## 100 Level
### 1st Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 101</td>
<td>Engineering Pure Maths</td>
<td>3</td>
</tr>
<tr>
<td>GEG 103</td>
<td>Engineering Applied Maths I</td>
<td>3</td>
</tr>
<tr>
<td>FSC 105</td>
<td>Introductory Physics I</td>
<td>3</td>
</tr>
<tr>
<td>FSC 102</td>
<td>Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>MEG 101</td>
<td>Workshop Practice</td>
<td>1</td>
</tr>
<tr>
<td>MEG 103</td>
<td>Technical Drawing I</td>
<td>2</td>
</tr>
<tr>
<td>GST 105</td>
<td>Use of English I</td>
<td>2</td>
</tr>
<tr>
<td>GST 103</td>
<td>Nigerian people and Culture</td>
<td>2</td>
</tr>
<tr>
<td>GST 102</td>
<td>Philosophy and Logic</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>
### 2nd Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 102</td>
<td>Engineering Pure Maths II</td>
<td>3</td>
<td>GEG 101</td>
</tr>
<tr>
<td>GEG 104</td>
<td>Engineering Applied Maths II</td>
<td>3</td>
<td>GEG 103</td>
</tr>
<tr>
<td>MEG 102</td>
<td>Workshop Practice</td>
<td>1</td>
<td>MEG 101</td>
</tr>
<tr>
<td>MEG 104</td>
<td>Technical Drawing II</td>
<td>2</td>
<td>MEG 103</td>
</tr>
<tr>
<td>PHS 102</td>
<td>Introductory Physics II</td>
<td>2</td>
<td>FSC 105</td>
</tr>
<tr>
<td>PHS 101</td>
<td>Introduction Physics III</td>
<td>3</td>
<td>FSC 105</td>
</tr>
<tr>
<td>PHS 103</td>
<td>Physics Lab</td>
<td>2</td>
<td>FSC 105</td>
</tr>
<tr>
<td>GST 106</td>
<td>Use of English</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>GST 104</td>
<td>Philosophy</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>20</strong></td>
<td></td>
</tr>
</tbody>
</table>

### 200 Level

### 1st Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 201</td>
<td>Fundamental of Electrical Engineering I</td>
<td>2</td>
<td>FSC 105, GEG 101, GEG 103, PHS 101, PHS 102.</td>
</tr>
<tr>
<td>EEG 207</td>
<td>Electrical System Graphic</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>GEG 201</td>
<td>Engineering Mathematics</td>
<td>3</td>
<td>GEG 102, GEG 104</td>
</tr>
<tr>
<td>GST 201</td>
<td>General African Studies</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MEG 201</td>
<td>Thermodynamics</td>
<td>2</td>
<td>PHS 101, GEG 104</td>
</tr>
<tr>
<td>MEG 205</td>
<td>Engineering Mechanics I (Statics)</td>
<td>2</td>
<td>GEG 102, GEG 104</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>18</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Laboratory Courses

### 2nd Semester
### Course Code | Course Title                                      | Units | Prerequisite
--- | ------------------------------------------------- | ----- | ---
CEG 202 | Mechanics of Materials I                         | 4     | PHS 102
EEG 202 | Fundamental of Electrical Engineering I          | 2     | EEG 201
EEG 204 | Introduction to Switching and Logic Systems     | 2     | EEG 203
EEG 206 | Computer Programming I                           | 2     | GEG 201
EEG 208 | Physical Electronics                             | 2     | EEG 205
EEG 210 | Fundamental of Electrical Engineering Lab II     | 1     | EEG 201, EEG 209
GEG 202 | Introductory Engineering Statistics              | 3     | GEG 101, GEG 104
GST 202 | General African Studies II                       | 2     |       
MEG 202 | Introductory Engineering Lab II                  | 1     | EEG 201
MEG 208 | Mechanical Engineering Lab II                    | 3     | EEG 205
**Total** |                                                   | **24** |   

For year 2: Pre-requisites is a pass in all year 1 Physics and Mathematics courses

### 300 Level

#### 1st Semester

| Course Code | Course Title                                      | Units | Prerequisite
--- | ------------------------------------------------- | ----- | ---
CEG 311 | Civil Engineering Technology                      | 3     | CEG 202
EEG 301 | Circuits and System I                             | 2     | EEG 202, EEG 204
EEG 305 | Electronic Circuit I                              | 2     | EEG 202, EEG 204
EEG 307 | Instrumentation and measurement I                 | 2     | EEG 202, EEG 204
EEG 309 | Energy Conversion                                 | 2     | EEG 202
EEG 311 | Computer Programming II                           | 2     | EEG 206
*EEG 313 | Energy Conversion Laboratory                      | 1     | EEG 202, EEG 210
*EEG 315 | Electronic Circuits Laboratory I                  | 1     | EEG 202, EEG 204, EEG 210
#EEG 320 | Electrical Engineering Technology                 | 3     | EEG 202
GEG 301 | Engineering Mathematics II                        | 2     | GEG 201
GST 307 | Entrepreneurship and Good Governance I            | 2     |       
**Total** |                                                   | **19** |   

#### 2nd Semester

| Course Code | Course Title                                      | Units | Prerequisite
--- | ------------------------------------------------- | ----- | ---
EEG 302 | Circuit and Systems II                            | 2     | EEG 301
EEG 304 | Transmission Lines and Filters                    | 2     | EEG 301
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 306</td>
<td>Electronic Circuits II</td>
<td>2</td>
<td>EEG 305</td>
</tr>
<tr>
<td>EEG 308</td>
<td>Power Electronics</td>
<td>2</td>
<td>EEG 305</td>
</tr>
<tr>
<td>EEG 310</td>
<td>Electrical Drives</td>
<td>2</td>
<td>EEG 308</td>
</tr>
<tr>
<td>EEG 312</td>
<td>Instrumentation and Measurement II</td>
<td>2</td>
<td>EEG 307</td>
</tr>
<tr>
<td>EEG 314</td>
<td>Logic Design of Digital Systems</td>
<td>2</td>
<td>EEG 204</td>
</tr>
<tr>
<td>*EEG 316</td>
<td>Electronic Circuits Laboratory II</td>
<td>1</td>
<td>EEG 305, EEG 315</td>
</tr>
<tr>
<td>#EEG 320</td>
<td>Electrical Engineering Technology</td>
<td>3</td>
<td>EEG 202</td>
</tr>
<tr>
<td>EEG 419</td>
<td>Electrical Drives Laboratory</td>
<td>1</td>
<td>EEG 308, EEG 318</td>
</tr>
<tr>
<td>MEG 311</td>
<td>Mechanical Engineering Technology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GEG 302</td>
<td>Operational Method</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>GST 307</td>
<td>Entrepreneurship and Good Governance II</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>23</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Laboratory Courses

# Required course for Mechanical & Civil Engineering Students.

### 400 Level

#### 1st Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 401</td>
<td>Microprocessor and Microcomputer</td>
<td>2</td>
<td>EEG 312</td>
</tr>
<tr>
<td>EEG 403</td>
<td>Communication Systems</td>
<td>2</td>
<td>EEG 306, 302</td>
</tr>
<tr>
<td>EEG 405</td>
<td>Classical Control Systems</td>
<td>2</td>
<td>EEG 302</td>
</tr>
<tr>
<td>EEG 407</td>
<td>Active Networks</td>
<td>2</td>
<td>EEG 302, EEG 306</td>
</tr>
<tr>
<td>EEG 409</td>
<td>Power Transmission and Distribution</td>
<td>2</td>
<td>EEG 302</td>
</tr>
<tr>
<td>EEG 411</td>
<td>Electrical Machine Theory</td>
<td>2</td>
<td>EEG 310</td>
</tr>
<tr>
<td>EEG 415</td>
<td>Electromagnetic Waves Theory (EMWT) I</td>
<td>2</td>
<td>GEG 301</td>
</tr>
<tr>
<td>*EEG 417</td>
<td>Communications Laboratory</td>
<td>1</td>
<td>EEG 306, EEG 316</td>
</tr>
<tr>
<td>*EEG 421</td>
<td>Control Systems Laboratory</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>*EEG 423</td>
<td>Microprocessor Laboratory</td>
<td>1</td>
<td>EEG 312, EEG 316</td>
</tr>
<tr>
<td>*EEG 431</td>
<td>Electrical Machines Theory Laboratory</td>
<td>1</td>
<td>EEG 202, EEG 210</td>
</tr>
<tr>
<td>GEG 401</td>
<td>Technical Communication</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GEG 402</td>
<td>Numerical Methods</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### 2nd Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 400</td>
<td>Industrial Training</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

### 500 Level

#### 1st Semester
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 501</td>
<td>Power System Analysis</td>
<td>2</td>
<td>EEG 409</td>
</tr>
<tr>
<td>EEG 503</td>
<td>Modern Communication Systems</td>
<td>2</td>
<td>EEG 403</td>
</tr>
<tr>
<td>EEG 505</td>
<td>Synthesis and Design of Control Systems</td>
<td>2</td>
<td>EEG 405</td>
</tr>
<tr>
<td>EEG 507</td>
<td>High Power Engineering</td>
<td>2</td>
<td>EEG 409</td>
</tr>
<tr>
<td>EEG 509</td>
<td>EWMT II</td>
<td>2</td>
<td>EEG 415</td>
</tr>
<tr>
<td>EEG 513</td>
<td>Project I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GEG 501</td>
<td>Engineering Economics</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Plus Minimum of 2 Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 511</td>
<td>Power Systems Economics</td>
<td>2</td>
<td>EEG 409</td>
</tr>
<tr>
<td>EEG 515</td>
<td>Introduction to VLSI Design</td>
<td>2</td>
<td>EEG 401</td>
</tr>
<tr>
<td>EEG 517</td>
<td>Microcomputer Graphics</td>
<td>2</td>
<td>EEG 401</td>
</tr>
<tr>
<td>EEG 519</td>
<td>Power Systems Design, Planning and Equipment.</td>
<td>1</td>
<td>EEG 409</td>
</tr>
<tr>
<td>EEG 525</td>
<td>Telephony and facsimile Systems</td>
<td>2</td>
<td>EEG 403</td>
</tr>
<tr>
<td>CPE 505</td>
<td>Information Theory and Coding</td>
<td>2</td>
<td>EEG 312, 405</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td></td>
</tr>
</tbody>
</table>

**2nd Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 504</td>
<td>Power Systems Protection</td>
<td>2</td>
<td>EEG 501</td>
</tr>
<tr>
<td>EEG 510</td>
<td>Energy Management and Power Quality Assessment</td>
<td>2</td>
<td>EEG 501</td>
</tr>
<tr>
<td>EEG 512</td>
<td>Digital Signal Processing</td>
<td>2</td>
<td>EEG 505</td>
</tr>
<tr>
<td>EEG 514</td>
<td>Project II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EEG 518</td>
<td>Microwave Engineering</td>
<td>2</td>
<td>EEG 509</td>
</tr>
<tr>
<td>GEG 502</td>
<td>Law and Management</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Plus Minimum of 2 Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 502</td>
<td>Digital Computer Design</td>
<td>2</td>
<td>EEG 401</td>
</tr>
<tr>
<td>EEG 506</td>
<td>Electrical Machine Design</td>
<td>2</td>
<td>EEG 411</td>
</tr>
<tr>
<td>EEG 508</td>
<td>High Power Engineering II</td>
<td>2</td>
<td>EEG 507</td>
</tr>
<tr>
<td>EEG 516</td>
<td>Antennas and Propagation</td>
<td>2</td>
<td>EEG 509</td>
</tr>
<tr>
<td>EEG 520</td>
<td>Digital Control Systems</td>
<td>2</td>
<td>EEG 405</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td></td>
</tr>
</tbody>
</table>
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING COURSE DESCRIPTION

EEG 201* - FUNDAMENTALS OF ELECTRICAL ENGINEERING I
Methods of analysis suitable for the problems in Network Theory in terms of currents, voltages, energy/voltage amperes, Loop and Nodal analysis.
Electrochemical power sources.

EEG 202 – FUNDAMENTALS OF ELECTRICAL ENGINEERING II
Emf. Generation, Single phase; rms, mean, form factor, peak factor, phasor and phasor diagram.
Series and parallel resonance circuit. Resonance, Q-factor, impedance and power P, S, and Q3 phaser, delta and star conversion line and phase voltages.
Complex Notation and its Application to RLC circuits. Resonance, Q-factor, impedance and power P,S, and Q.3 phaser, delta and star conversion line and phase voltage.
Complex Notation and its Application to RLC circuits, Resonance, a-factor, impedance and admittance power, P,S,G. Introduction to D.C. Machines, A.C. Machines and Transformers.

EEG 203 – SIGNALS AND SYSTEMS (SIGNAL THEORY)
Continuous and discrete signals, transformations and inverse transformations, spectral analysis of steps, ramps and impulse, signal descriptions by impulse and step functions.
The independent variable; Definitions of rise-time, settling time, overshoot, period magnitude and duration of a signal.
Fourier Analysis, Perseval Theorem
Periodic and Non-Periodic signals.
Devices and Models
Network analysis and circuit with independent and dependent sources.
Time invariant and stationary systems.

EEG 204 – INTRODUCTION TO SWITCHING AND LOGIC SYSTEMS
Number systems conversion between bases, Arithmetic with bases other than ten, 1 and 2s complement, BCD, weighted and unweighted codes; Gray codes.
Truth Function and Truth False
Boolean Algebra and De-Morgan theorem. Truth function set or Venn diagram and truth tables.
Minimization of Boolean function; using Boolean Algebra and Karnaught Map (K-Map).
Switching Devices: Switches Relays, logic circuits. Realization of simple combinatorial circuit, binary single bit address, simple code conversion, bit comparators. Introduction to multivibrator circuits; Astable, Monostable and bistable.

EEG 205 – PHYSICAL ELECTRONICS
Electrons and hole, carrier motion in semiconductors. Principles of Semiconductor devices.
Introduction to Microwave semiconductor devices, LED, LCD, and other optical devices.
Introduction to lasers and masers. Introduction to microelectronics and IC Technology.

EEG 207 – ELECTRICAL SYSTEM GRAPHIC

EEG 210 – ELECTRICAL ENGINEERING MATERIALS

EEG 301 – CIRCUITS AND SYSTEM I

EEG 302 – CIRCUIT AND SYSTEMS II PRE-REQUISITES EEG 201 AND 203

EEG 303 – POWER ELECTRONICS

EEG 306 – ELECTRONICS CIRCUITS II

EEG 307 – ENERGY CONVERSION
Electromechanical Energy Conversion: Single and double coil devices, concentrate3d and distributed windings, mmf patterns in air-gap torque and induced voltage analysis, constructional features of synchronous; induction and D.C. machines. Direct Energy Conversion: The solar cell, thermo-electric energy conversion, the fuel cell MHD energy conversion. Power transformers. Phasor diagrams and equivalent circuits, regulations and efficiency calculations and measurements, three-phase transformers parallel operation of transformers.
Other types of transformers: auto transformers and instrument transformers. Per unit system of
calculation. Transformer Design.

Small A.C. Motors.
The single phase or induction motor-principle. The split-phase induction motor, Capacitor start
induction motor, the shaded-pole motor. The single-phase series motor.

EEG 309 – MEASUREMENT AND INSTRUMENTATION I
Use of CRO in electronic/electrical measurements. Digital methods for measurement of physical
qualities. Transducers Analog electronic instruments for voltage, power wave-form, frequency and
phase measurements. Digital instrumentation. Theory of errors. Absolute and relative treatment of
errors. Moving iron, moving coil, thermals electrostatic and induction type instruments.

EEG 310 – ELECTRICAL DRIVE
Drive Components and Principles:
Armature volts and Ward Leonard speed control schemes. Torque and speed control. The thyristor-
models, characteristics, turn on and turn off requirements. Natural and forced communication.
Introduction of Ac/DC, AC/AC and DC/DC conversion.

Industrial Drives:
Choice of an electric motor for industrial drive. Specification of control system, duty performance,
criteria, motor dynamic. Control characteristics of the shunt motor, two-phase servo motor, stepped
motor, stepper motor, matching motor and gearless system, motor enclosure, motor rating. Block
diagram and models of electric Drives.

Power Control Devices:
Operational amplifiers and thyristors, A.C. & D.C. Generator transfer functions, power gain/time-
constant, analogue and digital transducers for speed and position management. Block Diagram of
Industrial drives.

EEG 312 – INSTRUMENTATION II
Transducer, digital instruments, curve tracers, recorders, measurement of temperature, displacement
magnetic ratio and multiple ratio measurements. Data conversion and interfacing. Data loggin
switches and displays. Data Acquisition Systems, software Data Conversion. Multiplexing Spatrac
Encoders, Errors.

EEG 314 – PULSE AND DIGITAL ELECTRONICS
Review of Boolean Algebra and Logic Circuit
Review of number systems and Logic codes
Minimisation of Boolean functions, Map and Tabular Methods
Combinational Logic systems, elements, Adders, Code Converters Encoders and Decodes,
Multiplexers, demultiplexers PLAS, Error Detecting and Correcting codes. Parity checkers.
Sequential Logic systems elements, flips – flops and their transition clock mode and pulse mode
circuits. Designs of Synchronous sequential logic system.

Counters, Registers, Sequence Generators.
Logical Design using MSI, LSI and VLSI part.
Memories and their realization.

ROMS – PROM, EPROM, EEPROM
RAMS – SRAM, DRAM
Magnetic Memories – HD, FD CD, Tapes etc.
Bipolar and MOS Technologies
TTL, ECL, COSMOS, P-MOS, N-MOS Totem Pole, Tri-state and open collector Logic elements
Properties:- Fan-out, fan-in, Noise margin, propagation, delay and switching speed.
MSI, LSI, ULSI technologies
Interfaces and converters
Serial-Parallel converters
Analogue – digital and digital-Analogue converters sample and Hold, successive approx.
R-2R ladder networks etc.
TTL – MOS – Interfaces

Pre-requisite : EEG 305

EEG 401 – MICROPROCESSORS AND MICROCOMPUTERS
History of digital computers and microcomputers, Microprocessor preliminaries, Microprocessor in
system design. Basic digital building block – Register, Counter, Clocks etc. Microprocessor
hardware, Algorithms and their suitability for microprocessor implementation, Microprocessor
software, Microprocessor applications.

EEG 403 – COMMUNICATIONS SYSTEMS
Spectral Analysis, Auto-correlation, Weiner-Khinchines theorem, Amplitude Modulation,
Modulators and Demodulators. Angle, Phase and Frequency Modulation. The sampling theorem,
Pulse Modulation, PAM, PWM, PPM. Propagation of Radio Waves, Multipath transmission.
Introduction to Noise Remote Control and supervisory systems.

EEG 405 – CLASSICAL CONTROL SYSTEMS ANALYSIS
Modeling of physical systems, Dynamic equation of mechanical, electrical, thermal and fluid flow
systems. Transfer functions of mechanical, electrical and electromechanical control components.
Block diagrams Signals flow graphs. Characteristic equations, s-plane roots, and stability.
Performance criteria. Roots locus, polar and Bode plots. M- and N- diagrams. Inverse Nyquist
plots. State space description of control systems, analogue computer simulation of control systems.

EEG 407 – INTRODUCTION TO COMPUTERS
Principle of analogue computing. Linear computer units – summer. Integrators/Differentiators,
Non-linear operators, operational amplifiers. Solution to some differential equations. Block
diagram of a simple one-address machine. Function of the store, arithmetic and control unit.
Computer architecture. On-line operation and data high-ways. Computer programming, assembly
language, systems software.

EEG 409 – POWER TRANSMISSION AND DISTRIBUTION
Electrical parameters. Long line equations, analytical and graphical methods of solution for short
and long lines. Performance charts. Application of Matrix Methods. Circle diagrams and power
limits of uniform long lines. Reactive Power Compensation. Insulators and voltage distribution.
Conductor materials and configurations. Sag and Tension Calculations.

EEG 411 – ELECTRICAL MACHINES THEORY
Three-phase synchronous machines, generation of three-phase power. Equivalent circuit Linear and
non-linear machine analysis. Parallel operation. Operating Charts of synchronous motor starting
and performance. V. Curves, power factor control. Three phase diagram. Torque/speed
characteristics, speed control. Starting Induction regulators. Fractional-horsepower motors.
EEG 415 – ELECTROMAGNETIC WAVES THEORY

GEG 501 – ENGINEERING ECONOMICS
Project development and financial analysis
Market analysis and demand estimation
Investigation and technical aspect of project development and financial analysis
Criteria for Project Choice
Project Financing
Determination of Economic and Social profitability
GEG 502 - ENGINEERING MANAGEMENT
PART 1 - CONTRACT. (LAW)

Definition of a Contract
Classification of a contract
Ingredient of a valid contract
Elements of a Contract
Consideration
Intention to create legal relation
Capacity of a contract
Consent of a party
Concept of brevity of a contract and its exceptions.
Mistakes of a Contract
Duress in a contract
Undue influence in a contract
Misrepresentation a contract
Illegality in a contract
Discharge of a Contract
How does a contract come to an end
Remedies for breach of a contract

PART 2 - MANAGEMENT
Introduction to Management
Decision Analysis
How to model a decision situation
Quantitative techniques for situations of uncertainty.
Decision tree
Project Management
Project evaluation and review techniques
Concept of Motivation
Theories of motivation
Hertzberg 2 factor theory
Transportation Management Model.

EEG 501 – POWER SYSTEMS ANALYSIS

EEG 502 – DIGITAL COMPUTER DESIGN
Hardware design of digital computers. Arithmetic and logic unit, adder, multipliers, dividers, logic and sifting operations. Floating point arithmetic. Memory organization, design of a basic computer. Instruction set, structure. Fetch-execute micro-operations, hardwired control unit, microprogrammed control unit. Index registered addressing, interrupt operation, direct memory access. Organisation of commercially available computers.

EEG 503 – COMMUNICATION SYSTEMS

EEG 504 – POWER SYSTEMS PROTECTION
The concept of protective relaying in power systems. Distance relaying. Differential relaying protective systems in generators, motors, busbars and transformers. Basic principles of relay design, construction, characteristics, applications and testing. Prerequisites: EEG 409.

EEG 505 – SYNTHESIS AND DESIGN OF CONTROL SYSTEMS

EEG 506 - ELECTRICAL MACHINE DESIGN
Principles of electrical machines and design. The output equation, the calculation of machine parameters, saturation problems in machine design. Specific electric and magnetic loading related to cooling of machines. Specific design problems and computer-aided design of electrical machines. Definition and classification of windings: Coil construction and insulation, physical problems connected with single and double layer-winding; voltage analysis of 3-winding symmetrization.

EEG 507 – HIGH POWER ENGINEERING I
Generation and measurement of high currents. Thermal losses due to high currents. High impulse currents. Technical losses in power networks due to high currents. Compatibility issues. Prerequisite: EEG 307

EEG 510 – ENERGY MANAGEMENT AND POWER QUALITY ASSESSMENT

EEG 511 – POWER SYSTEMS ECONOMICS AND OPERATION

EEG 512 – DIGITAL CONTROL SYSTEM AND DIGITAL SIGNAL PROCESSING
formulation and solution of the state equations. Introduction to microcontroller and microprocessor based control systems implementation.


Examples: Implementing DFT, DFT to FFT. The Goertzel Algorithm: Implementation of the FFT on the 68 HC 16 Code. Prerequisites: EEG 505.

**EEG 515 – INTRODUCTION TO VLSI SYSTEMS DESIGN**

What is VLSI Technology? MOS transistor Theory., Inverter Circuits. Data and Control flow. MOS processing and design rules. Integration and system fabrication. Logic Design with MOS. Architecture and Design of System Fabrication. Logic with MOS, architecture and design of systems controllers, system timing. Highly concurrent systems and their suitability for VLSI implementation, signal processing using MUS VLSI technology, systems, computational aspects of VLSI. Prerequisites: EEG 306.

**EEG 516 – ANTENNAS AND PROPAGATION**


**EEG 517 – MICROCOMPUTER GRAPHICS**


**EEG 518 – MICROWAVE OPTICS**


**EEG 519 – POWER SYSTEMS DESIGN, PLANNING AND EQUIPMENT**


**EEG 520 – HIGH POWER ENGINEERING II**

EEG 525 – TELEPHONE AND FACSIMILE SYSTEMS

POSTGRADUATE DEGREE PROGRAMME
DEPARTMENT OF ELECTRICAL ELECTRONICS
UNIVERSITY OF LAGOS

1. INTRODUCTION
The postgraduate programmes of the Department of Electric-al Engineering are directed towards providing basic and applied research opportunities relevant to the processing of electrical energy and information. Consequently, the department's higher degree programmes have the twin objectives of offering postgraduate courses and basic research in specialized areas of Electrical and Electronic Engineering and secondly, updating, as the need arises, the knowledge of practicing engineers and applied scientists in specialised fields of Electrical and Electronic Engineering, through industry oriented and application-specific research programmes.

2. AREAS OF SPECIALIZATION
Programmes shall be offered for courses and research in the following areas of specialization:
(i) Electrical Machines, Power Engineering and High-Voltage Techniques
(ii) Electrical and Control Engineering
(iii) Electrical and Communication Engineering

3. FACILITIES AVAILABLE FOR RESEARCH
Research may be carried out in any of the areas listed under paragraph 2. There are reasonably well-equipped Electrical Machines Laboratory, High-Voltage Laboratory (capable of test voltage up to 1 million volts) Control Laboratory, Electronics Laboratory and Communication Laboratory. The Computer Centre of the University possesses several PC's for use of staff and students, and there are plans for the centre to purchase in addition to an advanced mini-computer purely for scientific research purpose. In addition to the facilities available in the Faculty's NIGERDOCK COMPUTER CENTRE, some PC's are available in the department for the use of students and lecturers.

4. ADMISSION REQUIREMENTS
All the prevailing university regulations governing postgraduate degree shall apply.

MASTER OF SCIENCE (M.Sc.) IN ELECTRICAL ENGINEERING
Introduction:
This programme is to last for 12 calendar months for full-time students. It consists of eight courses, one of which shall be a research project. The units for each course are as laid down below. The research project shall be four units. Apart from the research project which shall last throughout the calendar year a number of courses shall be available during the first semester while the rest shall be available in the second semester.

Admission requirements.
(i) The programme shall be open to candidates with a Bachelor's degree or equivalent in Electrical or Electronic Engineering of the University of Lagos or any other approved University.

(ii) Candidates may be required to satisfy the department in a selection process involving written examinations.

**Degree Requirements**

To obtain an M.Sc. in Electrical Engineering, candidate must:

(iii) Satisfy the examiners in a minimum of 24 units, made up as follows:

(a) 10 units of the compulsory courses

(b) 10 units from the optional courses

(c) 4 units of the "Research Project" course

(iv) Satisfy all other requirements as stipulated in the Regulations of the School of Postgraduate Studies.

B. MASTER OF PHILOSOPHY (M.PHIIL) AND DOCTOR OF PHILOSOPHY (PH.D.) IN ELECTRICAL ENGINEERING

**Introduction:**

These programme are designed for candidates wishing to do original postgraduate research in Electrical Engineering. Candidates are expected to take and pass a 1st year coursework of a minimum of 30 units unless they already possess the M.Sc. or equivalent in Electrical Engineering of the University of Lagos or any other approved University.

**Admission Requirements**

(i) The M.Phil. programme shall be open to candidates having:

(a) a Bachelor's degree or equivalent in Electrical Engineering with a minimum of 2nd Class (Upper);

The Ph.D. programme shall be open only to candidates having an M.Phil. or equivalent in Electrical Engineering.

Candidates for either the M.Phil. or Ph.D. programme may be required to satisfy the department in an interview or written examination or both.

**M.Phil. Degree Requirements**

To obtain an M.Phil in electrical Engineering, unless he already has an M.Sc. in electrical engineering and therefore requires to satisfy only a minimum of six units at the 900 level, a candidate must:

Satisfy a minimum of 30 units, made up of the following:

(a) 10 units of the compulsory courses

(b) 10 units from the optional courses

(c) four units of the "Selected Topics in current Electrical Engineering Research" course.

(d) six units of the "Research Seminars" courses at the 900-level.

Satisfy all other existing requirements as stipulated in the Regulations of the School of Postgraduate studies.

**Ph.D. Degree Requirements**

To obtain a Ph.D. in electrical Engineering, a candidate must:

(i) Satisfy a minimum of six units of the "Research Seminars" at the 950-level

(ii) Satisfy all other requirements as stipulated in the regulations of the School of Postgraduate Studies.
# PROGRAMME STRUCTURE

## M.Sc. & M.Phil. Courses

### Compulsory Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>No of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAG 800:</td>
<td>Numerical Methods in Engineering</td>
<td>2</td>
</tr>
<tr>
<td>EAG 803:</td>
<td>Methods of Applied Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>EEG801:</td>
<td>Mini-Project</td>
<td>3</td>
</tr>
<tr>
<td>EEG 802:</td>
<td>Computer-Aided Design Techniques</td>
<td>3</td>
</tr>
<tr>
<td>EEG 803:</td>
<td>M.Sc. Research Project</td>
<td>3</td>
</tr>
</tbody>
</table>

### Optional Courses

- **Specialising in Electrical Power Engineering and High Voltage Engineering**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>No of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 804:</td>
<td>Electrical Power systems and Control</td>
<td>3</td>
</tr>
<tr>
<td>EEG 805:</td>
<td>High Voltage Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EEG 806:</td>
<td>Projective Systems</td>
<td>3</td>
</tr>
<tr>
<td>EEG 807:</td>
<td>Rotating Machines</td>
<td>3</td>
</tr>
</tbody>
</table>

- **Specialising in Electronics and Communication Engineering**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>No of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGG 808:</td>
<td>Electronic Device Models &amp; Circuit Design</td>
<td>3</td>
</tr>
<tr>
<td>EGG 809:</td>
<td>Active Networks</td>
<td>3</td>
</tr>
<tr>
<td>EGG 810:</td>
<td>Analysis and Synthesis of Active Network</td>
<td>3</td>
</tr>
<tr>
<td>EGG 811:</td>
<td>Speech Analysis and Synthesis</td>
<td>3</td>
</tr>
<tr>
<td>EGG 812:</td>
<td>Digital Signal Processing</td>
<td>3</td>
</tr>
<tr>
<td>EGG 813:</td>
<td>Information Theory and Coding</td>
<td>3</td>
</tr>
<tr>
<td>EGG 814:</td>
<td>Electromagnetic Theory</td>
<td>3</td>
</tr>
<tr>
<td>EGG 815:</td>
<td>Microwave Engineering and Antennas</td>
<td>3</td>
</tr>
<tr>
<td>EGG 816:</td>
<td>Radio Wave Propagation</td>
<td>3</td>
</tr>
<tr>
<td>EGG 817:</td>
<td>Digital Computer Design</td>
<td>3</td>
</tr>
<tr>
<td>EGG 818:</td>
<td>Biomedical Electronics</td>
<td>3</td>
</tr>
</tbody>
</table>

- **Specialising in Electronics and Control Engineering**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>No of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 819:</td>
<td>Classical Control Theory: Analysis and Design of control Systems</td>
<td>3</td>
</tr>
<tr>
<td>EEG 820:</td>
<td>Sampled Data and Digital Control Systems: Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>EEG 821:</td>
<td>Analysis and Design and Linear Multi Variable Control Systems</td>
<td>3</td>
</tr>
<tr>
<td>EEG 822:</td>
<td>Introduction to Stochastic and Adaptive Control</td>
<td>3</td>
</tr>
</tbody>
</table>

### M.Phil. Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>No of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 901:</td>
<td>Selected topics in current electrical and Electronic Engineering</td>
<td>4</td>
</tr>
<tr>
<td>EEG 902:</td>
<td>Research Seminar I</td>
<td>3</td>
</tr>
<tr>
<td>EEG 903:</td>
<td>Research Seminar II</td>
<td>3</td>
</tr>
</tbody>
</table>
### Ph.D. Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG 951:</td>
<td>Research Seminar III</td>
<td>3</td>
</tr>
<tr>
<td>EEG 952:</td>
<td>Research Seminar IV</td>
<td>3</td>
</tr>
</tbody>
</table>

6. DESCRIPTION OF COURSES

**EEG 800:** Numerical Methods in Engineering I 3 units  

**EAG 803:** Methods of Applied Mathematics II 3 units  
Partial Differential Equations; Green's Functions; Fourier and Laplace Transforms; Complex Variables; Tensor Analysis Applications.

**EEG 801:** Mini-Project 3 units  
In this course, all M.Sc. students are encouraged to Undertake laboratory design oriented miniproject in the first semester under the supervision of one or more members of the academic staff of the department.

**EEG 802:** Computer-Aided Design Techniques 3 units  

**EEG 803:** M.Sc. Research Project 3 units  
Applications of research techniques to the solution of current electrical and electronic engineering problems as directed by A competent supervisor. Projects bordering on development of research methodologies. Projects on the problems of local industry and materials as well as of tropical environmental importance. Student is expected to give a seminar on the M.sc. research project.

**EEG 804:** Electrical Power systems and Control 4 units  

**EEG 805:** High Voltage Engineering 3 units  

**EEG 806:** Protective Systems 3 units  
Voltage and current transducer Power fault analysis construction and characteristics of protective relays Protection of A.C Machinery, Feeder Protection, Bus-zone protection.

**EEG 807: Rotating Machines Analysis**  
3 units


**EEG 808: Electronic Device Models and Circuit Design**  
3 units

The principles, structure and characteristics of semiconductor Devices; simple-frequency models for transistors: small signal and wide-band models for general nonreciprocal devices hybrid - PI and Tee models for transistors; relationship of models to transistor physics. Comparison of bipolar and Field effect transistors; detailed frequency response of simple and multistage amplifiers, design of feedback amplifiers, D.c. coupling techniques, design of multistage"tuned amplifiers Selected digital and analogue circuits Operational Amplifiers and applications. Integrated circuit design.

**EEG 809: Active Networks.**

Active network modelUn the complex frequency plane, Conventional feedback and sensitivity, theorems for feedback Circuits, stability and physical reliability of electrical networks, Nyquist's and Routh's criteria for stability: Activity and Passivity Criteria. Examples using Op-Amps, FDNR's converters, grators, Nullators, etc.

**EEG 810: Analysis and Synthesis of Passive Networks**  
3 units

Geometrical and analytical description of networks. State Variable characterizations: scattering matrices, signal flow graphs: Sensitivity. Design of driving-point and transfer impedance Functions with emphasis on the transfer loss and phase of minimum Phase networks, flow diagram, physical network characteristics, Including relations existing between real and imaginary components of network functions, modern methods of network synthesis.

**EEG 811: Speech Analysis and Synthesis**  
3 units

Acoustic theory of speech production; speech signals processing, Digital models and time domain models of speech signals; Digital speech processing for man-machine communication. Realization of voice response and Speaker recognition systems.

**EEG 812: Digital Signal Processing**  
3 units

Sampling as a modulation process, the sam'pling theorem: the Z-transform and discrete-time system analysis, direct and computer- Aided design of recursive and non recursive digital filters: the Discrete Fourier transform (DFT) and the Fast Fourier transform (FFT), digital filtering using the FFT, analogue-to-digital and digital-to-analogue conversion; effects of quantization and finite-word-length arithmetic. Correlation functions and power spectral densities for discrete time filters, methods for descrete time whiner filters, methods for designing digital filters to meet precise frequency domain specification.
EEG 813: Information Theory  
Information measure, entropy, mutual information, source encoding; noiseless coding theorem, noisy coding theorem; exponential error bounds; introduction to probabilistic error correcting codes, block and convolutional codes, block and convolutional codes and error bounds; channels with memory; continuous channels, rate distortion function Introduction to coding and brief review of modern algebra (vectors, spaces and Galois fields); theory of linear codes; decoding hamming, cyclic and Bose-Chandhuri codes, error detecting and correcting coded; simple automatic fault diagnosing techniques.

EEG 814: Electromagnetic Theory  

EEG 815: Microwave Engineering and Antennas  
Mathematical methods for the solution of wave equation; Transmission lines and waveguides, selected topics in the Theory of wave guide structures, surface guides and artificial Dielectrics. Introduction to the concepts of radiation, generalized for field Formulas. Antenna theorems and fundamentals. Radiative Networks. Antenna arrays, linear and planner arrqys; aper Antennas; terminal impedance, propagation. Selected advance Topics.

EEG 816: Radio Wave Propagation  
General Solutions of Maxwell's equations, geometrical optics Approximations, propagation above a place earth, effects of surface irregularities and stratified atmospheres, scattering by turbulence.

EEG 817: Digital Computer Design  
Essential elements of the hardware design of digital computers. Arithmetic and logic units, adders, multipliers, dividers, logic and shifting operations, floating point arithmetic. Memory Organisation, digital memories. Hard-wired control unit, microProgrammed control unit, index registers. Organization of commercially available computers. Design of basic computer.

EEG 818: Biomedical Electronics  
Introduction to the generation and processing of bio-electric Signals induding structure and function of the neuron Generation and propagation of nerve impulses, electronic Neutral-type systems and heir realization. Biological and Medical instruments and equipments. Application in the Design of hearing aids for the deaf and of cardinal pace makers, or a similar case study.

EEG 819: Classical control Theory: Analysis and Design of Control Systems:  

256
Non-linearities and their effect on system performance. Describing function principles; examples illustrating stability situations, stable and unstable limit cycles, methods to eliminate oscillations, frequency response calculations. Phase plane principles; application to control systems, relay operated systems; optimum switched and dual mode systems. Popov stability criteria.

EEG 820: **Sampled Data and digital Control Systems Analysis and Design** 3 UNITS

EEG 821: **Analysis and Design of Linear Multivariable Control systems** 3 UNITS

EEG 822: **Introduction to Stochastic and Adaptive Control** 3 units

EEG 901: **Selected Topics in Current Electrical and Electronic Engineering**
Selected topics of current research in power, high voltage, Electronics, control, communication and antennas, etc will be presented by senior academic members of staff. The format will include lecturers and student preparation and presentation of two major review papers for evaluation.

EEG 902 & 903: **Research Seminars I & II** 4units,
Candidates will be required to make at least two seminar presentations on their M.Phil Research Topic. Each candidate will be required to produce a manuscript in the usual journal format on the topic under investigation. For these candidates, literature review and/or development or relevant mathematical models related to dissertation topics will be acceptable.

EEG 951 & 952: **Research Seminars III and IV** 3units
The format will be similar to the Research seminars I and III for The M.Phil, except that more emphasis will be on the actual Results of the student's Ph.D. research work.