT
NUMBER OF CREDITS: C6
PREREQUISITES: NORMALLY ALL LEVEL 1 AND LEVEL 2 COURSES
COURSE DESCRIPTION: The purpose of this course is to develop the student’s ability in Civil Engineering Design as well as the ability to work in a team. The emphasis is on self-learning, creativity, design, understanding, project team working and communication skills, as well as engineering judgment and problem solving. The project gives professional orientation to work in the final year by simulating as closely as is possible, the investigation and design works which are required for substantial Civil Engineering works and projects in the provision of buildings, lifeline facilities and Civil Engineering infrastructure. The integration of health and safety, and risk and vulnerability in the design process gives the student a complete outlook on the design process.

LEVEL: 3
SEMESTER: YEAR-LONG
COURSE CODE: CVNG 3015
COURSE TITLE: SPECIAL INVESTIGATIVE PROJECT
NUMBER OF CREDITS: C6
PREREQUISITES: NORMALLY ALL LEVEL 1 AND LEVEL 2 COURSES
COURSE DESCRIPTION: This course is a project-based one, designed to generate an investigative learning atmosphere. The project work is carried out year-long, engenders a sense of enquiry, research and verification in the student, and draws on the first two years of learning in the programme. The emphasis is on self-learning, creativity, understanding, communication skills, as well as on engineering analysis and problem solving. The projects are supervised by tutors from the Department of Civil & Environmental Engineering. Special permission may be sought to pursue a relevant engineering-based project in other Departments in the Faculty of Engineering.

LEVEL: 3
COURSE CODE: CVNG 3002
COURSE TITLE: STRUCTURAL ANALYSIS
NUMBER OF CREDITS: E3  
PREREQUISITES: CVNG 2001 STRUCTURAL MECHANICS; CVNG 2006 STRUCTURAL DESIGN I

COURSE DESCRIPTION: Symmetry and anti-symmetry, indeterminacy, slope deflection, moment distribution, structural dynamics, stability, pre-stressed concrete, plates, combined bending and axial loads, arches, influence lines, suspension cables.

LEVEL: 3  
SEMESTER: 1  
COURSE CODE: CVNG 3003  
COURSE TITLE: STRUCTURAL DESIGN II  
NUMBER OF CREDITS: C2

PREREQUISITE: PREREQUISITE: CVNG 2001 STRUCTURAL MECHANICS; CVNG 2006 STRUCTURAL DESIGN I

COURSE DESCRIPTION: Computer modelling, hurricane resistant design, earthquake resistant design of concrete and steel moment frames, pre-stressed concrete. (Coursework)

LEVEL: 3  
SEMESTER: 1  
COURSE CODE: CVNG 3005  
COURSE TITLE: FOUNDATION ENGINEERING  
NUMBER OF CREDITS: E3

PREREQUISITES: CVNG 2008 SOIL MECHANICS; CVNG 2009 SOIL MECHANICS II

COURSE DESCRIPTION: Site investigations, bearing capacity and settlement, design of spread footings and rafts, pile foundations, sheet pile walls.

LEVEL: 3  
SEMESTER: 1  
COURSE CODE: CVNG 3007  
COURSE TITLE: ENVIRONMENTAL ENGINEERING I  
NUMBER OF CREDITS: E3

PREREQUISITES: NONE

COURSE DESCRIPTION: Environmental needs and priorities, pollution, the role of environmental engineering, water quality standards, unit operations in water treatment, sources of wastewater, wastewater quality and effluent standards, unit operations in wastewater treatment, on site treatment and disposal, stream purification processes, sources of solid wastes, treatment of solid and fecal wastes, control of leachates, recycling, environmental impact assessment, soil conservation systems and mitigation of forest destruction.

LEVEL: 3  
SEMESTER: 1  
COURSE CODE: CVNG 3009  
COURSE TITLE: HIGHWAY ENGINEERING  
NUMBER OF CREDITS: E3

PREREQUISITES: MATH 2230, MATH 2240, CVNG 2003, CVNG 2009

COURSE DESCRIPTION: Highway traffic characteristics, capacity of roadways and intersections, design of intersections, traffic management, parking studies; environmental impact, road safety; route location, economic analysis, introduction to transportation planning; pavement materials, pavement and drainage design; quality control and pavement maintenance management systems.

LEVEL: 3  
SEMESTER: 2  
COURSE CODE: CVNG 3001  
COURSE TITLE: STRUCTURAL ENGINEERING  
NUMBER OF CREDITS: E3

PREREQUISITES: CVNG 2001 STRUCTURAL MECHANICS; CVNG 2006 STRUCTURAL DESIGN I
COURSE DESCRIPTION: Introduction to matrix stiffness and flexibility methods, plate bending theory, introduction to finite element analysis, seismic loads II, plastic collapse analysis of framed structures, yield line analysis.

LEVEL: 3  
SEMESTER: 2  
COURSE CODE: CVNG 3004  
COURSE TITLE: STRUCTURAL DYNAMICS  
NUMBER OF CREDITS: E3  
PREREQUISITES: CVNG 3002 STRUCTURAL ANALYSIS

COURSE DESCRIPTION: Fourier Series and Integral, SDOF solutions in the time and frequency domains under several types of dynamic loads, numerical integration of the governing equations, MDOF solutions by modal analysis, approximate solutions for natural frequency of MDOF and continuous systems.

LEVEL: 3  
SEMESTER: 2  
COURSE CODE: CVNG 3006  
COURSE TITLE: ENVIRONMENTAL GEOTECHNICS  
NUMBER OF CREDITS: E3  
PREREQUISITES: CVNG 3005 FOUNDATION ENGINEERING

COURSE DESCRIPTION: Geotechnical aspects of environmental control - Expansive soils, identification and classification, design of buildings and pavements. Landslides, geotech investigations, stability analysis, stabilisation techniques. Earthquakes, liquefaction of sands, effect on retaining structures and earthdams. Land-use planning.

LEVEL: 3  
SEMESTER: 2  
COURSE CODE: CVNG 3008  
COURSE TITLE: ENVIRONMENTAL ENGINEERING II  
NUMBER OF CREDITS: E3  
PREREQUISITES: CVNG 2005 MECHANICS OF FLUIDS II; CVNG 3007 ENVIRONMENTAL ENGINEERING I

COURSE DESCRIPTION: Water supply systems, wastewater collection and disposal systems, hydraulics of treatment plants, pumping stations, urban storm water drainage systems, industrial wastewater and pollutants, treatment systems for industrial and agricultural waste water, solid waste collection systems disaster mitigation, environmental engineering in the built environment.

LEVEL: 3  
SEMESTER: 2  
COURSE CODE: CVNG 3010  
COURSE TITLE: TRANSPORTATION ENGINEERING  
NUMBER OF CREDITS: E3  
PREREQUISITE: CVNG 3009 HIGHWAY ENGINEERING

COURSE DESCRIPTION: Transport policy, economics and mathematics; design operation and management of air, land and sea transportation systems; Transportation planning, Intelligent Transportation Systems (ITS), architecture design and management; Road safety management systems; managing the environmental impact of transportation.

LEVEL: 3  
SEMESTER: 2  
COURSE CODE: CVNG 3011  
COURSE TITLE: PAVEMENT DESIGN & MANAGEMENT  
NUMBER OF CREDITS: E3  
PREREQUISITE: CVNG 3009 HIGHWAY ENGINEERING

COURSE DESCRIPTION: Roads and highways pavement design, airport runway design, seaports and special pavements, pavement management systems, road rehabilitation and maintenance.
LEVEL: 3  
SEMESTER: 2  
COURSE CODE: CVNG 3013  
COURSE TITLE: COASTAL ENGINEERING  
NUMBER OF CREDITS: E3  
PREREQUISITE: CVNG 2005 MECHANICS OF FLUIDS II  
COURSE DESCRIPTION: Introduction to coastal zone management; The marine environment, coastal processes; Wave generation and propagation; Coastal sediment transport, sediment budget; Port and marine structures. Design of coastal defense works; Port-planning and management. Coastal pollution control, EIA and waste disposal in the coastal zone.

LEVEL: 3  
SEMESTER: 2  
COURSE CODE: ENGR 3001  
COURSE TITLE: NATURAL HAZARDS & DISASTER MANAGEMENT IN THE CARIBBEAN  
NUMBER OF CREDITS: 3  
PREREQUISITES:  
COURSE DESCRIPTION: Definitions and concepts, characteristics of natural hazards in the Caribbean, economic, social and environmental impacts; techniques for identification, mapping and prediction, vulnerability and risk assessment, the disaster management cycle, structural and non-structural mitigation, emergency planning, recovery and reconstruction, disaster management and development planning, disaster management and agriculture, tourism, public health, public policy and legislation, sociology of disasters, disaster education.

LEVEL: 3  
SEMESTER: 2  
COURSE CODE: CVNG 3017  
COURSE TITLE: OFFSHORE GEOTECHNICAL ENGINEERING  
NUMBER OF CREDITS: E3  
PREREQUISITES: CVNG 2008 SOIL MECHANICS I; CVNG 2009 SOIL MECHANICS II  
COURSE DESCRIPTION: Introduction to offshore structures, codes of practice, companies, geohazards, risk analysis, health and safety, quality assurance and control, installation; offshore project management, deep water, offshore site investigations, geophysical methods; offshore soils, in-situ testing, geological aspects; development of design stratigraphies, assignment of engineering parameters, shallow gas, soil behaviour under cyclic loading; pile capacity, pile axial and lateral response, tension piles, pile driving, jackups, gravity platforms; seabed bearing structures, seafloor stability, scour, liquefaction, suction caissons, pipelines, cables, trenching, anchor piles, seismic analysis, model testing; awareness of FE, research, de-commissioning.
3.2 BSc in COMPUTER SYSTEMS ENGINEERING
Coordinator: Dr Ezra Mugisa

All Computer Systems Engineering students are required to complete a minimum of 106 credits for the award of the BSc in Computer Systems Engineering.

LEVEL 1

Semester 1  (18 Credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG 1000</td>
<td>Electrical Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR 1000</td>
<td>Introduction to Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>COMP 1126</td>
<td>Introduction to Computing I</td>
<td>E3</td>
</tr>
<tr>
<td>COMP 1127</td>
<td>Introduction to Computing II</td>
<td>E3</td>
</tr>
<tr>
<td>MATH 1180</td>
<td>Engineering Mathematics I</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG 1101</td>
<td>Physics for Engineers</td>
<td>E3</td>
</tr>
</tbody>
</table>

Semester 2  (19 Credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG 1012</td>
<td>Engineering Science and Technology</td>
<td>C4</td>
</tr>
<tr>
<td>ELET 1400</td>
<td>Introduction to Electronics</td>
<td>E3</td>
</tr>
<tr>
<td>ELET 1405</td>
<td>Practices in Basic Electronics</td>
<td>E/C3</td>
</tr>
<tr>
<td>COMP 1220</td>
<td>Computing and Society</td>
<td>E3</td>
</tr>
<tr>
<td>COMP 1161</td>
<td>Object-Oriented Programming</td>
<td>E3</td>
</tr>
<tr>
<td>FOUN 1xxx</td>
<td>(See faculty requirements)</td>
<td>E3</td>
</tr>
</tbody>
</table>

Note: The other Foundation Courses may be taken at any time during the undergraduate course of study. See Faculty Handbook for more information

LEVEL 2

Semester 1  (15 Credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
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</thead>
<tbody>
<tr>
<td>ELET2405</td>
<td>Practices in Electronics Designs I</td>
<td>C3</td>
</tr>
<tr>
<td>ELET2430</td>
<td>Digital Circuits and Microprocessors</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2450</td>
<td>Embedded Systems</td>
<td>E3</td>
</tr>
<tr>
<td>COMP2101</td>
<td>Discrete Mathematics for Computer Science</td>
<td>E3</td>
</tr>
<tr>
<td>COMP2140</td>
<td>Software Engineering</td>
<td>E3</td>
</tr>
</tbody>
</table>

Semester 2  (14 Credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

23
COMP2180  Web Design and Programming I   E3
COMP2111  Analysis of Algorithms   E3
MATH 2240  Probability and Statistics   E2
COMP2135  Systems Programming   E3
COMP2190  Net-Centric Computing   E3

Summer Course   (3 Credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
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</thead>
<tbody>
<tr>
<td>COMP3910</td>
<td>Internship in Computing</td>
<td>3</td>
</tr>
</tbody>
</table>

LEVEL 3   (31 credits)

Students taking Level 3 courses must register for all core courses and any two electives.

YEAR-LONG (compulsory)   (6 Credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Number of credits</th>
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</thead>
<tbody>
<tr>
<td>SWEN3920</td>
<td>Capstone Project</td>
<td>C6</td>
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Semester 1

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
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<tbody>
<tr>
<td>Core Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELET 2460</td>
<td>Signals and Systems</td>
<td>E3</td>
</tr>
<tr>
<td>COMP 3100</td>
<td>Operating Systems</td>
<td>E3</td>
</tr>
<tr>
<td>COMP 3150</td>
<td>Computer Network &amp; Communication</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG 3021</td>
<td>Introduction to Engineering Management and Accounting Systems</td>
<td>E4</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP 3155</td>
<td>Computer &amp; Network Security</td>
<td>E3</td>
</tr>
<tr>
<td>ELET 3485</td>
<td>Introduction to Robotics</td>
<td>E3</td>
</tr>
</tbody>
</table>

Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
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<tbody>
<tr>
<td>Core Courses</td>
<td></td>
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</tr>
<tr>
<td>COMP3801</td>
<td>Tools and Techniques of Embedded Systems Design</td>
<td>E3</td>
</tr>
<tr>
<td>MGMT3136</td>
<td>New Venture Creation and Entrepreneurship</td>
<td>E3</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECNG 3016</td>
<td>Advanced Digital Electronics</td>
<td>E3</td>
</tr>
<tr>
<td>MATH2230</td>
<td>Engineering Mathematics 2</td>
<td>E3</td>
</tr>
</tbody>
</table>
Course Descriptions

COMPUTER SYSTEMS ENGINEERING

LEVEL: 1
SEMESTER: 1
COURSE CODE: ECNG 1000
COURSE TITLE: ELECTRICAL CIRCUITS
NUMBER OF CREDITS: 3
COURSE DESCRIPTION: This course introduces students to the fundamental building blocks of electrical circuit theory. These include the basic electrical circuit analysis tools required to analyse the behaviour and functional as well as performance characteristics of electrical subsystems containing resistors, inductors and capacitors. These tools are applied to obtain both the full dynamic performance of circuits and the steady state performance of sinusoidal systems. Topics include: concepts of basic electrical quantities such as electric charge, current, voltage, power and energy; network theorems such as Thevenin’s theorem, Norton’s theorem, superposition and maximum power transfer; Laplace transform and the Laplace model; steady state and dynamic responses of simple networks; ac steady state analysis and the complex power model.

LEVEL: 1
SEMESTER: 1
COURSE CODE: ENGR 1000
COURSE TITLE: INTRODUCTION TO ENGINEERING
NUMBER OF CREDITS: 3
CREDITS
COURSE DESCRIPTION: An introduction to the following: historical development of engineering; formation of the engineer; role and functions of engineers and professional organizations; creative and critical thinking; technical communications; ethics; liability; safety; legal forms of association; contracts; company law; intellectual property; engineering economics and business operations; infrastructure; energy systems and economics, environment and sustainable development; approaches to design.

LEVEL: 1
SEMESTER: 1
COURSE CODE: COMP 1126
COURSE TITLE: INTRODUCTION TO COMPUTING I
NUMBER OF CREDITS: 3
Course Description: The style of programming used is functional, and the language used is Python. The choices of programming style and language are intended to encourage students to think about solutions to problems in terms of the requirements of those solutions, rather than the mechanics of how to fulfill them. This entry level course into both the Computing sub-disciplines of Computer Science and Information Technology leans more towards the functional-first approach although basic concepts of Object-Oriented Programming are introduced. It is a first programming course and focuses attention on basic programming concepts (such as computation, function, operation) and structures (such as basic and structured data, procedures).

LEVEL: 1
SEMESTER: 1
COURSE CODE: COMP 1127
COURSE TITLE: INTRODUCTION TO COMPUTING II
NUMBER OF CREDITS: 3
Course Description: The primary goal of the course is to introduce students to the big ideas in Computer Science, and how they are used to control the complexity of developing large computational systems. In this course, recognizing patterns of problem solving is more important than the efficiency of the solutions themselves. An interpreted language is used to facilitate rapid feedback to the student as she experiments with proposed solutions to a problem. We hope that this mode of interaction will build confidence in students as they learn the joys and challenges of programming. This course continues the entry level course COMP1126. It covers concepts and tools that are essential in strengthening the learning of programming. These include data structures and higher order functions.

SEMESTER: 1
COURSE CODE: MATH1180
COURSE TITLE: ENGINEERING MATHEMATICS 1
NUMBER OF CREDITS: 3

LEVEL: 1
SEMESTER: 1
COURSE CODE: ECNG 1012
COURSE TITLE: ENGINEERING SCIENCE & TECHNOLOGY
NUMBER OF CREDITS: 4

Course Description: This is an introductory course in Engineering Science and consists of modules to expose students to the following: the science of materials used in the production of electrical engineering components; an understanding of the mechanics of fluids when driven by electrical machines; the techniques involved in the production of engineering drawings, and the function and utilization of basic mechanical workshop tools and equipment. On the electrical side, students would be taught to use the oscilloscope, meters, power supplies and signal generators; verify network theorems; design simple circuits, and perform computer simulation on these circuits.

LEVEL: 1
SEMESTER: 2
COURSE CODE: ELET1400
COURSE TITLE: INTRODUCTION TO ELECTRONICS
NUMBER OF CREDITS: 3

Course Description: Introduction to Semiconductor Theory and the P-N Junction: Review of the atomic structure and bonding; Energy level diagrams; Intrinsic and Extrinsic semiconductors; Electrical properties; the Fermi Dirac Distribution function; The P-N Junction and the diode; light emitting diodes (LED); The Bipolar Junction Transistor (BJT); the Field Effect transistor; Biasing the transistor circuit; DC Transistor circuits. Introduction to Digital Electronics: Analog and digital concepts; binary digits and logic levels; digital waveforms; logic gates and truth tables; Boolean algebra and logic simplification; DeMorgan’s theorem; Circuit minimization; Terminologies used in logic designs; Combinational logic circuits: BCD; Latches, Flip-Flops; Memory circuits and devices; Simple programmable arrays: ADC and DAC Circuits. Introduction to Analog Electronics and Communication Systems: Introduction to alternating current (AC); Frequency dependent RLC circuits; Bandwidth and half-power. The Operational Amplifier and its applications; Fundamentals of analog and digital Communication Systems; Noise and its effect on communication systems.

LEVEL: 1
SEMESTER: 2
COURSE CODE: ELET1405
COURSE TITLE: PRACTICES IN BASIC ELECTRONICS
NUMBER OF CREDITS: 3
COREQUISITES: ELET1400

Course Description: This laboratory course is presented in a teaching lab format and is meant to cover the laboratory components of the Introductory Electronics Course (ELET1400). Students will be guided in performing various explorations of the practical aspects of semiconductor device applications, digital circuits, analogue circuits and simple AM/FM circuits. Three minor design projects will be an integral part of the course test requirements. Orientation and lab safety information will be provided along with a detailed lab manual. Students will be required.

LEVEL: 1
SEMESTER: 1 and 2
COURSE CODE: ELNG1101
COURSE TITLE: PHYSICS FOR ENGINEERS
NUMBER OF CREDITS: 3
Course Description: This is calculus-based course covering the basic laws and phenomena in electricity and magnetism, oscillation and waves, rotational mechanics and modern Physics. It revises and expands on selected areas of the CAPE Physics content so as to reinforce and expand the student understanding of the fundamental concepts and their application to solving engineering problems.

LEVEL: 1
SEMESTER: 2
COURSE CODE: COMP 1161
COURSE TITLE: Object Oriented Programming
NUMBER OF CREDITS: 3
PREREQUISITES: COMP1126 & COMP1127 OR ECNG1009
COURSE DESCRIPTION: This course covers the methodology of programming from an object-oriented perspective, and introduces OOP principles using a language that supports the OOP paradigm. It also introduces object-oriented testing and debugging techniques, as well as the basics of graphical user interface programming and event-driven programming. The course continues the introduction to programming started in COMP1126 and continued in COMP1127.

LEVEL: 2
SEMESTER: 1
COURSE CODE: ELET2405
COURSE TITLE: PRACTICES IN ELECTRONICS DESIGNS I
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101, ELET1400 AND ELET1405
Course Description: Investigative labs (30%): Six lab exercises will be assigned that are consistent with the electronics courses that the student has undertaken for semester 1. A report of the results, analyses and discussions must be handed in at the end of each lab session. A Design Project (70%): An electronics design project based on the application of digital circuits and embedded systems will be assigned. In addition to working on their project during the assigned lab sessions, students are also expected to do the necessary background/research work outside of classes. A complete project report and demonstration of prototype will be individually presented at the end of the semester.

LEVEL: 2
SEMESTER: 1
COURSE CODE: ELET2430
COURSE TITLE: DIGITAL CIRCUITS AND MICROPROCESSORS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ELET1400
Course Description: The main objective of this course is to familiarize students with digital circuits and systems and in particular, the internal designs and operations of microprocessors, including Reduced Instruction Set computers (RISC) and Complex Instruction Set Computers (CISC). The course starts with a review of Flip flops and its application to counters, shift registers, memory architectures and arrays, and state diagrams. Basic processor designs will be covered, including Sequential Logic and Memory Design. Having set a good foundation, advanced processing techniques such as Microprogramming, Cache Memory Management and an introduction to parallelism will be covered.

LEVEL: 2
SEMESTER: 1
COURSE CODE: ELET2450
COURSE TITLE: EMBEDDED SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ELET1400
Course Description: The goal of this course is to provide students with an understanding of the inner workings of embedded system solutions and the underlining technology, which include the development of circuits and embedded software programs. It exposes students to the structure and component of embedded controllers and the tools necessary for the development of embedded systems solutions. Students will also be exposed to the design and implementation processes of embedded system solutions. In addition, students will develop the skills necessary to construct circuits and design algorithms to interface devices such as modem, GPS receivers, LCD and other input/output devices with a microcontroller based embedded system.
LEVEL: 2
SEMESTER: 1
COURSE CODE: COMP 2190
COURSE TITLE: Net-Centric Computing
NUMBER OF CREDITS: 3
PREREQUISITES: COMP1110, COMP1120, COMP1126, COMP1127 & COMP1161
Course Description: The underlying principle of Net-Centric Computing is a distributed environment where applications and data are downloaded from servers and exchanged with peers across a network on an as-needed basis. This is in stark contrast to the use of powerful personal computers that rely primarily on local resources. The course will provide students with an understanding of the various technologies involved in developing systems and providing services in such distributed environments. It examines the protocols that underpin the interaction among the heterogeneous platforms, the services that are provided by combining various elements of these platforms and ways in which these end systems are presented. End users impose many requirements upon the systems and services they interact with and these requirements play an important role during development. Security is foremost among these requirements and as such, the course also exposes students to important aspects of secure systems development including cryptography, intrusion detection and malware detection. The course will also provide students with the opportunity to experiment with the knowledge they gain. They will be required to engage in weekly laboratory exercises using various tools and/or development environments, and demonstrate an understanding of the concepts by completing graded projects. Bi-weekly lectures and weekly tutorials provide the main avenue for the introduction and discussion of the material.

LEVEL: 2
SEMESTER: 1
COURSE CODE: COMP 2101
COURSE TITLE: Discrete Mathematics for Computer Science
NUMBER OF CREDITS: 3
PREREQUISITES: COMP1125 and COMP1160
Course Description: Background, Asymptotic Analysis, Limits Orders of Growth Counting Permutations Combinations Inclusion-exclusion principle Elementary Probability Theory Counting in event space Probability Tree Bernoulli distribution Geometric distribution Binomial distribution Poison distribution Elementary Number Theory Modular Arithmetic Chinese Remainder Theorem Groups formed from Z modulo a prime Generating Functions and their Applications Convexity Properties Convolution Applications to: signal processing image compression solving linear recurrences probability theory error detection and correction Graph Theory Trees Planarity Spanning Trees Eulerian and Hamiltonian Cycles Colouring Matching

LEVEL: 2
SEMESTER: 1
COURSE CODE: COMP 2140
COURSE TITLE: SOFTWARE ENGINEERING
NUMBER OF CREDITS: 3
PREREQUISITES: COMP1125 and COMP1160

LEVEL: 2
SEMESTER: 2
COURSE CODE: COMP 2180
COURSE TITLE: WEB DESIGN & PROGRAMMING
NUMBER OF CREDITS: 3
PREREQUISITES: COMP1125 and COMP1160
COURSE DESCRIPTION: Networking concepts,

**LEVEL: 2**  
**SEMESTER: 2**  
**COURSE CODE: COMP 2111**  
**COURSE TITLE: ANALYSIS OF ALGORITHMS**  
**NUMBER OF CREDITS: 3**  
**PREREQUISITES: COMP1125 and COMP1160**  

**LEVEL: 3**  
**SEMESTER: 1**  
**COURSE CODE: ELET2460**  
**COURSE TITLE: SIGNALS AND SYSTEMS**  
**NUMBER OF CREDITS: 3**  
**PREREQUISITES: ELNG1101 and ELET1400**  
**Course Description:** This course is concerned with predicting and analyzing the response of linear time invariant (LTI) systems when certain signals, such as the unit impulse, the unit step and the sinusoid, are furnished as inputs. Transfer function models of LTI systems will be developed and analyzed using a number of powerful techniques based on the Laplace Transform and the Fourier Transform. These techniques will also be used extensively in other engineering courses, for example telecommunications, control systems and signal processing. To enhance the learning experience, MATLAB will be used to explore some of the concepts discussed and to verify some of the predictions.

**LEVEL: 3**  
**SEMESTER: 1**  
**COURSE CODE: ECNG3021**  
**COURSE TITLE: INTRODUCTION TO ENGINEERING MANAGEMENT AND ACCOUNTING SYSTEMS**  
**NUMBER OF CREDITS: 4**  
**PREREQUISITES: at LEVEL 3**  
**Course Description:** This course provides final year Engineering students with a background in management and accounting skills to equip them to function in the business world. It provides a working understanding of the main elements of the successful planning, operation and control of industries and businesses as they relate to the following essential areas: Accounting and Finance; Management and Organizational Theory; Project Management, Production Planning and Control Techniques; and Introduction to Business Law. The course is loaded with examples of its applications in engineering firms and industries.

**LEVEL: 3**  
**SEMESTER: 2**  
**COURSE CODE: COMP 3900**  
**COURSE TITLE: CAPSTONE PROJECT**  
**NUMBER OF CREDITS: 3**  
**PREREQUISITES: COMP2111 and COMP2140 and 8 other credits from level 2 or 3 CS courses**  
**COURSE DESCRIPTION:** Groups of 2-4 students implement a substantive software system under the supervision of a staff member. The software may address a problem in any domain, but must meet minimum standards of design and functionality, appropriate for a capstone course of a B.Sc. degree.
LEVEL: 3  
SEMESTER: 2  
COURSE CODE: MGMT3136  
COURSE TITLE: ENTREPRENEURSHIP AND NEW VENTURE CREATION  
NUMBER OF CREDITS: 3  
PREREQUISITES: at LELVEL 3  

Course Description: This course deals with one of the most challenging issues confronting developing countries. It focuses on understanding and appreciating the entrepreneurial mindset in relation to the ability to create new ventures successfully. The course also focuses on “intrapreneurship” or in the reinvigoration of existing enterprises with an attitude of innovation, responsiveness and receptivity to change, and it considers entrepreneurship in an international context.

3.3 BSc in ELECTRONICS ENGINEERING  
Coordinator: Dr Paul Aiken

Electronics Engineering Programme  
We intend to apply for ABET Accreditation during the Academic year 2014-15.

Students are required to complete a minimum of 101 credits for the award of the BSc in Electronics Engineering.

COURSE LISTING

LEVEL 1 (all courses compulsory)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG 1000</td>
<td>Electrical Circuits</td>
<td>E 3</td>
</tr>
<tr>
<td>ECNG 1009</td>
<td>Introduction to Programming</td>
<td>C 3</td>
</tr>
<tr>
<td>ENGR 1000</td>
<td>Introduction to Engineering</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 1101</td>
<td>Physics for Engineers</td>
<td>E 3</td>
</tr>
<tr>
<td>MATH 1180</td>
<td>Engineering Mathematics I</td>
<td>E 3</td>
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</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET 1400</td>
<td>Introduction to Electronics</td>
<td>E 3</td>
</tr>
<tr>
<td>ELET 1405</td>
<td>Practices in Basic Electronics</td>
<td>C/E 3</td>
</tr>
<tr>
<td>ECNG 1012</td>
<td>Engineering Science and Technology</td>
<td>C 4</td>
</tr>
<tr>
<td>COMP 1160</td>
<td>Object Oriented Programming</td>
<td>E 3</td>
</tr>
</tbody>
</table>
FOUN 1xxx  (See faculty requirements)  E 3

Note: The other Foundation Courses may be taken at any time during the undergraduate course of study. See Faculty Handbook for more information

LEVEL 2 (all courses are compulsory)

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ELET 2405</td>
<td>Practices in Electronics 1</td>
<td>C3</td>
</tr>
<tr>
<td></td>
<td>ELET 2430</td>
<td>Digital Circuits and Microprocessors</td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td>ELET 2450</td>
<td>Embedded Systems</td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td>ELET 2460</td>
<td>Signals and Systems</td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td>MATH 2230</td>
<td>Engineering Mathematics 2</td>
<td>E3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester 2</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ELET 2415</td>
<td>Practices in Electronics 2</td>
<td>C3</td>
</tr>
<tr>
<td></td>
<td>ELET 2410</td>
<td>Analysis and Design of Analogue Circuits</td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td>ELET 2420</td>
<td>Semiconductor Devices</td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td>ELET 2480</td>
<td>Modern Communications</td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td>ECNG 2009</td>
<td>Control Systems</td>
<td>E3</td>
</tr>
</tbody>
</table>

Summer Apprenticeship/Internship

- **Approved Industry (Summer between Level 2 and Level 3)**
  Summer Apprenticeship is meant to expose students to the practical applications of the concepts learnt in classes and is expected to be a source of motivation and inspiration. It also provides an opportunity to identify potential projects.

- **HEART NTA**
  Complete selected certification courses.

LEVEL 3

Students taking Level 3 courses must:
1. Register for all courses listed as compulsory and core (for chosen option).
2. Select one of the following options:
a. Telecommunications or  
b. Industrial Instrumentation  
3. Select a year-long project (ECNG3020) from the Project Listing.

<table>
<thead>
<tr>
<th>YEAR-LONG (compulsory)</th>
<th>(6 Credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Title</strong></td>
</tr>
<tr>
<td>ECNG 3020</td>
<td>Special Project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>One Semester (compulsory)</th>
<th>(13 Credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Title</strong></td>
</tr>
<tr>
<td>ECNG 3021</td>
<td>Introduction to Engineering Management and Accounting Systems</td>
</tr>
<tr>
<td>PHYS3386</td>
<td>Electromagnetism</td>
</tr>
<tr>
<td>MGMT3136</td>
<td>Entrepreneurship and New Venture Creation</td>
</tr>
<tr>
<td>ELET3405</td>
<td>Practical Analysis of Advanced Electronics</td>
</tr>
</tbody>
</table>

**Option 1:**  *Telecommunications (compulsory)*  (12 Credits)

<table>
<thead>
<tr>
<th><strong>Course Code</strong></th>
<th><strong>Title</strong></th>
<th><strong>Number of credits</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET 3480</td>
<td>Wireless Communication Systems</td>
<td>E 3</td>
</tr>
<tr>
<td>ELET 3470</td>
<td>Wireless Transmission &amp; Fiber-Optics</td>
<td>E 3</td>
</tr>
<tr>
<td>ELET 3460</td>
<td>Digital Signal and Image Processing</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 3050</td>
<td>Broadband Networks</td>
<td>E 3</td>
</tr>
</tbody>
</table>

**Option 2:**  *Industrial Instrumentation (compulsory)*  (12 Credits)

<table>
<thead>
<tr>
<th><strong>Course Code</strong></th>
<th><strong>Title</strong></th>
<th><strong>Number of credits</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET 3412</td>
<td>Instrumentation and Measurements</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 3030</td>
<td>Power Electronics and Protection Circuits</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 3040</td>
<td>Industrial Automation</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 3060</td>
<td>Power Plant Instrumentation</td>
<td>E 3</td>
</tr>
</tbody>
</table>

**Electives**  (3 credits)
Choose any other level 2 or level 3 course from FST or a language course from Faculty of Humanities and Education (FHE).
COURSE DESCRIPTIONS
ELECTRONICS ENGINEERING

LEVEL: 1
SEMESTER: 1
COURSE CODE: ECNG1000
COURSE TITLE: ELECTRICAL CIRCUITS
NUMBER OF CREDITS: 3
Course Description: This course introduces students to the fundamental building blocks of electrical circuit theory. These include the basic electrical circuit analysis tools required to analyze the behaviour and function as well as the performance characteristics of electrical subsystems containing resistors, inductors and capacitors. These tools are applied, to obtain both the full dynamic performance of circuits and the steady state performance of sinusoidal systems. Topics include: concepts of basic electrical quantities such as electric charge, current, voltage, power and energy; network theorems such as Thevenin’s theorem, Norton’s theorem, superposition and maximum power transfer; Laplace transform and the Laplace model; steady state and dynamic responses of simple networks; ac steady state analysis and the complex power model. Lab exercises will be assigned in the ECNG1012 electrical laboratory sessions.

LEVEL: 1
SEMESTER: 1
COURSE CODE: ENGR1000
COURSE TITLE: INTRODUCTION TO ENGINEERING
NUMBER OF CREDITS: 3
Course Description: An introduction to the following: historical development of engineering; formation of the engineer; roles and functions of engineers and professional organizations; creative and critical thinking; technical communication; Ethics; liability; safety; legal forms of association; contracts, company law; intellectual property; engineering economics and business operations; infrastructure; energy systems and economics, environment and sustainable development; approaches to design. Field trips to local industries are an integral part of the course.

LEVEL: 1
SEMESTER: 1
COURSE CODE: ECNG1009
COURSE TITLE: INTRODUCTION TO PROGRAMMING
NUMBER OF CREDITS: 3
Course Description: This course introduces students to the field of computing for the purpose of problem solving. Basic concepts of computer architecture and operating systems are discussed leading to compilers and interrupters. Students will be able to describe and analyze data structures, such as those created by using arrays, lists and pointers. This course also involves knowledge of the concepts of loops and iteration techniques, and recursion, in algorithms which include character codes and mathematical operations such as base converters, masking and base arithmetic. The uses of algorithms are introduced for basic problem solving such as brute force/exhaustive methods, greedy methods and divide and conquer. Students are introduced to programming in C and C++ and the visual studio environment, along with data base concepts.

LEVEL: 1
SEMESTER: 2
COURSE CODE: ECNG1012
COURSE TITLE: ENGINEERING SCIENCE AND TECHNOLOGY
NUMBER OF CREDITS: 3
Course Description: This is an introductory course in Engineering Science and consists of five modules to expose students to the following: the science of materials used in the production of electrical engineering components; an understanding of the mechanics of fluids when driven by electrical machines; the techniques involved in the production of engineering drawings, and
the function and utilization of basic mechanical workshop tools and equipment. On the electrical side, students would be taught to use the oscilloscope, meters, power supplies and signal generators; verify network theorems; design simple circuits, and perform computer simulation on these circuits. A basic electrical design project will be assigned.

LEVEL: 1
SEMESTER: 1
COURSE CODE: MATH1180
COURSE TITLE: ENGINEERING MATHEMATICS 1
NUMBER OF CREDITS: 3

LEVEL: 1
SEMESTER: 1 and 2
COURSE CODE: ELNG1101
COURSE TITLE: PHYSICS FOR ENGINEERS
NUMBER OF CREDITS: 3
Course Description: This is calculus-based course covering the basic laws and phenomena in electricity and magnetism, oscillation and waves, rotational mechanics and modern Physics. It revises and expands on selected areas of the CAPE Physics content so as to reinforce and expand the student understanding of the fundamental concepts and their application to solving engineering problems.

LEVEL: 1
SEMESTER: 2
COURSE CODE: COMP 1161
COURSE TITLE: OBJECT ORIENTED PROGRAMMING
NUMBER OF CREDITS: 3
PREREQUISITES: ECNG1009
Course Description: Class of objects; methods; members; message passing; encapsulation and information hiding; separation of behavior and implementation. Imperative control structures, assignment state, parameter passing models. Inheritance; polymorphism; class hierarchies. Interface vs. multiple inheritance. Templates/generics. Using APIs; class libraries. Module/packages; name space solution; primitive types; array, string processing; I/O processing; pointers and references; linked structures; strategies for choosing the right data. Collection classes and iteration protocols; event-driven and concurrent programming; exception handling; Introduction to GUI programming; thread programming. OO testing; debugging tools. Object-Oriented Methods: analysis and design, design for re-use; modeling tools, comparison of OOD and top-down/bottom-up design; intro to the concept and use of design patterns.

LEVEL: 1
SEMESTER: 2
COURSE CODE: ELET1400
COURSE TITLE: INTRODUCTION TO ELECTRONICS
NUMBER OF CREDITS: 3
Course Description: Introduction to Semiconductor
Theory and the P-N Junction: Review of the atomic structure and bonding; Energy level diagrams; Intrinsic and Extrinsic semiconductors; Electrical properties; the Fermi Dirac Distribution function; The P-N Junction and the diode; light emitting diodes (LED); The Bipolar Junction Transistor (BJT); the Field Effect transistor; Biasing the transistor circuit; DC Transistor circuits. Introduction to Digital Electronics: Analog and digital concepts; binary digits and logic levels; digital waveforms; logic gates and truth tables; Boolean algebra and logic simplification; DeMorgan’s theorem; Circuit minimization; Terminologies used in logic designs; Combinational logic circuits: BCD; Latches, Flip-Flops; Memory circuits and devices; Simple programmable arrays: ADC and DAC Circuits. Introduction to Analog Electronics and Communication Systems: Introduction to alternating current (AC); Frequency dependent RLC circuits; Bandwidth and half-power. The Operational Amplifier and its applications; Fundamentals of analog and digital Communication Systems; Noise and its effect on communication systems.

LEVEL: 1
SEMESTER: 2
COURSE CODE: ELET1405
COURSE TITLE: PRACTICES IN BASIC ELECTRONICS
NUMBER OF CREDITS: 3
COREQUISITES: ELET1400
Course Description: This laboratory course is presented in a teaching lab format and is meant to cover the laboratory components of the Introductory Electronics Course (ELET1400). Students will be guided in performing various explorations of the practical aspects of semiconductor device applications, digital circuits, analogue circuits and simple AM/FM circuits. Three minor design projects will be an integral part of the course test requirements. Orientation and lab safety information will be provided along with a detailed lab manual. Students will be required

LEVEL: 2
SEMESTER: 2
COURSE CODE: ECNG2009
COURSE TITLE: CONTROL SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and MATH1180
Course Description: The area of automatic control involves the use of procedures and strategies for forcing dynamic systems to behave in a specified fashion. We are all directly engaged in the control of dynamic systems on a continual basis – consciously or otherwise. For example, driving requires control of both direction and speed of an automobile; effective walking and running requires control of direction, speed and balance; our body systems control body parameters such as heart-rate, blood-pressure, temperature etc. with little conscious intervention This course uses what is termed the “classical or frequency domain” approach to control systems design. The techniques borrow heavily from the telecommunications industry of the early 1920’s when engineers like Bode and others developed frequency response methods for solving problems encountered in the design of equalisers and amplifiers for long distance communication over the transatlantic cable. This course emphasises industrial application of theoretical concepts. Students require a good grasp of signals and systems theory as well as mathematics to successfully navigate this course.

LEVEL: 2
SEMESTER: 1
COURSE CODE: MATH 2230
COURSE TITLE: ENGINEERING MATHEMATICS II
NUMBER OF CREDITS: 3
PREREQUISITES: MATH1180
COURSE DESCRIPTION: Vector calculus: parametric curves and arc length, review of partial differentiation, vector fields, line integrals and double integrals, Green’s theorem, surface integrals, triple integrals and Divergence theorem. Laplace transforms: definition and existence of Laplace transforms, properties of Laplace transforms (linearity, inverse transform, shift formulae, Laplace transform of derivatives), applications and further properties of Laplace transforms (solving differential equations, convolution and integral equations, Dirac’s delta function, differentiation of transforms,
Gamma function). Fourier series: definitions, convergence, even and odd functions, half range expansions. Partial differential equations: definitions, heat equation (derivation, solution by separation of variables, insulated ends as boundary conditions, nonhomogeneous boundary conditions), wave equation (derivation, solution by separation of variables), Laplace’s equation in Cartesian and polar coordinates.

LEVEL: 2
SEMESTER: 1
COURSE CODE: ELET2405
COURSE TITLE: PRACTICES IN ELECTRONICS DESIGNS I
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101, ELET1400 AND ELET1405
Course Description: *Investigative labs (30%)*: Six lab exercises will be assigned that are consistent with the electronics courses that the student has undertaken for semester 1. A report of the results, analyses and discussions must be handed in at the end of each lab session. A *Design Project (70%)*: An electronics design project based on the application of digital circuits and embedded systems will be assigned. In addition to working on their project during the assigned lab sessions, students are also expected to do the necessary background/research work outside of classes. A complete project report and demonstration of prototype will be individually presented at the end of the semester.

LEVEL: 2
SEMESTER: 2
COURSE CODE: ELET2415
COURSE TITLE: PRACTICES IN ELECTRONICS DESIGNS II
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101, ELET1400 AND ELET1405
Course Description: *Investigative labs (30%)*: Six lab exercises will be assigned that are consistent with the electronics courses that the student has undertaken for semester 2. A report of the results, analyses and discussions must be handed in at the end of each lab session. A *Design Project (70%)*: An electronics design project based on the application of analogue circuits and communication systems will be assigned. In addition to working on their project during the assigned lab sessions, students are also expected to do the necessary background/research work outside of classes. A complete project report and demonstration of prototype will be individually presented at the end of the semester.

LEVEL: 2
SEMESTER: 2
COURSE CODE: ELET2410
COURSE TITLE: ANALYSIS AND DESIGN OF ANALOGUE CIRCUITS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ELET1400
Course Description: The purpose of this course is to introduce the student to the fundamentals of the analysis and design of analogue circuits. It continues on the basic concepts of operational amplifiers, diodes and DC transistor circuits that were explored in ELET1400. Topics to be covered include circuit application of solid state devices to the designs of various diode and transistor circuits. The differential amplifier and its use in the design of operational amplifiers are discussed. The students are also introduced to the functional operation of commonly used linear ICs along with the basic concepts of oscillations. The course ends with some examples of data conversion circuits that demonstrate the operational relationships between analog and digital circuits. The use of manufacturers’ data sheets for the design of analog circuits is an integral part of this course. The learning experience is enhanced with computer-based exercises and assignments. SPICE simulation tools will be used throughout this course.

LEVEL: 2
SEMESTER: 2
COURSE CODE: ELET2420
COURSE TITLE: SEMICONDUCTOR DEVICES
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ELET1400
Course Description: This course provides the basic foundation for understanding electronic semiconductor devices and their circuit applications and limitations. It has introductory elements of quantum mechanics as a requirement for understanding the dynamics of the behavior of charge carriers and energy distributions within a semiconductor lattice and across p-n junctions. As such, reasonably strong mathematical and electrical field theory backgrounds are required – as obtained from the prerequisites. The three fundamental areas of semiconductor devices: semiconductor theory, p-n junction devices and field effect devices, are adequately covered in this course. The learning experience is enhanced with computer-based exercises and assignments. Math lab and SPICE simulation tools will be used throughout this course.

LEVEL: 2
SEMESTER: 1
COURSE CODE: ELET2430
COURSE TITLE: DIGITAL CIRCUITS AND MICROPROCESSORS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ELET1400

Course Description: The main objective of this course is to familiarize students with digital circuits and systems and in particular, the internal designs and operations of microprocessors, including Reduced Instruction Set computers (RISC) and Complex Instruction Set Computers (CISC). The course starts with a review of Flip flops and its application to counters, shift registers, memory architectures and arrays, and state diagrams. Basic processor designs will be covered, including Sequential Logic and Memory Design. Having set a good foundation, advanced processing techniques such as Microprogramming, Cache Memory Management and an introduction to parallelism will be covered.

LEVEL: 2
SEMESTER: 1
COURSE CODE: ELET2450
COURSE TITLE: EMBEDDED SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ELET1400

Course Description: The goal of this course is to provide students with an understanding of the inner workings of embedded system solutions and the underlining technology, which include the development of circuits and embedded software programs. It exposes students to the structure and component of embedded controllers and the tools necessary for the development of embedded systems solutions. Students will also be exposed to the design and implementation processes of embedded system solutions. In addition, students will develop the skills necessary to construct circuits and design algorithms to interface devices such as modem, GPS receivers, LCD and other input/output devices with a microcontroller based embedded system.

LEVEL: 2
SEMESTER: 1
COURSE CODE: ELET2460
COURSE TITLE: SIGNALS AND SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ELET1400

Course Description: This course is concerned with predicting and analyzing the response of linear time invariant (LTI) systems when certain signals such as the unit impulse, the unit step and the sinusoid, are furnished as inputs. Transfer function models of LTI systems will be developed and analyzed using a number of powerful techniques based on the Laplace Transform and the Fourier Transform. These techniques will also be used extensively in other engineering courses, for example telecommunications, control systems and signal processing. To enhance the learning experience, MATLAB will be used to explore some of the concepts discussed and to verify some of the predictions.

LEVEL: 2
SEMESTER: 2
COURSE CODE: ELET2480
COURSE TITLE: MODERN COMMUNICATION SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ELET1400
Course Description: This course seeks to familiarize students with the basic foundations of communications systems, covering the concepts from signal preparations, signal transmission, and signal reception of both digital and analog systems. It specifically deals with analog and digital modulation techniques, transmission of the signal across a carrier, and the acquisition and demodulation of these signals. This leads to an introduction to modern technologies such as wireless transmission, GNSS systems, cellular technology and GSM.

LEVEL: 3
SEMESTER: N/A (1 YEAR)
COURSE CODE: ECNG3020
COURSE TITLE: SPECIAL ENGINEERING PROJECT
NUMBER OF CREDITS: 6
PREREQUISITES: ELET2405, ELET2415 and at LEVEL 3
Course Description: The ECNG 3020-Special Project is regarded as the capstone course of the entire BSc Engineering Programme. ECNG 3020 is a student-driven, research and development project. Monthly seminars, intended to support the student in the research process are held and students are assessed by a final project submission and dissertation presentation. The course is year-long and counts for 6 credits and contributes 20% of the final weighted average used in the determination of honours. ECNG 3020 Special Project is designed to develop technical skills in the following areas: Design to specification; Formulation of creative solutions to engineering problems; Engineering analysis and enquiry; Validation and testing against benchmarks; Project management; Time management; and Communication. ECNG 3020 presents the opportunity to build upon the core of engineering skills gained in the earlier years and to broaden the scope of knowledge already gained. Project details are provided in a Project Handbook.

LEVEL: 3
SEMESTER: 1
COURSE CODE: ECNG3021
COURSE TITLE: INTRODUCTION TO ENGINEERING MANAGEMENT AND ACCOUNTING SYSTEMS
NUMBER OF CREDITS: 4
PREREQUISITES: at LEVEL 3
Course Description: This course provides final year engineering students with a background in management and accounting skills to equip them to function in the business world. It provides a working understanding of the main elements of the successful planning, operation and control of industries and businesses as they relate to the following essential areas: Accounting and Finance; Management and Organizational Theory; Project Management, Production Planning and Control Techniques; and Introduction to Business Law. The course is loaded with examples of its applications in engineering firms and industries.

LEVEL: 3
SEMESTER: 2
COURSE CODE: MGMT3136
COURSE TITLE: ENTREPRENEURSHIP AND NEW VENTURE CREATION
NUMBER OF CREDITS: 3
PREREQUISITES: at LEVEL 3
Course Description: This course deals with one of the most challenging issues confronting developing countries. It focuses on understanding and appreciating the entrepreneurial mindset in relation to the ability to create new ventures successfully. The course also focuses on “intrapreneurship” or in the reinvigoration of existing enterprises with an attitude of innovation, responsiveness and receptivity to change, and it considers entrepreneurship in an international context.
LEVEL: 3  
SEMESTER: 2  
COURSE CODE: PHYS3385  
COURSE TITLE: ELECTROMAGNETISM  
NUMBER OF CREDITS: 3  
PREREQUISITES: ELNG1101 and MATH2230  

LEVEL: 3  
SEMESTER: 1  
COURSE CODE: ELET3405  
COURSE TITLE: PRACTICAL ANALYSIS OF ADVANCED ELECTRONIC CIRCUIT AND SYSTEMS  
NUMBER OF CREDITS: 3  
PREREQUISITES: ELET2405 and ELET2415  
Course Description: This course is divided into three main sections. Section 1 will run for the first 5 weeks of the semester and will expose students to general troubleshooting and problem solving techniques for advanced electronics circuits and systems. Sections 2 and 3 will run concurrently for the remainder of semester and are strongly focused on problem solving and effective troubleshooting of circuits and systems for telecommunication and for instrumentation and control, respectively. Manufacturers’ datasheets, schematic diagrams, systems design specifications and operation and service manuals will be provided. Students are required to use this information along with their knowledge of electronic circuits and systems designs to implement effective repairs or redesigns. Although fixed 4-hour sessions are timetabled each week students are encouraged to use the open lab hours to work on their assigned weekly task. Students will be normally required to complete two sections - Section 1 and either Section 2 or Section 3 depending of their area of specialization (telecommunication or industrial automation).

LEVEL: 3  
SEMESTER: 1  
COURSE CODE: ELET3470  
COURSE TITLE: WAVE TRANSMISSION AND FIBER OPTICS  
NUMBER OF CREDITS: 3  
PREREQUISITES: ELET2480  
Course Description: This course starts with coverage of the basic background in electromagnetic theory that is required for understanding the behavior of waves in various mediums. It continues with the fundamentals of wave propagation and waveguiding of all kinds; the essentials of propagation along optical fibers; and the concepts underlying integrated optics systems. It details the theoretical analyses of various transmission line including twisted wire pairs, coaxial cables, and traces on printed circuits boards. A study of antennas and their interfacing to transmission line is included. A thorough analysis is done on the theory of fiber optic and dielectric transmission medium with extended discussions on their practical application. Finally practical fiber optic communication system, its signals and its components are studied.

LEVEL: 3  
SEMESTER: 1  
COURSE CODE: ELET3480  
COURSE TITLE: WIRELESS COMMUNICATION  
NUMBER OF CREDITS: 3  
PREREQUISITES: ELET2480
**Course Description:** This course offers a definitive professional's overview of wireless communications technology and system design. Virtually every important new wireless standard and technological development, including W-CDMA, cdma2000, UMTS, and UMC 136/EDGE; IEEE 802.11 and HIPERLAN WLANs; Bluetooth, LMDS, and more, have been reviewed. The technologies and applications that drive the development of 2G, 2.5G, and 3G systems are explored. An overview of the 4G technologies is presented.

**LEVEL:** 3  
**SEMESTER:** 2  
**COURSE CODE:** ELNG3050  
**COURSE TITLE:** WIRELESS BROADBAND NETWORKS  
**NUMBER OF CREDITS:** 3  
**PREREQUISITES:** ELET3480

**Course Description:** This course starts with a description of the latest techniques in block based transmission with strong emphasis on Orthogonal Frequency Division Multiplexing (OFDM). Multiple input/output antennas systems with applications to ultra wideband systems are then analyzed. Access control and management to ensure quality data transmission is discussed. The introduction of WIMAX and LTE systems and standards are detailed as examples of 4G systems.

**LEVEL:** 3  
**SEMESTER:** 1  
**COURSE CODE:** ELET3430  
**COURSE TITLE:** INSTRUMENTATION AND MEASUREMENTS  
**NUMBER OF CREDITS:** 3  
**PREREQUISITES:** ELET2410 and ELET2430 or ELET2460

**Course Description:** In modern measurement processes, the parameter to be measured is sensed and converted to an electrical signal for processing and display. The apparatus and methods used to perform this task include the use of a wide range of transducers and conditioning circuits that are usually interface to computers for final signal processing and display. This course highlights this measurement process and the design and operation of the electronic circuit and systems that enable it. In depth analyses of the physics of the operation of sensors and their interfaces to analogue and digital electronic circuits will be studied. Examples of Industrial measurement systems will be discussed with particular attention to their design details. Students will be exposed to the real world instrumentation and measurement system during their industrial case study sessions. This aspect of the course has proven to be very informative and eye-opening for the students creating high motivation levels and increased interest.

**LEVEL:** 3  
**SEMESTER:** 1  
**COURSE CODE:** ELNG3030  
**COURSE TITLE:** POWER ELECTRONICS AND PROTECTION CIRCUITS  
**NUMBER OF CREDITS:** 3  
**PREREQUISITES:** ELET2410 and ELET2420

**Course Description:** Power electronics refers to control and conversion of electrical power from one form to another by power semiconductor devices that are usually operate as switches. This course offers a comprehensive coverage of power electronic devices and circuits. It provides a basic knowledge of circuitry for the control and conversion of electrical power with high efficiency. It begins with the introduction of power semiconductor devices, their basic operations and characteristics. The required semiconductor physics background would have been covered in ELET2420 (semiconductor devices) which is a prerequisite for this course. The application of these devices to the design of controlled rectifiers, inverters, choppers, cyclo-converters, and dual converter circuits are presented. Typical commercial and industrial applications along with their waveform analyses are also discussed. These converters can change and regulate the voltage, current, or power; dc-dc converters, ac-dc rectifiers, dc-ac inverters, and ac-ac cyclo-converters are in common use. Several low and high power applications are included. All high power circuits require some form of cooling and protection from over-current and/or over-voltages. The components, circuit design techniques and application of several cooling and protection circuits are presented.

**LEVEL:** 3
SEMESTER: 1
COURSE CODE: ELNG3040
COURSE TITLE: INDUSTRIAL AUTOMATION
NUMBER OF CREDITS: 3
PREREQUISITES: ECNG2009 and ELET2450
Course Description: This course provides the student with basic skills useful in identifying the concepts of automated machines and equipment and describes the terms and phrases associated with industrial automation. A range of automated control systems will be studied in depth with special emphasis on the use of ladder Logic and F- Logic for PLC programming. The industry standards and protocols are covered. The design and operation of distributed control systems (DCS) is emphasized. The methods of programming for the various automated controllers are an integral part of this course. Examples of automation in selected industries are discussed to highlight the various applications of the automated systems. The practical component for this class will be covered in the advanced electronics lab course.

LEVEL: 3
SEMESTER: 2
COURSE CODE: ELNG3060
COURSE TITLE: POWER PLANT INSTRUMENTATION
NUMBER OF CREDITS: 3
PREREQUISITES: ELET3430, ELNG3030 and ELNG3040
Course Description: This course provides a comprehensive study of the instruments that are used to measure and control the processes of electricity power generation. The student is first exposed to an in-depth analysis of the processes of controlling the generation of electricity from tradition fuel sources. This is followed by a study of the instrumentation and control aspects of alternative form of electricity generation. Special emphasis is made to sensitize students to the environmental impact of these systems. Design ethics and design for safety are embedded in this course. A Case study of specific application of instruments in the control processes of power plants is an integral part of this course.

LEVEL: 3
SEMESTER: 2
COURSE CODE: ELET3440
COURSE TITLE: SATELLITE COMUNICATION & GNSS SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ELET2480
Course Description: This course is made up of two Sections: Section I, “Satellite Communication,” introduces students to the fundamental communications principles behind current state-of-the-art satellite communications systems. Section II, “Global Navigational Satellite Systems (GNSS),” provides an overview of the principles of operation of satellite navigation systems with primary emphasis on the U.S. Global Positioning System (GPS)

LEVEL: 3
SEMESTER: 2
COURSE CODE: ELET3440
COURSE TITLE: INTRODUCTION TO ROBOTICS
NUMBER OF CREDITS: 3
PREREQUISITES: ELET2450 and ELET2430
Course Description: This course introduces students to the field of robotics and its applications in today’s technologically advanced society. In addition it covers the different components that constitute a robot, its operation and how it fits together to form a complete system. The course also investigates and discusses the use of robot technology in several areas of application. Specific topics covered include embedded controllers, sensors, actuators, wireless communication and mobile robots design and applications.