UNDERGRADUATE INFORMATION HANDBOOK

Regulations & Syllabuses

2017-2018
CONTENTS

Mission Statement ........................................................................................................... 1
Dress Code and Conduct ............................................................................................... 2
Staff Listing .................................................................................................................... 3
Message from the Director .............................................................................................. 7

SECTION 1: General Information .............................................................. 9
  1.1 Programmes of Study ......................................................................................... 9
  1.2 Academic Quality Assurance ............................................................................ 9
  1.3 Course Materials ............................................................................................... 10

SECTION 2: Undergraduate Regulations ........................................... 11
  2.1 Qualifications for Admission to BSc Engineering Programmes .......... 11
  2.2 Grade Point Average (GPA) Requirements ................................................... 12
  2.3 Classification of Degree ...................................................................................... 14

SECTION 3: UNDERGRADUATE PROGRAMME DESCRIPTIONS ......... 16
  3.0 Preliminary Engineering (1 year qualifying programme) .................. 16
  3.1 BSc in Biomedical Engineering ................................................................. 18
  3.2 BSc in Civil Engineering ............................................................................ 21
  3.3 BSc in Computer Systems Engineering .................................................. 24
  3.4 BSc in Electrical Power Engineering ....................................................... 28
  3.5 BSc in Electronics Engineering ................................................................. 31

SECTION 4: COURSE DESCRIPTIONS .................................................. 36
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

DIRECTOR AND DEPUTY DEAN
Aiken, Paul
BSc, MPhil (Physics) UWI; MSc, PhD (Electrical Engineering), Columbia University, New York; Senior Member IEEE; Professional Engineer
Ext: 2254, 2204; Office: 927-1640, 977-7171

COORDINATORS

GRADUATE RESEARCH COORDINATOR
Latchman, Haniph
Professor
BSc (Eng) UWI; DPhil, Oxford (EE)
Senior Member IEEE
Ext: 2254, 2204

UNDERGRADUATE COORDINATOR
Falconer, Lindon
BSc (Electronics & Comp Sci), MSc (Digital Tech), UWI, Mona; Member IEEE; Former Snr Eng. Digicel
Ext: 2254, 2204

OUTREACH COORDINATOR
Thomas, Omar
PhD, Florida State University
Professional Engineer (PE)
Ext: 2254, 2204

PROJECTS AND LABORATORY COORDINATOR
Falconer, Lindon
BSc (Electronics & Comp Sci), MSc (Digital Tech), UWI, Mona; Member IEEE; Former Snr Eng. Digicel
Ext: 2254, 2204

ADMINISTRATIVE STAFF
Scarlett, Cherri-Ann
Senior Administrative Assistant
Ext: 2254

Gray, Shanique
Administrative Assistant II
Ext: 2254

Williams, Tena
Customer Service Representative
Ext: 2254

TECHNICAL STAFF

Falconer, Lindon
Electronics Engineer
BSc (Electronics, Comp Sci), MSc (Digital Tech), UWI, Mona; Member IEEE; Former Snr Eng. Digicel
Projects and Laboratories Coordinator
Ext: 2254

Brown, Errol
Senior Electronics Technologist
Inventory and PCB constructions
Ext: 2254

Brooks, Joseph
Senior Electronics Technologist
Equipment Calibration and Lab Tech
Ext: 2254

Thompson, Gowan
Electrical and Workshop Technician
Ext: 2254

Anderson, Stephan
Information Technologist III
Ext: 2254

Douglas, Dennis
Laboratory Technologist
Civil Engineering
Ext: 2254

ACADEMIC STAFF

Full time staff of MSE

PROFESSORS

Latchman, Haniph
Professor
BSc (Eng) UWI, DPhil, Oxford (EE)
Senior Member IEEE
Ext: 2254, 2204
SENIOR LECTURERS

Aiken, Paul
BSc, MPhil, UWI, MSc, PhD, Columbia University; Senior Member IEEE; Professional Engineer
Industry: Founder and Board Director, Mona-Tech Engineering Services Ltd
(Electronics/Biomedical/Electrical Engineering)
Ext: 2254, 2204; Office: 927-1640, 977-6171

Brown, Noel
PhD, Queens University; PE
Industry: Former Director, JenTech Consultants (Civil Engineering)
Ext: 2254, Office: 977-1924

Hay, Carlton
PhD, University of Florida (Gainesville)
Industry: Managing Director NHL Engineering Ltd.
(Civil Engineering)

Lawrence, Adrian
PhD, University of Florida (UF); PE (Civil Engineering)
Ext: 2254

Smith, David
PhD, Queens University
Industry: Director, Smith-Warner International (Fluids and Coastal Engineering)

LECTURERS

Alli, Kolapo
PhD, Obafemi Awolowo University
(Electronics and Electrical Power Engineering)
Ext: 2254, 2204

Archibald, Wayne
PhD, Carnegie Mellon University
(Materials Engineering)
Ext: 2254, 2204

Falconer, Lindon
BSc, MSc, UWI, Mona; Member IEEE
(Electronics Engineering)
Ext: 2254, 2204

McMorris, Nicolas
PhD, University of Delaware, PE
(Civil Engineering)
Ext: 2254

Thomas, Omar
PhD, Florida State University, PE
(Civil Engineering)
Ext: 2405

VISITING LECTURER

Fitz-Coy, Norman
PhD, Auburn University
Associate Professor, University of Florida
(Aeronautical and Mechanical Engineering)

ADJUNCT ACADEMIC STAFF

Staff shared with other Departments in FST.

PROFESSORS

Coore, Daniel
PhD, Massachusetts Inst. of Tech. (MIT); MIEEE
Department of Computing
(Computer Systems Engineering)
Ext: 2814

Robinson, Ralph
PhD
Department of Life Sciences
(Biology for Engineers)
Ext: 2292

SENIOR LECTURERS

Mandal, Arpita
PhD, Indian Institute of Technology
Department of Geology and Geography
(Civil Engineering)
Ext: 2258-9

Mansingh, Gunjan
PhD, UWI
Department of Computing
(Computer Systems Engineering)
Ext: 2814
Mugisa, Ezra
PhD, MIEEE
Head, Department of Computing
(Software Engineering)
Ext: 2815

Myers, Leary
PhD, Howard University, MIEEE
Department of Physics
(Electronics Engineering)
Ext: 2274

LECTURERS
Ausaru, Ajani
Department of Mathematics
(Engineering Maths 1)
Ext: 2284

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

Brown, Alrick
BSc, MPhil (Pursuing), UWI
Department of Physics
(Introduction to Programming)

Clarke, Leo
PhD, UWI
Department of Physics
(Electronics Engineering)
Ext: 2274

Coy, Andre
PhD, Sheffield University; SMIEEE
Department of Physics
(Electronics Engineering)
Ext: 2274

Daniel, Samuel
MPhil,
Department of Physics
(Physics for Engineers)
Ext: 2274

Dennis, Haile
MSc
International Centre for Nuclear Sciences
(Electrical Power (Nuclear) Engineering)

Ferguson, Eyton
MSc, PhD (Pending), UWI
Department of Computing
(Computer Systems Engineering)
Ext: 2815

Fokum, Daniel
PhD, Kansas State University; MIEEE
Department of Computing
(Computer Systems Engineering)
Ext: 2815

Gaynor, Paul
PhD, UWI
Department of Computing
(Computer Systems Engineering)
Ext: 2815

Mangaroo, Basil
BSc, UWI St. Augustine
Senior Engineer, Department of Chemistry
(Machine Shop and Electrical Power Engineering)

Plummer, Richard
MPhil
Department of Mathematics
(Statistics & Probability)
Ext: 2284

Small, Andre
MPhil, PhD (Pursuing), UWI
Department of Mathematics
(Engineering Mathematics)
Ext: 2284

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

PART-TIME ACADEMIC STAFF in MSE
Barrett, Raphael
MBA
Industry: Consultant
(Engineering Management)

Downer-Edward, Vivalyn
Attorney at Law
(Civil Engineering Law)
Ext: 2254
Mona School of Engineering

**Ellis, Noel**  
MSc  
Industry: Aviation and Communications  
(Telecommunication)  
Ext: 2254

**Fletcher, Maurice**  
PhD, University of Miami  
(Introduction to Engineering)  
Ext: 2254

**Graham, Tratisca**  
Attorney at Law  
(Business Law)

**Johnson, Vance**  
MSc, PhD (Pursuing), UWI  
Industry: Civil Engineering  
(Geotechnical Engineering)  
Ext: 2254

**Lyle, Ervin**  
MSc  
Industry: Automation Consultant  
(Industrial Automation and Controls)  
Ext: 2254

**Maxam, Ava**  
PhD, UWI  
Industry (MonaGIS)  
(Geoinformatics for Civil and Environmental Engineers)

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

**Shaw, Courtney**  
MSc, City University of London  
Biomedical Engineering  
(Pre-Eng Physics and Biomedical Engineering)

**Thomas, Lowell**  
MSc, UWI  
Electronics Engineering  
(Power Plant Instrumentation)

**Young, Garfield**  
PhD  
Geomatics Education  
(Geomatics for Civil and Environmental Engineers)
MESSAGE FROM THE DIRECTOR

On behalf of all the staff of the Mona School of Engineering (MSE) in the Faculty of Science and Technology of the University of the West Indies (Mona), let me welcome all new and returning students for the 2017/2018 Academic Year.

In response to the demands of our biomedical and health sectors, we have added the BSc. in Biomedical Engineering to our list of engineering programmes. In an effort to increase access to our engineering programmes, we have also added a 1-year preliminary engineering programme which consists of the necessary components of mathematics, sciences, computer and laboratory techniques and communications skills for the beginner engineer. The first cohort of Jamaican students entering this programme have been awarded a US$5,000 bursary (50%) toward their tuition. This programme is a direct response to a call from the Government of Jamaica (GoJ) and various industries for an increase in the number of engineering graduates. The growing technical sectors of the country has estimated a demand of 1000 engineers graduates per year.

The GoJ and the Student Loan Bureau (SLB) have responded to our request for increased access to loans by engineering students. The interest rates on engineering loans have been reduced from 9.5% to 6%, and the loan threshold has been raised to J$750,000, up from $500,000. Other forms of funding opportunities to engineering students are being explored.

We continue to strengthen our partnerships with local and international industries. Our civil and electronics engineering teams have been working with the National Road Operating and Constructing Company Limited (NROCC) to resolve environmental issues that potentially resulted from roadway construction, including the design and deployment of equipment to remotely sense environmental conditions. We intend to launch our first shared engineering project design with Binghamton University where four of our final year electronics and computer systems engineering students will work with four of their final year electronics and computer engineering students on two Capstone Projects.

(Continued on page 8)
We encourage your participation in the activities of the student engineering clubs (JIE and IEEE), and also your support to our team preparing for the annual international robotics competition by IEEE South East USA. We have continued to excel in this competition and last year our very own Mr Jason Brown (final year computer systems engineering student) won the coveted Best Paper award from a pool of 1000 applicants.

The MSE continues to work hard towards creating a world class teaching and research facility, with strong synergies with our industrial and commercial partners. We have successfully attracted four new academic staff including a professor of electronics and electrical engineering (formerly of University of Florida). ABET International accreditation will be doing a site visit on October 8-12 for assessment of our BSc Electronics Engineering. This is our first attempt at international accreditation and we will use the learning experience from this exercise to facilitate accreditation of all our engineering programmes.

We wish you a very successful 2017/2018 academic year.

**Paul Aiken**, PhD, PE, Senior Member IEEE
Director, MSE and Deputy Dean, Faculty of Science and Technology
SECTION 1: GENERAL INFORMATION

1.1 PROGRAMMES OF STUDY
The Mona School of Engineering (MSE) in the Faculty of Science and Technology (FST) at the UWI Mona Campus currently offers both four (4) year (with the first year being Preliminary Engineering) and three 3-year programmes of study leading to a BSc. in the following engineering programmes: Biomedical Engineering, Civil Engineering, Computer Systems Engineering, Electrical Power 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 Preliminary Engineering programme is a 1-year programme that serves as a qualifying year for students seeking to access any one of the 3-year BSc engineering programmes. The existing BSc. Engineering programmes have a minimum entry requirement of passes in CAPE mathematics and physics (or equivalent). Students who do not meet this requirement will now have the opportunity for admissions to the preliminary year. This preliminary year allow students from any country to access our engineering programmes. It creates a pathway for students from non-traditional educational backgrounds, such as City and Guilds.

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 oversees the adherence to the guidelines set by the accrediting agencies.
Each BSc Engineering programme at Mona will apply for ABET international accreditation as soon as they are eligible to do so after graduating the first cohort.

1.3 COURSE MATERIALS
Upon payment of tuition fees (either in full or part payments), the student shall receive an E-tablet with the prescribed texts for each course within their registered programme.
SECTION 2: UNDERGRADUATE REGULATIONS

2.1 QUALIFICATIONS FOR ADMISSION TO BSc. ENGINEERING PROGRAMMES

1) Minimum requirements for entry to the preliminary engineering programme are:
   a. Passes in at least 5 CXC CSECs, or 5 GCE O'Levels, or 5 International Baccalaureate® (IB) all including Mathematics, English, Physics (or equivalent) and any other two subjects; or
   b. Certificate or Diploma in City & Guilds engineering examinations; or
   c. Relevant high schools and SAT passes from international institutions, or
   d. Relevant passes in ‘Gaokao’ (China’s National College Entrance Examination) examination, or
   e. Passes in relevant college entry exams from other countries, or
   f. Passes in high school Mathematics and Physics (or other sciences) and completed HEART NTA diploma in relevant technical discipline, or has been working in relevant technical field for at least 4 years.

2) Admissions for the traditional 3-year BSc engineering programmes (starts at Level 1) requires passes in at least five (5) CSECs (or equivalent) including English A, Mathematics, and Physics, along with:
   a. Passes in units 1 and 2 of CAPE Mathematics and Physics; or
   b. Passes in GCE A'Levels Mathematics and Physics; or
   c. Passes in MATH0100, MATH0110, PHYS0411, PHYS0412, PHYS0421 and PHYS0422 from the Preliminary year of the Faculty of Science and Technology of The UWI; or
   d. Diploma in a relevant engineering programme from an approved institution; or
   e. Diploma in a relevant engineering discipline in the City & Guilds examination, inclusive of a pass in the advanced Mathematics and science courses (Unit 351); or
   f. Associate degrees with Mathematics and Physics or relevant engineering programmes from approved community colleges; or
   g. Passes in Higher International Baccalaureate (IB) in Mathematics and Physics; or
Successful completion of the Preliminary Engineering Year with minimum GPA of 2.0, including passes in all pre-engineering Mathematics and Physics courses.

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).

2.2 GPA REQUIREMENTS

The Grade Point Average (or quality points) for BSc Engineering programmes is calculated from ALL COURSES from Level 1 to Level 3 that constitutes the candidate’s degree. The actual GPA will determine the class of degree received. The GPA accrued from the preliminary engineering year WILL NOT be calculated in the final GPA of the BSc programmes.

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.

In the determination of GPA, the defined grades with the corresponding quality points shall be:

<table>
<thead>
<tr>
<th>GRADE</th>
<th>QUALITY POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>4.30</td>
</tr>
<tr>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>A-</td>
<td>3.70</td>
</tr>
<tr>
<td>B+</td>
<td>3.30</td>
</tr>
<tr>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>B-</td>
<td>2.70</td>
</tr>
<tr>
<td>C+</td>
<td>2.30</td>
</tr>
<tr>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>F1</td>
<td>1.70</td>
</tr>
<tr>
<td>F2</td>
<td>1.30</td>
</tr>
<tr>
<td>F3</td>
<td>0.00</td>
</tr>
</tbody>
</table>
The scheme to be used for conversion of numerical marks to letter grades shall be as follows:

<table>
<thead>
<tr>
<th>GRADE GPA</th>
<th>MARKS %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>90-100</td>
</tr>
<tr>
<td>A</td>
<td>80-89</td>
</tr>
<tr>
<td>A-</td>
<td>75-79</td>
</tr>
<tr>
<td>B+</td>
<td>70-74</td>
</tr>
<tr>
<td>B</td>
<td>65-69</td>
</tr>
<tr>
<td>B-</td>
<td>60-64</td>
</tr>
<tr>
<td>C+</td>
<td>55-59</td>
</tr>
<tr>
<td>C</td>
<td>50-54</td>
</tr>
<tr>
<td>F1</td>
<td>45-49</td>
</tr>
<tr>
<td>F2</td>
<td>40-44</td>
</tr>
<tr>
<td>F3</td>
<td>0-39</td>
</tr>
</tbody>
</table>

**Weighted GPA**

The Weighted GPA for the BSc Engineering programmes is the sum of 80% of the average determined by applying weights of 10%, 30% and 60% for levels 1, 2 and 3 courses respectively (except for the 6 credit final year project(s)), and 20% of the compulsory 6 credit final year project.

**Other Regulations**

A student having a GPA for a given semester of less than 2.00 shall be deemed to be performing unsatisfactorily, and shall be placed on warning. A student on warning whose GPA for the succeeding semester is less than or equal to 1.99, will be required to withdraw. However, a student may be reinstated if his/her GPA improves beyond 1.99 in Semester 2 by credits obtained in summer re-sit examinations.

Students must be guided by all other rules and regulations of the School as outlined in the Mona School of Engineering Regulations at (https://www.mona.uwi.edu/engineering).
2.3 CLASSIFICATION OF DEGREE

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:

<table>
<thead>
<tr>
<th>DEGREE CLASS</th>
<th>CUMULATIVE GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>≥ 3.60</td>
</tr>
<tr>
<td>Upper Second</td>
<td>3.00 – 3.59</td>
</tr>
<tr>
<td>Lower Second</td>
<td>2.50 – 2.99</td>
</tr>
<tr>
<td>Pass</td>
<td>2.00 – 2.49</td>
</tr>
</tbody>
</table>
SECTION 3: UNDERGRADUATE PROGRAMME DESCRIPTIONS

Definition Course Codes:

BMNG  Biomedical Engineering
COMP  Computer Science
CVNG  Civil Engineering
ECNG  Electrical and Computer Engineering
ELET  Electronics
ELNG  Electronics Engineering
ENGR0xxx  Preliminary Engineering Courses
ENGR1xxx  Faculty of Engineering
FOUN  Foundation Courses
GEOM  Geomatics and Geoinformatics
INFO  Information Technology
MGMT  Management Studies
MATH  Mathematics
PHYS  Physics

Note: The letter 'E' or 'C' preceding the credit allocation indicates Examination by Written Papers or by Course Work, respectively.
3.0 PRELIMINARY ENGINEERING (1 year qualifying programme)

Coordinator: Dr Paul Aiken

The overall aims of this preliminary engineering programme are to:

- provide a programme structure that allows students to qualify for transition into any of the BSc engineering programmes within The UWI;
- provide the requisite foundation in mathematics, sciences, laboratory techniques and communication skills that are required for a beginner engineering student; and
- facilitate increased enrolment in engineering to meet the future needs of our industries.

Students are required to register for 30 credits of courses across two semesters. These courses will facilitate the development of competences in mathematics, sciences, laboratory skills, technical writing, along with exposure to softer skills via electives from social sciences and humanities. The credits for these courses will not be added to any of the BSc Engineering programmes in The UWI and will only serve to qualify students for access to the BSc engineering programmes.

PROGRAMME STRUCTURE AND CONTENT

Note: E = Examination, C = Coursework, and the numeral after E or C = Number of Credits
ONE YEAR (all courses are compulsory)

Semester 1:  15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR0110</td>
<td>Pre-Engineering Physics I</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR0120</td>
<td>Pre-Engineering Mathematics I</td>
<td>E4</td>
</tr>
<tr>
<td>ENGR0130</td>
<td>Chemistry for Engineers</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR0230</td>
<td>Biology for Engineers</td>
<td>E3</td>
</tr>
<tr>
<td>ELECTIVE 1</td>
<td>Humanities/Social Sciences course</td>
<td>E3</td>
</tr>
</tbody>
</table>

Semester 2:  15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR0210</td>
<td>Pre-Engineering Physics II</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR0220</td>
<td>Pre-Engineering Mathematics II</td>
<td>E4</td>
</tr>
<tr>
<td>ENGR0150</td>
<td>Basics of Technical Communications</td>
<td>C2</td>
</tr>
<tr>
<td>ENGR0240</td>
<td>Computer Applications for Beginning Engineers</td>
<td>C2</td>
</tr>
<tr>
<td>ELECTIVE 1</td>
<td>Humanities/Social Sciences course</td>
<td>E3</td>
</tr>
</tbody>
</table>

Note: Students with CAPE passes (or equivalent) in mathematics or sciences may be eligible for respective exemptions.
Students are required to complete a minimum of 97 credits for the award of the BSc in Biomedical Engineering.

**PROGRAMME STRUCTURE AND CONTENT**

Note: E = Examination, C = Coursework, and the numeral after E or C = Number of Credits

**LEVEL 1 (all courses are compulsory)**

**Semester 1:** 15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG1009</td>
<td>Introduction to Programming</td>
<td>C3</td>
</tr>
<tr>
<td>ELET1400</td>
<td>Introduction to Electronics</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG1101</td>
<td>Physics for Engineers</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1000</td>
<td>Introduction to Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1180</td>
<td>Engineering Mathematics I</td>
<td>E3</td>
</tr>
</tbody>
</table>
Semester 2: 16 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMNG1210</td>
<td>Introduction to Biomedical Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>COMP1161</td>
<td>Object Oriented Programming</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG1000</td>
<td>Electrical Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG1006</td>
<td>Laboratory and Project Design I</td>
<td>C3</td>
</tr>
<tr>
<td>ECNG1012</td>
<td>Engineering Science and Technology</td>
<td>C4</td>
</tr>
</tbody>
</table>

LEVEL 2 (all courses are compulsory)

Semester 1: 15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG2004</td>
<td>Laboratory and Project Design II</td>
<td>C3</td>
</tr>
<tr>
<td>ELET2450</td>
<td>Embedded Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2460</td>
<td>Signals and Systems</td>
<td>E3</td>
</tr>
<tr>
<td>MATH2230</td>
<td>Engineering Mathematics II</td>
<td>E3</td>
</tr>
<tr>
<td>PHYS2386</td>
<td>Electromagnetism and Optics</td>
<td>E3</td>
</tr>
</tbody>
</table>

Semester 2: 14 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMNG2210</td>
<td>Biomedical Instrumentation I</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG2005</td>
<td>Laboratory and Project Design III</td>
<td>C3</td>
</tr>
<tr>
<td>ECNG2009</td>
<td>Control Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2410</td>
<td>Analysis and Design of Analog Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>MATH2240</td>
<td>Probability and Statistics</td>
<td>E2</td>
</tr>
</tbody>
</table>
## LEVEL 3 (Core 22 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CORE COURSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMNG3110</td>
<td>Biomedical Instrumentation II</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG3020</td>
<td>Capstone Project</td>
<td>C6</td>
</tr>
<tr>
<td>ECNG3021</td>
<td>Introduction to Engineering Management and Accounting System</td>
<td>E4</td>
</tr>
<tr>
<td>ELET3460</td>
<td>Digital Signal and Image Processing</td>
<td>E3</td>
</tr>
<tr>
<td>PHYS3391</td>
<td>Biomedical Optics and Biomechanics</td>
<td>E3</td>
</tr>
<tr>
<td>PHYS3397</td>
<td>Medical Radiation Physics and Imaging</td>
<td>E3</td>
</tr>
<tr>
<td><strong>ELECTIVES (select any two) – 6 Credits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDSC3104</td>
<td>Health Services Management</td>
<td>E3</td>
</tr>
<tr>
<td>MGMT3136</td>
<td>Venture Capital and Entrepreneurship</td>
<td>C3</td>
</tr>
<tr>
<td>BMNG3230</td>
<td>Clinical Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>BMNG3240</td>
<td>Rehabilitation Engineering and Design</td>
<td>E3</td>
</tr>
<tr>
<td>ELECTIVE 1</td>
<td>Social Science (Level 2 or 3)</td>
<td>E3</td>
</tr>
<tr>
<td>ELECTIVE 2</td>
<td>Humanities (Level 2 or 3)</td>
<td>E3</td>
</tr>
</tbody>
</table>
3.2 BSc IN CIVIL ENGINEERING

Coordinator: Dr. Nicolas McMorris

Students are required to complete a minimum of 105 credits for the award of the BSc in Civil Engineering.

PROGRAMME STRUCTURE AND CONTENT

Note: E = Examination, C = Coursework, and the numeral after E or C = Number of Credits

LEVEL 1 (all courses are compulsory)

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>CVNG1005</td>
<td>Science of Materials</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG1009</td>
<td>Engineering Graphics</td>
<td>C3</td>
</tr>
<tr>
<td>ECNG1009</td>
<td>Introduction to Programming</td>
<td>C3</td>
</tr>
<tr>
<td>ELNG1101</td>
<td>Physics for Engineers</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1000</td>
<td>Introduction to Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1180</td>
<td>Engineering Mathematics I</td>
<td>E3</td>
</tr>
</tbody>
</table>
Semester 2: 20 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG1000</td>
<td>Mechanics of Solids</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG1001</td>
<td>Mechanics of Fluids I</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG1002</td>
<td>Civil Engineering Design I</td>
<td>C3</td>
</tr>
<tr>
<td>CVNG1007</td>
<td>Introduction to Geotechnical Engineering</td>
<td>C2</td>
</tr>
<tr>
<td>CVNG1008</td>
<td>Building Services Engineering</td>
<td>E4</td>
</tr>
<tr>
<td>CVNG1011</td>
<td>Geology</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG1012</td>
<td>Civil Engineering Law</td>
<td>E2</td>
</tr>
</tbody>
</table>

LEVEL 2 (all courses are compulsory)
Year-Long Courses (Semesters 1 and 2): 7 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG2003</td>
<td>Civil Engineering Design II</td>
<td>C3</td>
</tr>
<tr>
<td>CVNG2006</td>
<td>Structural Design I</td>
<td>C4</td>
</tr>
</tbody>
</table>

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>CVNG2001</td>
<td>Structural Mechanics</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG2005</td>
<td>Mechanics of Fluids II</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG2008</td>
<td>Soil Mechanics I</td>
<td>E2</td>
</tr>
<tr>
<td>GEOM2015</td>
<td>Geomatics for Civil &amp; Environmental Engineers</td>
<td>E2</td>
</tr>
<tr>
<td>MATH2230</td>
<td>Engineering Mathematics II</td>
<td>E3</td>
</tr>
</tbody>
</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>CVNG2009</td>
<td>Soil Mechanics II</td>
<td>E2</td>
</tr>
<tr>
<td>CVNG2010</td>
<td>Civil Engineering Management</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG2011</td>
<td>Engineering Hydrology</td>
<td>E3</td>
</tr>
<tr>
<td>MATH2240</td>
<td>Probability and Statistics</td>
<td>E2</td>
</tr>
<tr>
<td>GEOM2017</td>
<td>Geoinformatics for Civil &amp; Environmental Engineers</td>
<td>E2</td>
</tr>
</tbody>
</table>

LEVEL 3
Year-Long (Semesters 1 & 2): 12 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG3014</td>
<td>Civil Engineering Design Project</td>
<td>C6</td>
</tr>
<tr>
<td>CVNG3015</td>
<td>Special Investigative Project</td>
<td>C6</td>
</tr>
</tbody>
</table>

Semester 1: 14 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG3002</td>
<td>Structural Analysis</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG3003</td>
<td>Structural Design II</td>
<td>C2</td>
</tr>
<tr>
<td>CVNG3005</td>
<td>Foundation Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG3007</td>
<td>Environmental Engineering I</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG3009</td>
<td>Highway Engineering</td>
<td>E3</td>
</tr>
</tbody>
</table>

Semester 2: 6 Credits (Select any two courses)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG3008</td>
<td>Environmental Engineering II</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG3010</td>
<td>Transportation Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG3011</td>
<td>Pavement Design &amp; Management</td>
<td>E3</td>
</tr>
<tr>
<td>CVNG3013</td>
<td>Coastal Engineering</td>
<td>E3</td>
</tr>
</tbody>
</table>
3.3 BSc in COMPUTER SYSTEMS ENGINEERING

Coordinators: Dr Ezra Mugisa and Mr Lindon Falconer

All Computer Systems Engineering students are required to complete a minimum of 105 credits for the award of the BSc in Computer Systems Engineering. The Foundation courses are not shown.

PROGRAMME STRUCTURE AND CONTENT

Note: E = Examination, C = Coursework, and the numeral after E or C = Number of Credits

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>COMP1126</td>
<td>Introduction to Computing I</td>
<td>E3</td>
</tr>
<tr>
<td>COMP1127</td>
<td>Introduction to Computing II</td>
<td>E3</td>
</tr>
<tr>
<td>ELET1400</td>
<td>Introduction to Electronics</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG1101</td>
<td>Physics for Engineers</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1000</td>
<td>Introduction to Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1180</td>
<td>Engineering Mathematics I</td>
<td>E3</td>
</tr>
</tbody>
</table>
Semester 2:  16 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP1161</td>
<td>Object-Oriented Programming</td>
<td>E3</td>
</tr>
<tr>
<td>COMP1220</td>
<td>Computing and Society</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG1000</td>
<td>Electrical Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG1006</td>
<td>Laboratory and Projects 1</td>
<td>C3</td>
</tr>
<tr>
<td>ECNG1012</td>
<td>Engineering Science and Technology</td>
<td>C4</td>
</tr>
</tbody>
</table>

LEVEL 2

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>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>
<tr>
<td>COMP2190</td>
<td>Net-Centric Computing</td>
<td>E3</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>INFO2180</td>
<td>Dynamic Web Development I</td>
<td>E3</td>
</tr>
</tbody>
</table>

Semester 2:  11 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP2111</td>
<td>Analysis of Algorithms</td>
<td>E3</td>
</tr>
<tr>
<td>COMP2130</td>
<td>Systems Programming</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2405*</td>
<td>Practices in Electronics Designs I</td>
<td>C3</td>
</tr>
<tr>
<td>MATH2240</td>
<td>Probability and Statistics</td>
<td>E2</td>
</tr>
</tbody>
</table>

* Special case will be made to offer ELET2405 in semester 2
Summer Course: 3 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP3911</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>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG3020</td>
<td>Engineering Capstone Project</td>
<td>C6</td>
</tr>
</tbody>
</table>

Semester 1

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>CORE COURSES</strong></td>
<td></td>
</tr>
<tr>
<td>COMP3101</td>
<td>Operating Systems</td>
<td>E3</td>
</tr>
<tr>
<td>COMP3191</td>
<td>Principles of Networks</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG3021</td>
<td>Introduction to Engineering Management and Accounting Systems</td>
<td>E4</td>
</tr>
<tr>
<td>ELET 2460</td>
<td>Signals and Systems</td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td><strong>ELECTIVES (select one)</strong></td>
<td></td>
</tr>
<tr>
<td>INFO3155</td>
<td>Information Assurance and Security</td>
<td>E3</td>
</tr>
<tr>
<td>ELET3485</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>
</tr>
</thead>
<tbody>
<tr>
<td>CORE COURSES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP3801</td>
<td>Real Time Embedded Systems</td>
<td>E3</td>
</tr>
<tr>
<td>MGMT3136</td>
<td>New Venture Creation and Entrepreneurship</td>
<td>C3</td>
</tr>
<tr>
<td>ELECTIVES (select one)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECNG3016</td>
<td>Advanced Digital Electronics</td>
<td>E3</td>
</tr>
<tr>
<td>MATH2230</td>
<td>Engineering Mathematics II</td>
<td>E3</td>
</tr>
</tbody>
</table>
All Electrical Power Engineering students are required to complete a minimum of 101 credits for the award of the BSc in Electrical Power Engineering. The Foundation courses are not shown.

PROGRAMME STRUCTURE AND CONTENT
Note: E = Examination, C = Coursework, and the numeral after E or C = Number of Credits

LEVEL 1
Semester 1: 15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG1009</td>
<td>Introduction to Programming</td>
<td>C3</td>
</tr>
<tr>
<td>ELET1400</td>
<td>Introduction to Electronics</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG1101</td>
<td>Physics for Engineers</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1000</td>
<td>Introduction to Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1180</td>
<td>Engineering Mathematics I</td>
<td>E3</td>
</tr>
</tbody>
</table>
### Undergraduate Student Information Guide

**Semester 2:** 16 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVNG1001</td>
<td>Mechanics of Fluids I</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG1000</td>
<td>Electrical Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG1006</td>
<td>Laboratory &amp; Project Design I</td>
<td>C3</td>
</tr>
<tr>
<td>ECNG1012</td>
<td>Engineering Science and Technology</td>
<td>C4</td>
</tr>
<tr>
<td>ECNG1015</td>
<td>Introduction to Electrical Energy Systems</td>
<td>E3</td>
</tr>
</tbody>
</table>

**LEVEL 2**

**Semester 1:** 15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG2000</td>
<td>Electromechanical Energy Conversion Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG2004</td>
<td>Laboratory &amp; Project Design II</td>
<td>C3</td>
</tr>
<tr>
<td>ELET2450</td>
<td>Embedded Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2460</td>
<td>Signals and Systems</td>
<td>E3</td>
</tr>
<tr>
<td>MATH2230</td>
<td>Engineering Mathematics II</td>
<td>E3</td>
</tr>
</tbody>
</table>

**Semester 2:** 15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG2005</td>
<td>Laboratory &amp; Project Design III</td>
<td>C3</td>
</tr>
<tr>
<td>ECNG2009</td>
<td>Control Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2410</td>
<td>Design and Analysis of Analogue Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>EPNG2010</td>
<td>Nuclear Physics and Reactor Theory</td>
<td>E3</td>
</tr>
<tr>
<td>EPNG2020</td>
<td>Renewable Energy Systems</td>
<td>E3</td>
</tr>
</tbody>
</table>
LEVEL 3

Core Courses: 25 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG3013</td>
<td>Electrical Transmission and Distribution Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG3015</td>
<td>Industrial and Commercial Electrical Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG3020</td>
<td>Special Project (1 year)</td>
<td>C6</td>
</tr>
<tr>
<td>ECNG3021</td>
<td>Introduction to Engineering Management and Accounting Systems</td>
<td>E4</td>
</tr>
<tr>
<td>ELET3405</td>
<td>Practical Analysis of Advanced Circuits and Systems</td>
<td>E3</td>
</tr>
<tr>
<td>PHYS3385</td>
<td>Electromagnetism</td>
<td>E3</td>
</tr>
<tr>
<td>MGMT3136</td>
<td>Venture Capital and Entrepreneurship</td>
<td>E3</td>
</tr>
</tbody>
</table>

Electives: 6 Credit (Select any two courses)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG3010</td>
<td>Electrical Machines &amp; Drive</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG3012</td>
<td>Power Systems Analysis</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG3030</td>
<td>Power Electronics**</td>
<td>E3</td>
</tr>
<tr>
<td>EPNG3010</td>
<td>Nuclear Power Systems**</td>
<td>E3</td>
</tr>
<tr>
<td>EPNG3030</td>
<td>Integrating Electrical Power Systems</td>
<td>E3</td>
</tr>
</tbody>
</table>

** These two are available for 2017-18
3.5 BSc in ELECTRONICS ENGINEERING

Coordinators: Dr Paul Aiken and Mr Lindon Falconer

Students are required to complete a minimum of 101 credits for the award of the BSc in Electronics Engineering. The Foundation courses are not shown.

PROGRAMME STRUCTURE AND CONTENT

Note: E = Examination, C = Coursework, and the numeral after E or C = Number of Credits

LEVEL 1 (all courses compulsory)

Semester 1: 15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG1009</td>
<td>Introduction to Programming</td>
<td>C3</td>
</tr>
<tr>
<td>ELET1400</td>
<td>Introduction to Electronics</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG1101</td>
<td>Physics for Engineers</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1000</td>
<td>Introduction to Engineering</td>
<td>E3</td>
</tr>
<tr>
<td>ENGR1180</td>
<td>Engineering Mathematics I</td>
<td>E3</td>
</tr>
</tbody>
</table>
Semester 2: 16 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP1161</td>
<td>Object-Oriented Programming</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG1000</td>
<td>Electrical Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG1006</td>
<td>Laboratory &amp; Project Design I</td>
<td>C3</td>
</tr>
<tr>
<td>ECNG1012</td>
<td>Engineering Science and Technology</td>
<td>C4</td>
</tr>
<tr>
<td>ECNG1015</td>
<td>Introduction to Electrical Energy Systems</td>
<td>E3</td>
</tr>
</tbody>
</table>

LEVEL 2 (all courses are compulsory)

Semester 1: 15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET2405</td>
<td>Practices in Electronics 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>ELET2460</td>
<td>Signals and Systems</td>
<td>E3</td>
</tr>
<tr>
<td>MATH2230</td>
<td>Engineering Mathematics II</td>
<td>E3</td>
</tr>
</tbody>
</table>

Semester 2: 15 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG2009</td>
<td>Control Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2410</td>
<td>Analysis and Design of Analogue Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2415</td>
<td>Practices in Electronics II</td>
<td>C3</td>
</tr>
<tr>
<td>ELET2420</td>
<td>Semiconductor Devices</td>
<td>E3</td>
</tr>
<tr>
<td>ELET2480</td>
<td>Modern Communications</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.
YEAR-LONG (compulsory):  6 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG3020</td>
<td>Special Project</td>
<td>C6</td>
</tr>
</tbody>
</table>

One Semester (compulsory):  13 Credits

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG3021</td>
<td>Introduction to Engineering Management and Accounting Systems</td>
<td>E4</td>
</tr>
<tr>
<td>ELET3405</td>
<td>Practical Analysis of Advanced Electronics</td>
<td>C3</td>
</tr>
<tr>
<td>MGMT3136</td>
<td>Entrepreneurship and New Venture Creation</td>
<td>E3</td>
</tr>
<tr>
<td>PHYS3385</td>
<td>Electromagnetism</td>
<td>E3</td>
</tr>
</tbody>
</table>

Option 1:  Telecommunications (compulsory)  (12 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET3460</td>
<td>Digital Signal and Image Processing</td>
<td>E3</td>
</tr>
<tr>
<td>ELET3470</td>
<td>Wireless Transmission &amp; Fiber-Optics</td>
<td>E3</td>
</tr>
<tr>
<td>ELET3480</td>
<td>Wireless Communication Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG3050</td>
<td>Broadband Networks</td>
<td>E3</td>
</tr>
</tbody>
</table>
Option 2: Industrial Instrumentation (compulsory) (12 Credits)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>NUMBER OF CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET3430</td>
<td>Instrumentation and Measurements</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG3030</td>
<td>Power Electronics and Protection Circuits</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG3040</td>
<td>Industrial Automation</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG3060</td>
<td>Power Plant Instrumentation</td>
<td>E3</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).
SECTION 4: COURSE DESCRIPTIONS

SEMESTER: 2
COURSE CODE: BMNG1210
COURSE TITLE: INTRODUCTION TO BIOMEDICAL ENGINEERING

NUMBER OF CREDITS: 3
Course Description: This course provides an introduction to biomedical engineering principles using foundational resources from molecular and cellular biology and physiology, and relating them to various subspecialties of biomedical engineering. The essential molecular biology, cellular biology, and human physiology background are included for students to understand the context in which biomedical engineers work. The course also highlights important advances made over recent years, including iPS cells, microRNA, Nano medicine, imaging technology, biosensors, and drug delivery systems, giving students a modern description of the various subfields of biomedical engineering. Further, this introductory course will provide concrete examples of applying engineering knowledge to solve problems related to human medicine as well as concrete examples of recent technological breakthroughs.

SEMESTER: 2
COURSE CODE: BMNG2210
COURSE TITLE: BIOMEDICAL INSTRUMENTATION I

NUMBER OF CREDITS: 3
Course Description: This course will expose the students to the basic principles of biomedical instrumentation and measurements employed in the health care industry. Emphasis will be placed on how the biological signals of human body can be acquired and used in a successful manner. This course is part 1 of a two-part course in biomedical instrumentation and will explore the operation and application of a range of medical equipment dealing with instrumentation techniques for measuring common physiological signals, including bioelectric and biochemical sensors bio-stimulation, electronic circuit design issues, digital signal acquisition, electrical safety, signal conditioning and protection against noise. The practical work required in the use, servicing and maintenance of these instruments/equipment will be explored in ECNG2005 Laboratory and Project III.

SEMESTER:
COURSE CODE: BMNG3110
COURSE TITLE: BIOMEDICAL INSTRUMENTATION II

NUMBER OF CREDITS: 3
Course Description: This course covers the advanced principles, concepts, and operations of medical sensors and devices. The origin and nature of measurable physiological signals are studied, including chemical, electrochemical, optical, and electromagnetic signals. The principles and devices used to make the measurements, including design of electronic instrumentation, will be rigorously presented. This course will cover emerging frontiers of general diagnostics, including Electrophysical methods like ECG, EEG, EMG, defibrillator and pacemaker; imaging techniques: X-rays, nuclear medicine, ultrasound, and magnetic resonance. Supporting instrumentation such as incubators, respirators, anaesthesia and dialysis machines. Surgical techniques with diathermy and laser.

SEMESTER:
COURSE CODE: BMNG3230
COURSE TITLE: CLINICAL ENGINEERING

NUMBER OF CREDITS: 3
Course Description: This course covers the critical issues relating to the risk management and implementation of new technologies in the healthcare sector. It represents a comprehensive summary of the advances in clinical engineering and presents guidance on compliance and safety for hospitals and engineering teams. Students will solve common problems in the area of healthcare technology. Topics include compliance with the European Directive on Medical Devices 93/42/EEC, European Norms EN 60601-1-6, EN 62366, and the American Standards ANSI/AAMI HE75: 2009. Content coverage includes decision support systems, clinical complex systems, and human factor engineering. Examples are fully supported with case studies, and global perspective is maintained throughout. The course emphasizes how to assess new
healthcare technologies and what are the most critical issues in their management, and provides information on how to carry out risk analysis for new technological systems or medical software. Various tactics on how to improve the quality and usability of medical devices will be explored.

**SEMESTER:**
**COURSE CODE:** BMNG3240
**COURSE TITLE:** REHABILITATION ENGINEERING AND DESIGN
**NUMBER OF CREDITS:** 3

**Course Description:** This course introduces the fundamentals and applications of rehabilitation engineering and assistive technologies (ATs). It is an introduction to a field of engineering dedicated to improving the lives of people with disabilities. A range of disabilities and assistive technologies will be investigated. The course will examine the three basic approaches of assistive technologies and rehabilitation engineering, namely: design for use by the broadest possible population, design for subpopulations, and design for the individual. The relationship between engineering innovation, the engineering design process, the human-technology interface, and the physical medicine and rehabilitation medical community will be explored. The course highlights the models for AT service delivery, the design tools and principles of universal design, and various technology-transfer mechanisms, models, and principles. It explains the process for creating assistive device standards, followed by a review of seating biomechanics and soft tissue biomechanics, followed by the design and service delivery principles of wheelchairs and scooters, functional electrical stimulation and its applications, wheelchair-accessible transportation legislation, and the applications of robotics in medical rehabilitation. Prosthetic and orthotic design and usage, visual and hearing impairment, and augmentative and alternative communication (AAC) technology are also discussed.

**SEMESTER:** 1
**COURSE CODE:** COMP1126
**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).

**SEMESTER:** 1
**COURSE CODE:** COMP1127
**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: 2  
COURSE CODE: COMP1161  
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.

SEMESTER: 1  
COURSE CODE: COMP2101  
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 Convergence 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.

SEMESTER: 2  
COURSE CODE: COMP2111  
COURSE TITLE: ANALYSIS OF ALGORITHMS  
NUMBER OF CREDITS: 3  
PREREQUISITES: COMP1125 and COMP1160  

SEMESTER: 2  
COURSE CODE: COMP2130  
COURSE TITLE: SYSTEMS PROGRAMMING  
NUMBER OF CREDITS: 3  
PREREQUISITES: COMP1126, COMP1127 and COMP1161  
Course Description: This course teaches students how to become more effective programmers especially in dealing with issues of debugging, performance, portability, and robustness. Students will also learn how to read simple assembly code generated by a compiler in order to understand layout of functions, data, function calls, parameters, and simple programming for optimization of assembly code. The course covers data representation, machine-level code, computer arithmetic, elements of code compilation, performance evaluation and optimization, memory organization and management, and systems calls. Possible labs and projects include writing simple device drivers and writing simple programs that interface with peripherals.

SEMESTER: 1  
COURSE CODE: COMP2140  
COURSE TITLE: SOFTWARE ENGINEERING  
NUMBER OF CREDITS: 3  
PREREQUISITES: COMP1125 and COMP1160  

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 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.

SEMESTER: 1  
COURSE CODE: COMP3101  
COURSE TITLE: OPERATING SYSTEMS  
NUMBER OF CREDITS: 3  
PREREQUISITES: COMP2340  
Course Description: This course introduces the fundamentals of operating system design and implementation. The major components of an operating system—process management and resource scheduling, concurrency control, memory management, device management, file management, security, and the interrelations between these components are presented. Consideration is given to how design decisions can affect system performance. This course
Mona School of Engineering

covers the core body of knowledge in operating systems and other key aspects that the IEEE/ACM Computing Curricula recommends for computing graduates, and the content and learning outcomes are informed by these guidelines. It also includes practical experience with an operating system at the system administration and system programming levels.

**SEMESTER: 1**

**COURSE CODE:** COMP3191  
**COURSE TITLE:** PRINCIPLES OF COMPUTER NETWORKING  
**NUMBER OF CREDITS:** 3  
**PREREQUISITES:** COMP2140 and COMP2340

**Course Description:** This course builds upon the introductory content that was presented in COMP2190 with an emphasis on computer networking, and covers the fundamental concepts underlying computer networks and the Internet. These concepts are examined from the viewpoints of the application, transport, network, and link and physical layers. This course also surveys the design trade-offs inherent in various communications protocols implemented at different networking layers.

**SEMESTER: 1**

**COURSE CODE:** COMP3801  
**COURSE TITLE:** REAL TIME EMBEDDED SYSTEMS  
**NUMBER OF CREDITS:** 3  
**PREREQUISITES:** COMP2190

**Course Description:** Overview of Embedded Systems; Models of computation used in designing Embedded Systems: State Machines, State Charts, UML Specification of Embedded Systems; Hardware/Software Co-design Concepts; Organization of Embedded Systems; Embedded Inputs/Outputs: Characterization and Methods; Embedded Volatile and Non-Volatile memory devices; Fundamentals of Real-time theory; Scheduling executions of tasks; Real-time Synchronization and Implementation Challenges; HW/SW Architectures for real-time services; CPU architectural effects on Real-time performances; Architecture of existing embedded real-time OS: uClinux, uCOS, VxWorks, RTEMS, Windows CE.net, and ecos. Embedded Internet; Case studies: Applications of Embedded Systems in robotics, medicine and telecommunications; Development of software tools for Embedded Systems; Fault-tolerant Embedded Systems.

**SEMESTER: 2**

**COURSE CODE:** COMP3900  
**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.

**SEMESTER: Summer**

**COURSE CODE:** COMP3911  
**COURSE TITLE:** INTERNSHIP IN COMPUTING I  
**NUMBER OF CREDITS:** 3  
**PREREQUISITES:** PERMISSION FROM THE HEAD OF DEPARTMENT

**Course Description:** This internship course will provide students an opportunity to develop a professional understanding of computing so that they are prepared for employment. During this course students will develop the ability to apply the concepts learned in the classroom in an actual working situation and discover the value of work and the rewards of accomplishment. The course also provides an opportunity for students to develop positive work habits, to test aptitude for or interest in a selected field and ensures a natural transition to the highest level of professional preparation as a complement to the education/training goals of the department.
SEMESTER: 1
COURSE CODE: CVNG1000
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.

SEMESTER: 2
COURSE CODE: CVNG1001
COURSE TITLE: MECHANICS OF FLUIDS I
NUMBER OF CREDITS: E3

SEMESTER: 2
COURSE CODE: CVNG1002
COURSE TITLE: CIVIL ENGINEERING DESIGN I
NUMBER OF CREDITS: C3
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)

SEMESTER: 1
COURSE CODE: CVNG1005
COURSE TITLE: SCIENCE OF MATERIALS
NUMBER OF CREDITS: E3
Course Description: Fundamental structure, properties and behaviour 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 ion; Hazardous materials, classification and handling.

SEMESTER: 2
COURSE CODE: CVNG1007
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.
SEMESTER: 2
COURSE CODE: CVNG1008
COURSE TITLE: BUILDING SERVICES ENGINEERING
NUMBER OF CREDITS: 4
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.

SEMESTER: 1
COURSE CODE: CVNG1009
COURSE TITLE: ENGINEERING GRAPHICS
NUMBER OF CREDITS: 3
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.

SEMESTER: 2
COURSE CODE: CVNG1010
COURSE TITLE: INFORMATION TECHNOLOGY FOR ENGINEERS
NUMBER OF CREDITS: 2
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.

SEMESTER: 2
COURSE CODE: CVNG1011
COURSE TITLE: GEOLOGY
NUMBER OF CREDITS: 3
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.

SEMESTER: 2
COURSE CODE: CVNG2001
COURSE TITLE: STRUCTURAL MECHANICS
NUMBER OF CREDITS: 3
PREREQUISITES: CVNG1000 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.

SEMESTER: YEAR-LONG
COURSE CODE: CVNG2003
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)

SEMESTER: 1
COURSE CODE: CVNG2005
COURSE TITLE: MECHANICS OF FLUIDS II
NUMBER OF CREDITS: E3
PREREQUISITE: CVNG1001 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, and sediment transport.

SEMESTER: YEAR-LONG
COURSE CODE: CVNG2006
COURSE TITLE: STRUCTURAL DESIGN I
NUMBER OF CREDITS: C4
PREREQUISITES: CVNG1000 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)

SEMESTER: 1
COURSE CODE: CVNG2008
COURSE TITLE: SOIL MECHANICS I
NUMBER OF CREDITS: E2
PREREQUISITE: CVNG1007 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.
SEMESTER: 2
COURSE CODE: CVNG2009
COURSE TITLE: SOIL MECHANICS II
NUMBER OF CREDITS: E2
PREREQUISITE: CVNG2008 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.

SEMESTER: 2
COURSE CODE: CVNG2010
COURSE TITLE: CIVIL ENGINEERING MANAGEMENT
NUMBER OF CREDITS: E3
PREREQUISITE: 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.

SEMESTER: 2
COURSE CODE: CVNG2011
COURSE TITLE: ENGINEERING HYDROLOGY
NUMBER OF CREDITS: E3
PREREQUISITE: CVNG2005 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.
impact assessment, soil conservation systems and mitigation of forest destruction.

SEMESTER: 2
COURSE CODE: CVNG3008
COURSE TITLE: ENVIRONMENTAL ENGINEERING II
NUMBER OF CREDITS: E3
PREREQUISITES: CVNG3005 and CVNG3007
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.

SEMESTER: 1
COURSE CODE: CVNG3009
COURSE TITLE: HIGHWAY ENGINEERING
NUMBER OF CREDITS: E3
PREREQUISITES: MATH2230, MATH2240, CVNG2003, CVNG2009
Course Description: Highway traffic characteristics, capacity of roadways and intersections, design of intersections, traffic management, parking studies; environmental impact, route location, economic analysis, introduction to transportation planning, pavement materials, pavement and drainage design; quality control and pavement maintenance management systems.

SEMESTER: 2
COURSE CODE: CVNG3010
COURSE TITLE: TRANSPORTATION ENGINEERING
NUMBER OF CREDITS: E3
PREREQUISITE: CVNG3009 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.

SEMESTER: 2
COURSE CODE: CVNG3011
COURSE TITLE: PAVEMENT DESIGN & MANAGEMENT
NUMBER OF CREDITS: E3
PREREQUISITE: CVNG3009 HWY ENG
Course Description: Roads and highways pavement design, airport runway design, seaports and special pavements, pavement management systems, road rehabilitation and maintenance.

SEMESTER: 2
COURSE CODE: CVNG3013
COURSE TITLE: COASTAL ENGINEERING
NUMBER OF CREDITS: E3
PREREQUISITE: CVNG2005 MECH 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.

SEMESTER: YEAR-LONG
COURSE CODE: CVNG3014
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.

SEMESTER: YEAR-LONG
COURSE CODE: CVNG3015
COURSE TITLE: SPECIAL INVESTIGATIVE PROJECT
NUMBER OF CREDITS: 6
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.

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 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.

SEMESTER: 2
COURSE CODE: ECNG1006
COURSE TITLE: LABORATORY & PROJECT DESIGN I
NUMBER OF CREDITS: 3
PREREQUISITES: NONE

Course Description: This course is the first in a series of three Laboratory and Project Design courses. It consists of laboratory exercises to develop models for, and demonstrate the behaviour of energy storage devices operating under various conditions. The properties of energy storage devices would be utilised in a design project which is of use to industry. Students would be exposed to the recommended approach and procedure required to execute a design from a design brief, utilising project planning, time management and safe operating procedures. This course also includes a group project which aims to build team skills.

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.

SEMESTER: 2
COURSE CODE: ECNG1012
COURSE TITLE: ENGINEERING SCIENCE AND TECHNOLOGY
NUMBER OF CREDITS: 4
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.

SEMESTER: 2
COURSE CODE: ECNG1015
COURSE TITLE: INTRODUCTION TO ELECTRICAL ENERGY SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: NONE
Course Description: This course presents an introduction to Electrical Energy Systems. It is divided into two sections, introduction to the electromechanical energy conversion process and the analysis of three-phase electrical systems. In the first section, electromagnetic systems are analyzed utilizing the law of conservation of energy to develop mathematical models to represent energy conversions from electrical to magnetic and magnetic to mechanical. These mathematical models are used to develop equivalent circuits to represent the electrical, magnetic and mechanical systems. In the second section on three-phase electromagnetic systems, the analysis of these systems are performed by utilizing their electric and magnetic equivalent circuits to produce the vector voltage and current phasors associated with the electromagnetic system. These vector voltage and current phasors are used to analyse the system and deduce and improve its performance.

SEMESTER: 1
COURSE CODE: ECNG2000
COURSE TITLE: ELECTROMECHANICAL ENERGY CONVERSION SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ECNG1000 and ECNG1015
Course Description: This course provides an introduction to the more common types of electrical machines for students, who, as engineers, will treat with electrical machines as a critical element of a system or subsystems. Electronic and mechanical drive systems, control systems and power systems depend on the functioning characteristics of electrical machines. This course will provide the depth necessary for students requiring a comprehensive understanding of the steady state behaviour of the basic electrical machines. The principles of operation, steady state analysis and application of four machines, in particular, will be discussed. These are transformers, three-phase induction motors, synchronous machines and DC machines.

SEMESTER: 1
COURSE CODE: ECNG2004
COURSE TITLE: LABORATORY & PROJECT DESIGN II
NUMBER OF CREDITS: 3
PREREQUISITES: NONE
Course Description: This course is the second in a series of Laboratory and Project Design courses. It consists of laboratory exercises to demonstrate the principles presented in ECNG1014 Digital Electronics and ECNG2012 Electronics and Instrumentation. The knowledge gained in these two courses, together with the principles demonstrated in the laboratory exercises would then be utilised in a project to design and fabricate an electronic system to meet quality, safety, and environmental
standards, and take industry performance parameter requirements and legal issues into consideration.

SEMESTER: 2
COURSE CODE: ECNG2005
COURSE TITLE: LABORATORY & PROJECT DESIGN III
NUMBER OF CREDITS: 3
PREREQUISITES: NONE
Course Description: This course is the last in a series of Laboratory and Project Design courses. It consists of laboratory exercises to demonstrate the principles presented in Communication Systems (ECNG 2001, Introduction to Microprocessors (ECNG 2006) and Control Systems (ECNG 2009). The knowledge gained in these courses, together with the principles demonstrated in the laboratory exercises would then be utilised in a project to design and fabricate a system to solve an industrial problem. The project must meet quality, safety, and environmental standards, and take industry performance parameter requirements and legal issues into consideration, while utilising project planning and time management techniques. This course also includes a group project, which builds team skills. This project aims to meet a socioeconomic need of a particular community.

SEMESTER: 2
COURSE CODE: ECNG2009
COURSE TITLE: CONTROL SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ELNG1101 and ENGR1180
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.

SEMESTER: 1
COURSE CODE: ECNG3013
COURSE TITLE: ELECTRICAL TRANSMISSION AND DISTRIBUTION SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ECNG3015
Course Description: This is a 3 credit mandatory course for the students who opt for the Energy Systems option. The current energy systems offering focuses on the generation of the electricity and the general health of the system. This course addresses the void existing in the engineering analysis and the application of technology to the transmission and distribution area. The course is divided into 33 lecture and 6 tutorial one hour sessions. There will also be three research papers/projects and a mid-semester exam.

SEMESTER: 2
COURSE CODE: ECNG3015
COURSE TITLE: INDUSTRIAL AND COMMERCIAL ELECTRICAL SYSTEMS
NUMBER OF CREDITS: 3
PREREQUISITES: ECNG2000
Course Description: This is a 3 credit compulsory course for all students in the Electrical and Computer Engineering Department. This course provides all the knowledge required to analyse an industrial power network from determination of the design ratings of equipment to the setting of protection relays. Human safety issues, in the handling of electrical equipment, are emphasised in all the topics covered. Topics delivered in the course are all linked as all topics depend on theory delivered in the previous topics. All topics are done by first delivering the required theory and then the application of the theory to a typical industrial design problem. This course is divided into 34 lecture and 5 tutorial sessions, each of one hour duration. Evaluation is done through 4 investigative laboratory experiments,
SEMMETER: 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: This is the capstone course of the entire BSc Engineering Programme. The course 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. The course 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.

SEMMETER: 1
COURSE CODE: ECNG3021
COURSE TITLE: INTRODUCTION TO ENGINEERING MANAGEMENT AND ACCOUNTING SYSTEMS
NUMBER OF CREDITS: 3
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.

SEMMETER: 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.

SEMMETER: 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.
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.

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 behaviour 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.

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.
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.

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 underlying 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.

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.
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.

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).

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.

**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 application.

**SEMESTER: 2**  
**COURSE CODE: ELET3450**  
**COURSE TITLE: SATELLITE COMMUNICATION & 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).

**SEMESTER: 1**  
**COURSE CODE: ELET3460**  
**COURSE TITLE: DIGITAL SIGNAL AND IMAGE PROCESSING**  
**NUMBER OF CREDITS: 3**  
**PREREQUISITES: ELET2460**  
**Course Description:** This course reviews the basics of DSP – building on the fundamentals taught in ELET2460 – before moving to more advanced concepts of signal processing. In the first part of the course the students will be taken through the processes required for digital filter design, starting with the basic methods and moving on to more sophisticated techniques. Digital imaging processing will be covered in the second module. The tools and techniques employed in basic image processing (compression and de-noising) will be addressed; this will provide the student with the capacity to grasp the more complex concepts and techniques employed in modern image processing applications. Given that DSP is essentially about the manipulation of real-world signals, the tools, techniques and approaches to problem-solving taught in this course can be applied in disparate fields, from telecommunications to medical imaging, video and audio processing for law enforcement, to investment banking.

**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 behaviour 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.

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.

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.

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.

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.

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.

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.

SEMESTER: 1
COURSE CODE: ENGR0110
COURSE TITLE: PRE-ENGINEERING PHYSICS I
NUMBER OF CREDITS: 3
Course Description: This course is a pre-calculus-based physics course primarily intended for engineering students. It covers fundamental topics in mechanics, oscillations and heat, with emphasis on the study of forces, motion and the properties of matter and heat. This is the first of two introductory physics courses that revises and expands on selected areas of the high school physics and prepares the engineering student for more advanced topics in physics and engineering. Selected assignments and laboratory exercises are included and are designed to reinforce and expand the student understanding of the fundamental concepts and their application to solving engineering problems.

SEMESTER: 1
COURSE CODE: ENGR0120
COURSE TITLE: PRE-ENGINEERING MATHEMATICS I
NUMBER OF CREDITS: 4
Course Description: A practical introduction to the core mathematics required for engineering study and practice. Students will be led through basic geometry, algebra and pre-calculus to an introduction to calculus, and will cover topics in
algebra ranging from polynomial, rational, and exponential functions to conic sections. Trigonometry concepts such as Law of Sines and Cosines will be introduced. An introduction to probability and statistics is also be included. The mathematical theories will be explained in a straightforward manner, being supported by practical engineering examples and applications.

SEMESTER: 1
COURSE CODE: ENGR0130
COURSE TITLE: CHEMISTRY FOR ENGINEERS
NUMBER OF CREDITS: 3
Course Description: This course provides an introduction to chemistry that prepares students for further study in any engineering field. It offers a balance of conciseness, rigor, and depth needed to prepare students for more advanced coursework and careers in various engineering specialties, such as civil, environmental, electrical, computer, mechanical, and biomedical engineering. It elucidates the key concepts and skills important for entering engineering students, including problem solving, qualitative and quantitative thinking, and importance of units. It emphasizes the connection between molecular properties and observable physical properties and the connections between chemistry and other subjects studied by engineering students, such as mathematics and physics. Examples are drawn from problems of interest to modern engineers, including alternative energy, advanced materials, and the environment. Selected assignments and laboratory exercises are included and are designed to reinforce and expand the student understanding of the fundamental concepts and their application to solving engineering problems.

SEMESTER: 2
COURSE CODE: ENGR0210
COURSE TITLE: PRE-ENGINEERING PHYSICS II
NUMBER OF CREDITS: 3
Course Description: This course continues from the introduction of fundamental physics concepts in ENGR0110 to explore topics in electricity and magnetism, nuclear physics and optics. The fundamental theories of electromagnetism are used to describe the operation of electrical circuit components and measurements, and encompass the description and application of Coulomb’s law, Faraday’s law, Ohm’s law, Kirchhoff’s laws, Lenz’s law to the electric and magnetic fields. The concept of light as an electromagnetic wave and its various manipulations are also studied. The course closes of with a basic introduction of nuclear model of the atom and the phenomenon of radioactivity. Selected assignments and laboratory exercises are included and are designed to reinforce and expand the student understanding of the fundamental concepts and their application to solving engineering problems.

SEMESTER: 2
COURSE CODE: ENGR0220
COURSE TITLE: PRE-ENGINEERING MATHEMATICS II
NUMBER OF CREDITS: 4
Course Description: This course will introduce students to the topics of differential and integral calculus. Emphasis is placed on concepts of limits and continuity, differentiation and integration and their applications to solving problems. Concepts in probability and statistics will be explored. The theoretical concepts will be supported by practical engineering examples and applications.

SEMESTER: 1
COURSE CODE: ENGR0230
COURSE TITLE: BIOLOGY FOR ENGINEERS
NUMBER OF CREDITS: 3
Course Description: This is an introductory course of biology for a student in the engineering discipline to develop their
Selected assignments and laboratory exercises are included and are designed to reinforce and expand the student understanding of the fundamental concepts and their application to solving engineering problems.

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.

SEMESTER: 2  
COURSE CODE:  EPN2010  
COURSE TITLE:  NUCLEAR PHYSICS AND REACTOR THEORY  
NUMBER OF CREDITS: 3  
PREREQUISITE:  ELNG1101  
Course Description: This course introduces the basic concepts of atomic and nuclear physics, subatomic particles and the mechanisms involved in nuclear reactions. It establishes basic radiation safety principles and highlights the effects of radiation on the human body as well as introduces students to fundamental principles of nuclear reactor theory and operation.

SEMESTER: 2  
COURSE CODE:  EPN2020  
COURSE TITLE:  RENEWABLE ENERGY SYSTEMS  
NUMBER OF CREDITS: 3  
PREREQUISITES:  ECNG1000 and ELNG1101  
Course Description: This course covers all the technologies available to produce electrical energy from renewable sources, including solar, wind, hydro, geothermal and biomass. The physics governing the operation of these devices will presented combined with the engineering application of monitoring, controlling and connecting to the electrical grid. Students will do engineering calculations of power and energy availability of renewable energy sources and learn about requirements for integrating renewable energy sources into production, distribution and end-use systems.

SEMESTER: 1  
COURSE CODE:  GEOM2015  
COURSE TITLE:  GEOMATICS FOR CIVIL AND ENVIRONMENTAL ENGINEERS  
NUMBER OF CREDITS: 3  
PREREQUISITE:  NONE  
Course Description: Principles and field practice of Geomatics as applied to tasks in Civil and Environmental Engineering. Introduction to Geomatics; Measurement Basics. Leveling Techniques. Procedures and Applications. Distance and Angle Measurements. Adjustment of measurements. Traversing and Control Surveying; Volumetric Applications; Earthwork Applications; Profiles and Cross Sections; Construction Applications; Transportation Applications. Global navigation satellite systems (GNSS).

SEMESTER: 2  
COURSE CODE:  GEOM 2017  
COURSE TITLE:  GEOMATICS 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.

SEMESTER: 2  
COURSE CODE:  INFO2180  
COURSE TITLE:  DYNAMIC WEB DEVELOPMENT I  
NUMBER OF CREDITS: 3  
PREREQUISITES:  COMP1126, COMP1127 and COMP1161  
Course Description: This course covers the foundations of the technologies that enable the creation of interactive websites that process and modify server-based data. This includes fundamental networking technologies, data representation for the web, web UI design and site design, client-server architecture and client-side and server-side programming. It covers the fundamentals of ecommerce, web security, ethical and social issues, and relevant software engineering concepts such as the three-tier architecture and frameworks for the web. It also provides an introduction to mobile web issues and web multimedia.

SEMESTER: 2  
COURSE CODE:  INFO3155  
COURSE TITLE:  INFORMATION ASSURANCE AND SECURITY  
NUMBER OF CREDITS: 3  
PREREQUISITES:  COMP2190 and (COMP2201 or INFO2100)  
Course Description: Building upon the concepts introduced in Net-Centric Computing, this course explores the security issues that every IT professional must be aware of. The course will inform the student on the various attack surfaces and defensive approaches that must be considered during all phases of life of an organisation’s information technology assets. The course will also provide an opportunity for students to gain hands-on experience with the tools needed to protect an organisation from
the various forms of attack it can be subjected to.

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.

SEMESTER: 1  
COURSE CODE: MATH2230  
COURSE TITLE: ENGINEERING MATHEMATICS II  
NUMBER OF CREDITS: 3  
PREREQUISITE: ENGR1180  
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.