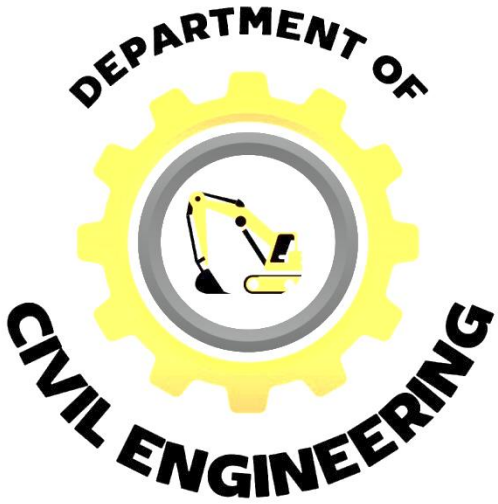


UNIVERSITY OF PORTHARCOURT

FACILITIES AVAILABLE TO THE DEPARTMENT

Civil Engineering Building

Centre for Occupational Health Safety and Environment (COHSE).

Centre for geotechnical and coastal research

Public Health Laboratory

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

A. UNDERGRADUATE PROGRAMMES

The Department of Civil and Environmental Engineering runs the following undergraduate programmes:

1. Bachelors of Engineering in Civil Engineering.
2. Bachelors of Engineering in Environmental Engineering.

The Bachelor of Engineering (B.Eng) in Civil Engineering and Environmental Engineering programmes is for five years. The course structure is mainly divided into Basic Engineering Courses and Core Civil Engineering/Core Environmental Engineering Courses. The Basic Engineering Courses covers courses taken in years one to five. These courses are professional Engineering courses mainly from within the Faculty of Engineering. The core Civil Engineering and Environmental Engineering Courses are taken from years two to five. There are also university wide courses/General Studies Courses and Science Courses taken in years one and two. The common courses (Science,General Studies and Basic Engineering courses) are foundation courses to all Engineering disciplines. The student undertakes three-month industrial training in their third year and six-month industrial training in year four. During the industrial training period, the students are supervised by both lecturers and industry-based supervisors. At their final year, they conduct a research project (with topics drawn from different fields of specialization in civil engineering and environmental engineering) and submit a report on it.

Civil Engineering Programme

Year One

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
GES 100.1	Communication Skills in English	3	0	3
GES 102.1	Introduction to Logic & Philosophy	2	0	2
CHM 130.1	General Chemistry I	2	3	3
PHY 101.1	Mechanics & Properties of Matter	3	0	3
PHY 102.1	Physics Laboratory I	0	3	1
MTH 110.1	Algebra and Trigonometry	3	0	3
MTH 120.1	Calculus	3	0	3
ENG 101.1	Engineering Drawing I	1	3	2
Total		**17**	**9**	**20**

Second Semester				
Course Code	**Course Title**	**L**	**P**	**C**
GES 101.2	Computer Appreciation and Application	2	0	2
GES 103.2	Nigerian Peoples and Culture	2	0	2
CHM 131.2	General Chemistry II	2	3	3
PHY 112.2	Electricity and Magnetism	3	0	3
PHY 103.2	Physics Laboratory II	0	3	1
MTH 124.2	Co-ordinate Geometry	3	0	3
ENG 102.2	Engineering Drawing II	1	3	2
ENG 103.2	Engineer in Society	1	0	1
ENG 104.2	Manufacturing Technology/Workshop Practice	1	3	2
Total		**15**	**12**	**19**

Year Two

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
PHY 216.1	Vibration, Waves and Optics	3	0	3
ENG 201.1	Engineering Mathematics I	3	0	3
ENG 202.1	Engineering Mathematics II	2	0	2
ENG 203.1	Engineering Mechanics	3	0	3
ENG 204.1	Basic Engineering Materials	2	0	2
ENG 210.1	Basic Electrical Engineering	3	0	3
ENG 212.1	Community Service	0	0	1
ENG 213.1	Computer Programming for Engineers	2	3	2
Total		**15**	**12**	**19**

Second Semester				
Course Code	**Course Title**	**L**	**P**	**C**
CHM 240.2	Physical Chemistry	3	0	3
ENG 205.2	Engineering Laboratory I	0	9	1
ENG 206.2	Engineering Mathematics III	3	0	3
ENG 207.2	Basic Fluid Mechanics	2	0	2
ENG 208.2	Basic Strength of Materials	2	0	2
ENG 209.2	Basic Thermodynamics & Heat Transfer	3	0	3
ENG 210.2	Basic Electrical Engineering	3	0	3
ENG 211.2	Engineering Laboratory II	0	3	1
CEG 231.2	Engineering Geology	2	0	2
Total		**18**	**3**	**17**

Year Three

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
ENG 301.1	Engineering Mathematics IV	3	0	3
ENG 302.1	Technical Writing & Presentation	2	0	2
CEG 311.1	Fluid Mechanics II	3	0	3
CEG 321.1	Strength of Materials II	3	0	3
CEG 323.1	Civil Engineering Materials	2	0	2
CEG 332.1	Soils Mechanics I	2	0	2
CEG 351.1	Principles of Surveying	2	0	2
CEG 352.1	Survey Camp	0	6	2
CEG 381.1	Civil Engineering Laboratory I	0	3	1
Total		**17**	**9**	**20**

Second Semester				
Course Code	**Course Title**	**L**	**P**	**C**
GES 300.2	Fundamentals of Entrepreneurship	2	-	2
ENG 303.2	Engineering Mathematics V	3	0	3
CEG 312.2	Engineering Hydrology	2	0	2
CEG 333.2	Soil Mechanics II	3	0	3
CEG 341.2	Elements of Architecture	2	3	3
CEG 342.2	Theory of Structures I	3	0	3
CEG 353.2	Surveying for Construction	3	0	3
CEG 361.2	Principles of Construction	2	0	2
CEG 382.2	Civil Engineering Laboratory II	0	3	1
Total		**20**	**6**	**22**

Long Vacation		
ENG 300.3	Industrial Training I	Pass/Fail

Year Four

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
ENG 401.1	Engineering Mathematics VI	3	0	3
ENG 402.1	Engineering Economics	2	0	2
CEG 413.1	Civil Engineering Hydraulics	2	0	2
CEG 443.1	Reinforced Concrete Design	3	0	3
CEG 444.1	Steel and Timber Design	2	0	2
CEG 445.1	Theory of Structures II	2	0	2
CEG 446.1	Civil Engineering Drawing	1	3	2
CEG 461.1	Highway Engineering	3	0	3
CEG 483.1	Civil Engineering Laboratory III	0	6	2
Total		**18**	**9**	**21**

Second Semester and Long Vacation				
Course Code	**Course Title**	**L**	**P**	**C**
ENG 400.2	Industrial Training II	9	-	9
GES 400.2	Entrepreneurship Project	2	-	2
Total		**11**	**-**	**11**

Year Five

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
ENG 501.1	Professional Practice & Procedure	2	0	2
ENG 502.1	Engineering Management	2	0	2
CEG 5xx.1	Optional Elective	1	3	2
CEG 514.1	Water & Wastewater Engineering	2	0	2
CEG 534.1	Foundation Engineering	2	0	2
CEG 547.1	Reinforced/Prestressed Concrete	2	0	2
CEG 548.1	Civil Engineering Design	1	3	2
CEG 562.1	Traffic and Transportation Engineering	3	0	3
CEG 5xx.1	Innovative Course	2	0	2
CEG 591.1	Technical Seminar	1	3	2
Total		**18**	**9**	**21**

Second Semester				
Course Code	**Course Title**	**L**	**P**	**C**
CEG 5xx.2	Optional Elective	3	0	3
CEG 515.2	Water Resources Engineering	2	0	2
CEG 516.2	Pollution Control Engineering	2	0	2
CEG 535.2	Geotechnical Structures	2	0	2
CEG 549.2	Structural Analysis	2	0	2
CEG 571.2	Civil Eng. Measurements & Construction	3	0	3
CEG 5xx.2	Innovative Course	2	0	2
CEG 592.2	Final Year Project	0	18	6
Total		**16**	**18**	**22**

Elective Courses				
Course Code	**Course Title**	**L**	**P**	**C**
CEG 584.1	Computer Aided Design in Civil Engineering	1	3	2
CEG 518.1	River Engineering	2	0	2
CEG 517.2	Design of Drainage Systems	3	0	3
CEG 536.2	Regional Geology	3	0	3
CEG 563.2	Highway Bridges and Culverts	3	0	3

Innovative Courses				
Course Code	**Course Title**	**L**	**P**	**C**
CEG 585.1	Risk analysis and reliability-based design	2	0	2
CEG 572.2	Construction Site Management	2	0	2

4.2 Course Contents for Civil Engineering Programme

4.2.1 General Studies Courses (GES)

GES 100.1: Communication Skills in English (3 Credits)

Study skill and methods including use of language and use of the library. Listening comprehension skill.Reading skills.Using grammar in reading and writing.Writing skills.Examination techniques.

GES 101.2: Computer Appreciation and Application (2 credits)

History of computers.Generations and classification of computers.IPO model of a computer.Components of a computer system hardware and software.Programming languages, organization of data. Data capture techniques. Introduction to computer networks.Software and its application. Use of keyboard as an input devices. DOS, windows, word processing, spreadsheets. Application of computers in medicine, social sciences, humanities, education and management sciences.

GES 102.1: Introduction to Logic and Philosophy (2 credits)

The nature, definition and branches of philosophy.Philosophy and other disciplines.Nature and branches of philosophy.Periods in the history of philosophy.Philosophy and national development.Types of argument and reasoning.Inferences.

GES 103.2: Nigerian Peoples and Culture (2 credits)

The concept of culture.Pre-colonial cultures and languages of Nigeria.Principles of kinship, descent and marriage in Nigeria cultures.Nigerian development in Nigeria.Religion in Nigerian culture.Culture, environment and health practices in Nigeria.

GES 300.2: Fundamentals of Entrepreneurship (2 credits)

The course discusses the concept, history and the development of entrepreneurship; the entrepreneur qualities and characteristics; the entrepreneur and business environment; identifying business opportunities; starting and developing new business ventures; legal forms of business ownership and registration; types of business ownership; feasibility studies; role of small and medium scale enterprise (SME) in the economy; role of government on entrepreneurship; business location and layout; accounting for SME; financing SME; managing of SME; marketing in SME; risk management of SME; success and failure factors of SME; prospects and challenges of entrepreneurship and intrapreneurship, ethical behaviour in small business.

GES 400.2: Entrepreneurship Project (2 credits)

The course focuses on engaging the student in individual or group project to select product(s) or service(s), conduct a feasibility study, design and develop the product/service, design its manufacturing system and marketing strategies, and determine the modalities for establishing and operating an enterprise based on the product/service. It is expected that the knowledge and experience gained in the Entrepreneurship Project would evolve in the desire and capability of the students for self-employment as small-scale-industry (SME) entrepreneurs. Pre-requisite: GES 300.2.

4.2.2 Sciences Courses [CHEMISTRY (CHM), PHYSICS (PHY), MATHEMATICS/COMPUTER SCIENCE (MTH)]

CHM 130:1: General Chemistry I (3 credits)

Basic principles of matter and energy from the chemist's point of view.A broadly based course suitable for students from various schools as well as those from the faculty of sciences. Topics to be covered will include atomic theory and molecular structure stoichiometry, the periodic classification of the elements, atomic structure, chemical bounding, properties of gases, solids, liquids and solutions, chemical equilibrium, ionic equilibria, chemical thermodynamics, electro-chemistry and chemical kinetics (includes laboratory sessions).

CHM 131.2: General Chemistry II (3 Credits)

Application of the principles of chemical and physical change to the study of the behaviour of matter and the interaction between matters. Course content includes the chemistry of representative elements and their common compounds with emphasis on gradation of their properties-brief chemistry of the first series of transition elements, general principles of extraction of metals; introductory nuclear chemistry (includes lab session).

CHM 240.2: Physical Chemistry (3 Credits)

Introduction to basic physical chemistry. The emphasis is on the properties of gases, the three laws of thermodynamics and the principles of chemical kinetics and electrochemical cells.

PHY 101.1: Mechanics and Properties of Matter (3 Credits)

Topics covered in this course will include the following: motion in one dimension, motion in a plane, work and energy, conservation laws, collisions, solid fraction, rational dynamic, equilibrium of rigid bodies oscillations, gravitation, fluid statics and fluid dynamics. Surface tension, elasticity and viscosity. Pre-requisite: WASC credit in physics, PHY 300 or equivalent.

PHY 102.1: Physics Laboratory I (1 Credits)

Laboratory exercises drawn from PHY 101.1

PHY 112.2: Electricity and Magnetism (3 Credits)

This is an introductory course on electricity and magnetism. Topics covered will include the elastic field. Gauss law.Electric potential, capacitors and dielectric, current and resistance, electromotive force and circuits, the magnetic field, Ampere's law, Faradays law of induction.

PHY 103.2: Physics Laboratory II (1 Credits)

The experiments carried out in this course will cover areas discussed in PHY 112.2. These experiments includes verification of the laws of electricity. Measurement of the electrical properties of conductors; D.C. and A.C circuit properties, series and parallel resonant circuits; transformer characteristics; and other electrical circuit problems.

PHY 216.1: Vibration, Waves and Optics (3 Credits)

This course is an introduction to oscillations and waves phenomena. Topics covered will include vibrations and waves, types of waves, sound waves and wave optics.

MTH 110.1: Algebra and Trigonometry (3 Credits)

Elementary notion of set, subset, union.Intersection, complements; ven diagram. Real numbers, integers.Rational and irrationals, mapping of a set.Real functions and their compositions.Quadratic functions. Cubic function.Roots of quadratic and cubic functions.Partial fractions.Equations with complex roots.Complex number, geometric representation of complex numbers.De moirvers, series and sequences.Principles of mathematical induction.Binomial theorem.Trigonometric function of angles.Circular functions.Addition theorems.Double and half angles.

MTH 120.1: Calculus (3 Credits)

Function of a real variable, graphs, limits and idea of continuity. The derivation as limit of rate of change.Techniques of differentiation.Methods of change. Techniques of differentiation: methods of integration. Definite integrals.Application of areas, volumes.

MTH 124.2: Coordinate Geometry (3 Credits)

Straight lines, circles, parabola, ellipse, hyperbola.Tangents, normal.Addition of vectors.Scalar and vector products.Vector equation of a line and plane.Kinematics of a particle.Components of velocity and acceleration of a particle moving in a plane. Force, momentum, laws of motion. Under gravity, projectiles, resisted particle motion, elastic, string, simple pendulum impulse. Impact of two smooth sphere, and a sphere on a smooth sphere. Addition of vectors.

4.2.3 Engineering Science Courses (ENG)

ENG 101. 1: Engineering Drawing I (2 Credits)

Introduction to drawing instruments, scales, draughting aids and their proper use. Size of paper and drawing layout.Dimensioning, line work and lettering.Geometrical constructions and engineering graphics.Development of geometric figures and intersection of solid and curves.Introduction to projections.

ENG 102.2: Engineering Drawing II (2 Credits)

Orthographic projections in first and third angles. Isometric projection; sections and sectioning, auxiliary views and staggered sectioning. Freehand sketching. Conventional practices with simple examples, including threads and threaded fasteners, cam profile and assembly drawing from detailed components. Pre-requisites ENG 101.1.

ENG 103.2: Engineer-in-Society (1 Credit)

History of engineering and technology and the philosophy of science.Development of the engineering industry up to the present dat. Safety and health at work.The role of engineers in nation building.Food production, housing, transportation, employment opportunities, energy supply, communication and social infrastructure, etc. The choice of Engineering solutions and decision-making process, risk analysis, etc. lectures by invited professionals

ENG104.2: Manufacturing Technology /Workshop Practices (2 Credit)

Manufacturing methods with metal materials (cold and hot workings) such as deep drawing; wire drawing; spinning and rolling; extrusion. Machine-tool manufacture (turning, milling and shaping, etc., metal-casting; manufacture of plastic products (moulding and blowing). Use of hand tools, bench work and measuring instruments. Fitting and joining processes (soldering, brazing) wood-working and machinery. Surface finishes, forging etc.

ENG 201.1: Engineering Mathematics I (Mathematics Analysis) (3 Credits)

Functions of several variables: functions of 2,3 or more variables, partial derivatives, differential, total differentials, application to approximate computations. Higher-order partial derivatives and differentials.Differentiation of composition, and implicit functions several variables.Exterma and conditional extremum. Change of variables. Multiple integrals: double and triple integrals, analysis in Cartesian coordinates, change of variable to polar, cylindrical, and spherical coordinates, curvilinear coordinates, application to problems of mechanics. Integral dependent on parameters, improper integrals, line integrals, green's formula, conditions for independence of line integral on path, application of problems of mechanics and thermodynamics. Surface integrals, fluid flux across a surface, properties, Stroke's formula. Fluid theory, vector field and vector lines. Applied series: expansion of power series, application of Taylor's series, Fourier series orthogonal system of functions, the Parseval's relation.Hilbert space, orthogonality with weight function, Fourier integral, Fourier transformation, applications. Special functions, gamma, beta, error, Bessel, legendre and hypergeometric functions. Introduction to analytic functions, Cauchy-Riemann equations, conformal mappings. Pre-requisite: MTH 120.1; ENG 202.1: Engineering Mathematics II

ENG 202.1: Engineering Mathematics II (Linear Algebra & Analytic Geometry) (2 Credits)

Surfaces and curves in space, cylinders, cones, and surfaces of revolution. First and second-order algebraic surface, ellipsoids, hyperboloids and paraboloids.Systems of linear equations.Determinants, minors and cofactors, evaluation methods. Vectors space, linear spaces, Euclidean space, orthogonality, change of basis, inverse matrix, eigenvectors and eigenvalues of matrix, rank. Linear mapping, symmetric, bilinear and quadratic forms.Differentiation and integration of matrices. Application of matrix algebra pre-requisite MTH 110.1 and 124.1.

ENG 203.1: Engineering Mechanics (Statics and Dynamics) (3 Credits)

Basic concepts and principles of mechanics, equilibrium of particles in 2 and 3 dimensions, moment and couple, system of forces, equilibrium of rigid bodies, friction wedges, screw, wheel bolts and statically determinate structure-beams, trusses, frames and mechanics. Linear and curvilinear motions, acceleration, kinetics of parties, Newton's second law, impulse, momentum, impact and restitution, work, energy, power and efficiency. Pre-requisite: PHY 101.1 and MTH 120.1

ENG 204.1: Basic Engineering Materials (2 credits)

Atomic and crystal structure, crystal imperfections and impurities in solids. Fundamentals of crystallography.Atomic vibration and diffusion.Mechanics properties engineering and true stress strain curves, ultimate strength, ductility,

impact strength, hardness.Electrical properties-conductivity, semi-conductivity and super conductivity.Optical and magnetic properties of materials. Simple phase diagrams of alloys, with emphasis on the iron-iron carbide system. The relationship between structure and properties.Creep, fatigue. Heat treatment processes. Stability of materials in the services environment corrosive media, sub-zero and elevated temperature, irradiation.Basic criteria for the selection of materials for engineering applications.Engineering properties of wood, concrete, ceramics, polymers and non-ferrous metals and alloys. Pre-requisite: CHM 131.2 and MATH 124.2

ENG 205.1: Engineering Laboratory I (1 Credit)

Assigned laboratory exercises to reflect the basic engineering courses in applied mechanics, materials science, fluid mechanics, strength of materials. Thermodynamics and heat transfer. Guidance on specific experiments and calculation will be provided by the various lecturers.

ENG 206.2: Engineering Mathematic III (Differential Equations) (3 Credits)

Ordinary differential equations; first-order equation, examples of Engineering model, equations with variables separable, Bernoulli's equation; exact equations; the envelops of a family of curves, singular solutions, Clairaut's and Lagrange's equations, orthogonal and isogonal trajectories. Second-and higher-order equations and system of first order equations, first integrals. Linear equations, general theory, boundary value problems.Euler's equations, geometrical and physical interpretation of solutions.Operators and the operator method of solving equations, system of linear equations. Operational calculus, Laplace transforms theory and application to initial-value problems. Introduction to partial differential equations elliptic, hyperbolic and parabolic equations. Pre-requisite: MTH 120.1 and 124.2

ENG 207.2: Basic Fluid Mechanics (2 Credits)

Fluid properties, fluids statics, principles of fluid flow and applications, flow measurements.Real fluid flow, curvilinear flow (two-dimensional).Dimensional analysis and similitude.Pipe flow and friction factors.Boundary layers and drag. Pre-requisite: PHY 101.1 and ENG 211.1

ENG 208.2: Basic Strength of Materials (2 credits)

Force equilibrium free body diagrams, centroids and second moment of area. Concept of stress and stain; stress diagram. Axially loaded members, composite bars; temperature stresses; relation between elastic constants. Thin cylindrical spherical and conical pressure vessels, cylindrical shells with rings, torsion of circular shaft and power transmission of shafts. Axial force, shear force and bending moment diagrams. Pure bending of beams, bending stresses in composite beams, shearing stresses in beams, complex stresses; principal stresses. Pre-requisite: ENG 211.1

ENG 209.2: Basic Thermodynamics and Heat Transfer (3 Credits)

Engineering thermodynamics: basic concepts definitions, thermodynamic properties; the thermodynamic system units; equations of state for perfect and real gases, and gas mixtures, thermodynamics work and heat; the first law of thermodynamic, energy equations and analysis; basic thermodynamic, energy equations and analysis; basic thermodynamics and introduction to irreversible relations; the second law of thermodynamics and introduction to irreversible processes. Heat transfer basic concepts, heat transfer modes and rate processes. Fourier's law of heat conduction; Newton's of cooling; Stephan-Boltzmann law of thermal radiation and configuration factor algebra; stationary heat conduction in simple geometries and composite bodies; correlational equations for convective heat transfer, boiling and condensation; heat transfer by combined modes; insulation and intensification of heat transfer; electrical and triple analogies; introduction to heat exchangers. Pre-requisite: PHY 101.1

ENG 210.2: Basic Electrical Engineering (3 Credits)

Circuit elements (R,L,C) DC and AC circuits and signal electrostatics and electromagnetism, basic circuit laws and theorems. Three phase circuits, power and power factor. Electrical and electronic measurements and measuring instruments.Introduction to machines.Introduction to electronics; semi-conductor. Pre-requisite PHY 101.1

ENG 211.2: Engineering Laboratory II (1 Credit)

Assigned laboratory exercise to reflect the basic engineering course in electrical/electronics. Guidance on specific experiments and calculations will be provided by the lecturer.

ENG 212.2: Community Services (1 Credit)

Civil work beneficial to the university community and its environs including but not limited to farming, road building and maintenance, landscaping, planting of flowers and hedges, grass-cutting and general cleaning of campus and its environs. Concreting and laying of seating and footpath slabs.

ENG 213.1: Computer Programming for Engineers (2 Credits)

Computers, computing and engineering, algorithms, flour chart and pseudo code.Computer languages, programming in Fortran77 or later versions.Debugging techniques.Computer code security. Laboratory: hands-on experience on computer through the use of compliers to run programs and to solve simple analysis problems in fluid, the thermodynamics, heat transfer and electrical systems.

ENG 300.3: Industrial Training I (0 Credit: Pass or Fail)

The practical exposure of the student through direct participation in the work of an industry, to real like working condition. During the training, the student acquires a familiarity with engineering works, organization. Physical layout, and the flow of information, materials and operations. This information is expected to complement and integrate the student's classroom instruction and laboratory/workshop exercise. Duration: 3 months.

ENG 301.1: Engineering Mathematics IV (Probability and Statistics) (3 Credits)

Theory of probability: motivation, probability models, probability axioms, combinatorial problems. Conditional probability, independence of events, Bernoulli trials. Discrete and continuous random variables, mass, distribution, and generating functions, random vectors, independent random variables, exponential distribution, reliability, failure density, hazard function, some important distributions, functions of two random variables, transform methods, computation of means time to failure, inequalities and limit theorems. Conditional distribution and expectation, stochastic process, Bernoulli, Poisson, and renewal processes, availability analysis, random incidence.Instruction to discrete and continuous Markova chains.Measures of central tendency. Statistical inference, parameter estimation, hypothesis testing. Regression, correlation and analysis of variance.Elements of experimental design. Pre-requisite: ENG 201.1

ENG 302.1: Technical Writing and Presentation (2 Credits)

Data gathering and presentation.Technical correspondence; letter of inquiry and replies, letter of application and memoranda.Illustrating technical writing using tables, graphs, diagrams, equations and appendices. Report writing: progress reports, proposals, students project, thesis and dissertations, oral and visual presentations. Computer –aided technical writing and presentation; words processing and words-processing software packages.

ENG 303.2: Engineering Mathematics V (Numerical Methods and Computer Application) (3 Credits)

Review of the number systems and error analysis. Numerical schemes, error analysis, computer algorithms and program for the solution of the following problems of linear equations, determinants and matrix eigenvalue problems; approximations; data fitting, orthogonal polynomials, least-squares, splines and fast Fourier transforms; differentiations and integration; difference equation; differential equations by Rubge-Kutta and other methods; boundary-value problems in ODE. Introduction to the finite-difference method for partial differential equations. Pre-requisite: ENG 202.1 & ENG 206.

ENG 400.2: Industrial Training II (9 Credits)

The practical exposure of the student through direct participation in the work of an industry, to real like working condition. During the training, the student acquires a familiarity with engineering works, organization. Physical layout, and the flow of information, materials and operations. This information is expected to complement and integrate the student's classroom instruction and laboratory/workshop exercise. Students give a presentation of their experience and submit a report at the end of the training. Duration: 6 months.

ENG 401.1: Engineering Mathematics VI (Mathematical Modelling and Operation Research) (3 Credits)

Basic concept methodology, structures, information support and systems approach. Synthesis, analysis, validation and computer simulation of mathematical methods.Mathematical modelling of engineering problems at micro, micro and meta-level.Inverse problems; unconstrained and constrained problems.Introduction to operation research.Sensitivity analysis; linear, integer, goal, geometric, dynamic, nonlinear and stochastic mathematical programming. Allocation, routing, searching, project scheduling, sequencing, replacement, inventory, gaming and queuing problems. Computer aided mathematical modelling of engineering systems, processes and operations. Application software packages. Pre-requisite: ENG 206.2, ENG 301.1 & ENG 303.2

ENG 402.1: Engineering Economics (3 Credits)

Scope of engineering investment decisions, compounding, discounting and economic equivalence; cash flow analysis and inflation. Choosing between alternatives; methods for evaluating investments; depreciation, taxes, and cost of capital; comparing alternative investment; replacement analysis budget and budget control, evaluation of public projects. Decision and cost analysis; lease-or-by decisions; economic feasibility study of engineering projects.Computer-aided engineering economics. Pre-requisite: ENG 301.1

ENG 501.1: Professional Practice and Procedures (2 Credits)

Registration of engineering, duties and code of conduct and practice.Ethics, professional responsibilities and practice of Engineering in Nigeria.Typical problems and solutions in various areas of engineering. Engineering projects, planning, feasibility studies and their relevance, guide pre-design survey and stages of engineering design project scheduling. Law: sources and branches of Nigeria law, courts and tribunals. Law of contracts, the engineer as an expert witness. Industrial legislation concerned with incapacity or injury, working conditions, wages, redundancy, trade unions, structure, right and liabilities. Industrial disputes, safety and environmental protection. Pre-requisite: good academic standing.

ENG 502.1: Engineering Management (2 Credits)

Organization structure, goals and functions.Project planning and control. Cost engineering; capital and operating cost estimating, contingencies and allowances. Production forecasts.Phases and constraints, decline functions.Productivity improvement.Purchasing and materials management.Maintenance management.Contract management. Pre-requisite: Good academic standing.

4.2.4 Civil Engineering Courses (CEG)

CEG 231.2: Engineering Geology (2 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Understand geological and mechanical principles
2. Perform geological structure analysis
3. Describe processes in engineering geology
4. Conduct geological and geophysical site investigation
5. Understand the application of engineering geology

Course contents:

Geological and Mechanical Principles: Geology and (Civil) Engineering, Rock forming minerals, Rock Types and Soil Types, Soil and rock properties. Geological Structure Analysis: Geological structures, Plate Tectonics, Geological Time (relative and absolute geological age), Geological Maps and Sections, Discontinuities Analysis (Hemispherical projection). Processes in Engineering Geology: Weathering and Soils, Surface Processes (Floodplains and Alluvium, Glacial Deposits, Climatic Variants), Coastal Processes, Groundwater flow. Geological and Geophysical Site Investigation: Site Geological Investigation; Boreholes, Airphoto and Remote Sensing. Engineering

Geophysics.Engineering Geology in Practice: Assessment of Difficult Grounds, Rock Excavation, Tunnel and Underground Spaces, Foundation of Structures (Buildings, Bridges, Roads & Rails and Dams). Applied Engineering Geology: Slope Failure and Landslides (Types, Effect of Groundwater, Stabilization, Hazard). Subsidence (Land Subsidence, Mining Subsidence, Subsidence in Karstic Areas), Earthquakes, Rock as Construction Materials (Dimension Stone & Aggregates). Case Studies: Nigeria Geology

CEG 311.1: Fluid Mechanics II (3 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Describe the concept of boundary layer formation.
2. Solve problems in open channel flows
3. Perform pipe network analysis
4. Analyse steady pipe flows
5. Design hydraulic structures.

Course contents:

Boundary layer Concepts; Turbulent pipe flow and simple pipeline design problems; Pipe flow systems – pipes in series, parallel and branch pipes; Uniform open channel flow – Flow in partly full pipes, Design of unlined channels; Non-uniform open channel flow – critical flow, rapidly varied flow, gradually varied flow; Hydraulic structures – weirs, culverts, overflow spillways, stilling basins and channel transition.

CEG 321.1: Strength of Material II (3 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Describe bending moment and shear force in beams, theory of bending beams, deflection of beams, Unsymmetrical bending and shear center,
2. Understand the applications of strain energy, bi-axial state or stress,
3. Explain the transformation of stresses, Mohr's circle. Failure theories. Springs. Creep.
4. Analyse fatigue fracture and stress concentration, combined stress in bending and torsion.
5. Understand the theory of column; critical load and critical stress; Euler's theory and its limitations; short, medium and long struts.

Course Contents:

Advanced topics in bending moment and shear force in beams, theory of bending beams, Deflection of beams, Unsymmetrical bending and shear center, Applications, Strain energy, Bi-axial state or stress, Transformation of stresses, Mohr's circle, Failure theories. Springs. Creep. Fatigue fracture and stress concentration. Combined stress in bending and torsion; Elements of the compound and composite cross-sections in bending and compression, thick cylinders. Bending and curved bars of small initial curvature, open-coiled and arrangements of springs. Theory of column; critical load and critical stress; Euler's theory and its limitations; short, medium and long struts.

CEG 323.1: Civil Engineering Materials (3 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Explain the various composition of concrete.
2. Describe the properties of concrete making materials.
3. Understand the application of Portland cement, aggregate, water, admixtures and miscellaneous materials.
4. Identify the suitability structural steel in civil infrastructures.
5. Review other construction materials such as timber, rubber, plastic, etc.masonry.

Course Contents:

Concrete technology-Composition of concrete. Properties of concrete making materials: Portland cement, aggregate, water, admixtures and miscellaneous materials. Concrete mix design.

Steel technology – production, fabrication and properties, corrosion and its prevention. Tests on steel and quality control. Timber technology - types of wood, properties, defects, stress grading, preservation and fire protection, timber products. Rubber, plastics, asphalt, tar, glass, lime, bricks and applications to buildings, roads and bridges.

CEG 332.1: Soil Mechanics I (2 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Understand soil description and origin of soils.
2. Explain the process of soil formation and classification.
3. Evaluate the index properties of soil
4. Apply soil as construction material
5. Describe flow in soils: permeability and seepage and principles of effective stress.

Course Content:

General Engineering considerations: Soil description: index properties, phase relationships; origin of soils: process of soil formation; soil classification; soil as construction materials; clay mineralogy. Water flow in soils: permeability and seepage; flow nets and method of construction of flow nets. Filter and seepage control; Principles of effective stress.

CEG 351.1: Principle of Surveying

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Understand the uses & care of basic surveying instruments.
2. Perform basic mathematical calculations used in surveying:
3. Explain the concept of Units & scales in surveying measurements.
4. Apply Methods of Horizontal control establishment: Co-ordinates determination by methods of traversing, triangulation, trilateration, intersection, resection and GPS.
5. Perform height determination by levelling process: Principles & Processes involved in spirit & trigonometrical levelling.

Course Contents:

Introduction to surveying: Basic definition and classification. The figure and shape of earth's surface.Uses& care of basic surveying instruments.Basic mathematical calculations used in surveying: Concept of Units & scales in surveying measurements. Introduction to plane rectangular co-ordinate systems.Basic Surveying Measurements: Linear& Angular measurements.Distance measurements with Tapes, EDM, Total Station and GPS. Corrections applicable to measured distances. Angle measurementson plane surface with compass, theodolite and total stations.Methods of Horizontal control establishment: Co-ordinates determination by methods of traversing, triangulation, trilateration, intersection, resection and GPS. Height determination by levelling process: Principles & Processes involved in spirit &trigonometricallevelling. Uses & Application of levelling in civil engineering works. Introduction to tacheometry: Distance and height measurements by tacheometric principle.

CEG 352.1: Survey Camp (2 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Consolidate on the knowledge and skills learnt in the course CEG 351.1, and to further teach problem solving skills in relation to practical surveying problems.
2. Learn group work skills and engender tolerance of diversity of opinions.
3. Understand simple technical report writing skills.
4. Perform surveying operations such as traverse, levelling and tacheometry, with the preparation of a site plan or map for civil engineering design.

Course Content:

This 2-week camp in the field is intended for students studying for the Civil and Environmental degrees respectively. This camp will either take place during the Easter vacation, or immediately after the first semester examination of every session. The aim of the camp is to consolidate on the knowledge and skills learnt in the course CEG 351.1, and to further teach problem solving skills in relation to practical surveying problems, and to equip the student with group work skills and engender tolerance of diversity of opinions. In addition, the course will further equip the students with simple technical report writing skills.The content of the course will be in project form, which will be based on the basic surveying operations such as traverse, levelling and tacheometry, with the preparation of a site plan or map for civil engineering design. Other tasks may be performed in addition to the above, depending on the resources available and this will vary from year to year. Pre-requisite: CEG 351.1.

CEG 381.1: Civil Engineering Laboratory 1 (1 credit)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Conduct Atterberg limit test on soil samples.
2. Perform consolidation test on soil samples.
3. Carry out the California Bearing Ratio (CBR) test on soil samples.
4. Conduct soil compaction test.
5. Perform sieve analysis test on soil samples.

Course Content:

Practical in Soil Mechanics and Geotechnical Engineering. These practical tests include; Atterberg limit test, soil compaction test, consolidation test, and sieve analysis to determine the grain size distribution of the soil.

CEG 312.2: Engineering Hydrology (2 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Quantify water in different phases and environmental states.
2. Apply first principles to derive and solve governing equations for water storage and flow
3. Generate governing equations, environmental constraints and operational requirements to solve engineering design problems.
4. Relate knowledge of surface water to groundwater quality.
5. Use unit hydrographs to predict flood, flood forcasting, warning, extending flood flows etc.

Course Contents:

Fundamental theories on hydrological cycle (water balance, atmospheric water, subsurface water, surface water), measurements and data collection. Precipitation analysis, evaporation and evapotranspiration processes, hydrograph analysis, rainfall runoff modelling (unit hydrograph), hydrological flow routing, infiltration, ground water movement

(Aquifers; types and properties and properties), hydrological statistics and hydrological design. Flow nets; hydraulic wells; pumping test. Pre-requisite: CEG 311.1.

CEG 333.2: Soil Mechanics II (3 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Explain the principle of stress and strain, elasticity and plasticity of soils
2. Evaluate the distribution of stresses in soils
3. Compute the normal and shear stresses acting on soils and draw the Mohr circle to predict the principal stresses.
4. Explain shear strength of soils, know the shear strength parameters and how to determine them through various tests in the laboratory and determine pore pressure parameters from the triaxial tests
5. Identify the critical state in soil mechanics and apply numerical methods to solve soil mechanics problems
6. Explain what earth pressure is and how to plot the distribution

Course Content:

Stress distribution in soils: Elastic equilibrium, boundary loads Bousinesq's and Westergard theories; volume change and compressibility; Consolidation; Time rate of consolidation; Consolidation settlement; Mohr circle; stress paths; stresses and strains; shear strength of soils; pore pressure parameters; problems of stability in soil; Introduction to numerical solutions to typical soil mechanics problems. Introduction to earth pressure distribution. Introduction to critical state soil mechanics. Pre-requisite: CEG 332.1.

CEG 341.2: Elements of Architecture (3 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Recognize the terms: Dimensional awareness, graphical communication, relation to environments.
2. Sketch drawings in terms of shades, light and shadows.
3. Prepare orthographics; dimetrics, and perspective projections.
4. Develop and critically analyze elementary architectural designs.
5. Relate effectively with professionals from disciplines that have direct influences on te built environment.

Course Content:

Introduction – Dimensional awareness, graphical communication, relation to environments. Free hand drawing-forms in terms of shades, light and shadows. Orthographics; dimetrics, perspective projections; Applications common curve. Elementary Designs.

CEG 342.2: Theory of Structures I (3 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Classify structures, describe plane frame; joints and supports; stability and determinacy; concepts and assumptions in analysis of structures.
2. Analysis of statically determinate structures; plane trusses, beams and frames (axial force, shear force and bending moment diagrams in beams and frames).
3. Deflections, method of superposition, principles of virtual work: principle of virtual displacement; principle of virtual force using energy method in beams, frames and trusses, Influence lines and moving Loads,

4. Analysis of statically indeterminate structures; by the force method (method of consistent deformation) – frames and trusses,
5. Introduction to stiffness method of analysis; slope deflection method; Moment Distribution method, and matrix methods of structural analysis.

Course Content:
Introduction to structural analysis; classification of structures; general description of plane frame; joints; supports; stability and determinacy; Basic concepts and assumptions for structural analysis Equilibrium. Analysis of Statically Determinate Structures. Plane trusses. Beams and Frames (Axial force, shear force and bending moment diagrams in beams and frames). Deflections, Method of Superposition, principles of virtual work: principle of virtual displacement; principle of virtual force using energy method in beams, frames and trusses, Influence lines and moving Loads, Analysis of statically indeterminate structures; by the force method (method of consistent deformation) – frames and trusses, Introduction to stiffness method of analysis; slope deflection method; Moment Distribution method, Introduction to matrix methods; 1 DOF systems, trusses.Pre-requisite(s): CEG 321.1, ENG 208.2, ENG 203.1

CEG 353.2: Surveying for Construction (3 credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Identify route surveys and designs
2. Review the levelling processes and their applications in civil construction works.
3. Prepare longitudinal profiles and cross sections of roads.
4. Compute areas and volumes of earthworks.
5. Calculate and set out transition curves for road design.

Course Content:

Route location surveys and designs: Review of leveling process and its applications in civil construction works. Longitudinal profiles and cross sections. Grades for roads, sewers, pipeline, bridges, culverts and tunnels. Computation of areas and volumes of earthworks from coordinates. Calculations from mass haul diagrams. Curves & curve designs: Geometry of simple and compound circular curves. Calculations and setting out involving transition curves. Geometry and setting out of vertical curves. Sight distance and slope staking. Use of Digital Terrain Models (DTMs) for route planning and designs. Elements of Hydrographic surveying for civil engineering works involving water borne operations like dredging works, coastal and shore protection works, dams & irrigation schemes, flood control, etc. Basic Photogrammetry Principles to Civil & Environmental Projects Planning.

CEG 361.2: Principles of Construction (2 credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Define the functions of civil engineering procedure.
2. Explain the principles of civil engineering influence of erection procedure on design.
3. Identify the procedures for site investigation, site organization, materials, temporary works earth works, construction machinery and equipment.
4. Review the elements of construction: Domestic, industrial and multi-storey buildings, construction of foundations, floors, walls, staircases, roofing and covering frames and space construction, fire protection.
5. Identify the elements of construction: roadwork's, subways, railways, air fields, hydraulic and liquid retaining structure, dams, harbours, docks, jetties etc.,

Course Content:

Introduction to Civil Engineering Procedure: Definition and functions of civil engineering procedure. The design and construction terms. Introduction to the principles of civil engineering influence of erection procedure on design. Operation and maintenance of civil engineering facilities. General Considerations in Civil Engineering: Site investigation, site organization, materials, temporary works earth works, construction machinery and equipment. Elements of Construction: Domestic, industrial and multi-storey buildings, construction of foundations, floors, walls, staircases, roofings and covering frames and space construction, fire protection. Elements of construction, roadwork's, subways, railways, air fields, hydraulic and liquid retaining structure, dams, harbours, docks, jetties etc., Dredging and reclamation, irrigation and river works, pipe lines for water, gas and sewage. Concept of appropriate technology in civil engineering.

CEG 382.2: Civil Engineering Laboratory II (1 Credit)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Perform sieve analysis test on fine and coarse aggregates for concrete making.
2. Prepare concrete samples for testing in the laboratory.
3. Carry out slump test on fresh concrete.
4. Conduct compressive strength and water absorption test on hardened concrete.
5. Analyze and report findings from the various test carried out.

Course Content:

Practical in Materials and Structures.These practical tests include; Compressive strength and water absorption test on concrete cube samples, slump test on fresh concrete, seieve analysis test on fine and coarse aggregates to determine their grain size distribution. Test result analysis and presentation.

CEG 413.1: Civil Engineering Hydraulics (2 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Outline different water resources terminology like hydrology, ground water, hydraulics of pipelines and open channel.
2. Apply energy and momentum equations, analyze flow in closed pipes, design and select pipes with respect to sizes.
3. Classify pumps and develop a system curve used in pump selection.
4. Design and select pumps (single or multiple) for different hydraulic applications.
5. Describe open channel cross sections, hydrostatic pressure distribution and Manning's law.

Course Content:
Pipe network analysis, Design of flexible boundary channels; Hydraulic machines; Hydraulic modeling; Unsteady flow – surges in open channels and water hammer analysis; Sediment transport; Hydro power; Introduction to river and coastal engineering; Fundamentals of irrigation engineering. Pre-requisite: CEG 311.1.

CEG 443.1: Reinforced Concrete Design (2 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Apply different codes of practice in the design of concrete structures.
2. Design simple reinforced concrete elements such as beams, slabs, columns, etc.
3. Explain the difference between an eccentrically loaded short column and a slender column.
4. Understand how to check for serviceability (crack and deflection) conditions using relevant design codes

5. Synthesis the design of reinforced concrete elements into realistic structures.

Course Content:

Use of codes of practice in use for the design of concrete structures. Design of simple reinforced concrete elements. Continuous reinforced concrete beams, slabs, flat slabs; torsion; eccentrically loaded short columns and slender columns; calculation of crack width, allowable deflection and shear capacity. Design of building frames in reinforced concrete.

CEG 444.1: Steel and Timber Design (3 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Explain the concept of limit state design of steel and timber structures.
2. Identify the various strength properties of timber and classify timber species into strength groups.
3. Explain the concept of structural connections in steel structures and members.
4. Design structural steel members in bending, compression and tension;
5. Illustrate the design of timber beams and joists, axially and eccentrically loaded timber columns using relevant codes of practice.

Course Content:

Limit state design of steel structure. Connections; beams and compound beams; plate girders; crane girders; axially loaded stanchions; eccentrically loaded stanchions; crane stanchions; stanchion bases; purlins and sheeting rails; truss and lattice girdle; bracing; detailing; strength properties of timbers; design of timber beams and jots; axially loaded members; hardwood design; plywood design.

CEG 445.1: Theory of Structures II (2 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Explain the concept of moment distribution.
2. Identify the concept of yield line in reinforced concrete square slab, rectangular slab, hexagonal slab, circular slab, etc., under different support conditions.
3. Illustrate with sketches, the failure patterns of slabs of different configurations and support conditions using the concept of yield line.
4. Use yield line analysis and strip methods to design reinforced concrete slabs.
5. Explain the concepts of mechanism, plastic hinges and plastic moment in plastically designed frames and beams.

Sway in moment distribution; yield line analysis and strip methods for slabs. Plastic methods of structural analysis. Introduction to limit state analysis of reinforced concrete and steel structures. Pre-requisite: CEG 342.2.

CEG 446.1: Civil Engineering Drawing (2 Credits)

Course Learning Outcomes

At the end of this course, students are expected to:

1. Identify structures such as building structures, highways, pipelines, bridges, dams and foundations using appropriate symbols and conventions.
2. Apply scale in drawing.
3. Produce manually, civil engineering structural drawings.
4. Develop computer aided civil engineering designs and structural drawings.
5. Produce plan and side views of drawings.

Course Content:

Introduction to Civil Engineering Drawing, Basic Civil Engineering Projects for drawing and detailing; Presentation of Civil Engineering Drawing Technical Information and Requirements; Civil Engineering Drawing and Detailing in Structural Engineering, Highway, Geotechnical Engineering, Water Resources, etc.

CEG 461.1: Highway Engineering (3 Credits)

Course Learning Outcomes

At the end of this course, students are expected to:

1. Explain the terms; road system and highway engineering.
2. Generate a geometric design.
3. Design interchanges and roadways.
4. Produce highway drainage structural desgns.
5. Design rail road grade intersections.
6. Prepare flexible and rigid pavement designs.

Course Content:

Route location; Geometric design- profile and longitudinal. Highway cross section. Determination of radius. Widths, sight distances, horizontal and vertical curves. Super-elevation and transition curves. Grade separation. Design of interchanges and roadways. Design of rail-road grade intersections. Design of highway drainage structures. Flexible and rigid pavement designs; pavement evaluation and highway maintenance technology.

CEG 483.1: Civil Engineering Laboratory III (2 Credits)

Course Learning Outcomes:

At the end of this course, the students are expected to:

1. Conduct flow meter demonstration test.
2. Carry out Flow over weir test.
3. Conduct hydrostatic pressure experiment.
4. Conduct flow in open channels tests.
5. Analyze and report findings from the various test carried out.

Course Content:

Practical in Fluid Mechanics/Hydraulics and Public Health Engineering. These practical tests include; Flow over weirs experiments, Flows in open channel experiment, Flow meter demonstration test and energy losses in pipes test. Analysis and report of result findings.

CEG 514.1: Water and Wastewater Engineering (2 Credits)

Course Learning Outcomes

At the end of this course, students are expected to:

1. Explain the terms, water and waste water treatment.
2. Apply knowledge of mathematics, physics, chemistry, and microbiology to solve engineering problems related to water and wastewater collection, transport, quality and treatment.
3. Use the fundamental principles of mass balance, chemical kinetics and equilibrium to design water or wastewater reactors to achieve a desirable treatment goal.

4. Analyze and discuss water quality data.
5. Formulate a preliminary design of water or waste water treatment plant.

Course Content:

Basic microbiology. Aqueous chemistry. Water pollution parameter. Water quality. Water demand. Characteristics of water and waste water. Water treatment units (pre-treatment, coagulation/flocculation, sedimentation, filtration, waste water flows and characteristics. Waste water collection systems. Design of sanitation and wastewater treatment units (VIP, septic tank systems, imhoff tank, waste stabilization ponds). Water reuse. Effluent water quality. Disinfection. Quality and environmental hygiene. Sludge disposal. Urban drainage. Loads on buried pipes. Water and waste water quantity estimation. Pre-requisite: CEG 311.1.

CEG 515.2: Water Resources Engineering (2 Credits)

Course Learning Outcomes

At the end of the course, students are expected to:

1. State the various components of hydrologic cycle that affect the movement of water in the earth.
2. Describe stream flow measurements technique i.e. the concepts of movement of ground water beneath the earth.
3. Outline the basic requirements of irrigation and various irrigation techniques and requirements of the crops.
4. Outline distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design.
5. Identify the basic components of river training works.

Course Content:

Engineering economics in water resources planning, irrigation and water requirements; hydroelectric power, drainage/flood-damage mitigation; planning for water-resources development. Probably concepts in designs, flood and rainfall drought. Application of rainfall distribution, flow-duration curves, flood routing methods, rating curves surges in open channel and sedimentation in the design of dams/reservoirs. Multipurpose reservoirs storage analysis and examination of the existing Nigerian dams/reservoir designs, operation and management policies. Pre-requisite: CEG 311.2 and CEG 312.2.

CEG 516.2: Pollution Control Engineering (2 Credits)

Course Learning Outcomes

At the end of the course, students are expected to:

1. Identify current forms of environmental pollution and an overview of both their causes and consequences to natural, economic and social systems.
2. Recognize the fundamental principles governing the interactions between systems (i.e. transport of pollutants in the environment),
3. Outline examples of good practice of technologies and options used to remediate reduce/eliminate pollution of the environment,
4. Analyze, synthesize, and evaluate evidence to understand problems.
5. Choose measures and techniques concerning atmospheric, water or terrestrial challenges.

Course Content:

Wastewater reuse and disposal; sludge treatment and disposal options. Review of solid waste collection treatment and disposal options with emphasis on landfill and windrow composting techniques and the design of simple one chamber incinerators; Health and environmental aspects of solid waste management; introduction of Environmental noise/vibrations standards; Air pollution sources effects and control; Domestic pest impact and control.

CEG 517.2: Design of Drainage Systems (2 Credits)

Course Learning Outcomes

At the end of the course, students are expected to:

1. Understand open channel hydraulics, flows, and properties.
2. Conduct designs of storm sewers and open drains.
3. Identify channels with composite sections and design channels with partially full pipes.
4. Compute and design sanitary sewers and simplified sewerage systems.
5. Explain loads on buried pipes, and strength of rigid pipes

Course Content:

Introduction: hydraulic design, appurtenances, ventilation of sewers, pipe material. Open channel hydraulics: open channel flows, channel properties, uniform flow equations, empirical equations, rational method. Channels with composite sections, channel design flow in partly full pipes. Design of storm sewers: peak runoff estimate, hydraulic design of storm sewers. Design of Open drains: design approach, conveyance (K), section factor (Z). Design of sanitary sewers: design principle, computation, design of conventional sewer network, design of simplified sewerage system. Loads on buried pipes: strength of rigid pipes, beddings, allowable loads on pipes. Sub-surface drains

CEG 518.1: River Engineering (2 Credits)

Course Learning Outcomes

At the end of the course, students are expeted to:

1. Identify mechanics of alluvial rivers, including channel and floodplain features, sediment transport and budgets, channel morphology, and various classification schemes.
2. Explain ecohydraulics and river corridor functions.
3. Recognize watershed and reach scale mechanisms that degrade river systems.
4. State bioremediation techniques of contaminated rivers.
5. Analyze time series of flow, sediment, and channel geometry data, and 1D numerical modeling.

Course Content:

Introduction – Mechanics of alluvial rivers, including channel and floodplain features, sediment transport and budgets, channel morphology, and various classification schemes. Ecohydraulics and River Corridor Functions. Watershed and reach scale mechanisms that degrade river systems. Bioremediation techniques of contaminated rivers. Classification review, natural channel design analyses. Time series analyses of flow, sediment, and channel geometry data, and 1D numerical modeling. River and restoration structures, dam removal, risks and uncertainty in manipulating rivers. Socio-cultural influences and ethics of stream restoration, permitting, and discussion effective communication (written and oral). Group design project presentations during final period

CEG 534.1: Foundation Engineering (2 Credits)

Course Learning Outcomes

At the end of the course, students are expeted to:

1. Identify the need for site exploration and characterization of site for geotechnical engineering designs.
2. Recognize different in - situ and laboratory test in soil mechanics and their use in foundation design.
3. State the different types of foundations, bearing capacities estimation for different types of soils and general foundation design.
4. Analyze and design foundations that will be within acceptable limit of settlement using relevant code of practice.
5. Analyze foundation settlements and take a technical decision on values obtained from such in order to ascertain the safety of foundation designed.

Course Content:

Site exploration and characterization; subsurface investigation: drilling geophysical methods. Bearing capacity of soils. Ultimate bearing capacity, allowable bearing pressures. Shallow foundations: Types and uses; analysis and design of shallow foundation- strip footings, pads, mat foundations and basements. Deep foundations; Analysis and design of piled foundations: methods of minimizing settlements. Pre-requisite: CEG 332.1 & CEG 333.2.

CEG 535.2: Geotechnical Structures (2 Credits)

Course Learning Outcomes

At the end of the course, students are expeted to:

1. Understand earth pressure theories.
2. Describe the equilibrium of retained soil.
3. Identify lateral earth pressures and how to estimate it.
4. Explain the differences between rigid and flexible retaining structures and where they can be used.
5. Analyze and design both rigid and flexible retaining structures as well as reinforced earth walls.

Course Content

Earth pressure theories, Rankine, Coulomb. Design and analysis of Geotechnical structures including dams, embankments, slopes, earth retaining walls (sheet pile, cantilevered gravity retaining walls, reinforced earth walls). Cellular cofferdams, caissons. Concept of factor of safety, probabilistic slope stability analysis. Design of deep excavations in soft ground. Introduction to soft ground tunneling, ground movements accompanying tunneling operations, tunnel linning designs, introduction to analysis and design of dynamically loaded machine foundations.

CEG 547.1: Reinforced/Prestressed Concrete Design (3 Credits)

Course Learning Outcomes

At the end of the course, students are expeted to:

1. Explain the concept of prestressed concrete.
2. Recognize the methods of prestressing, prestress materials and equipment.
3. Analyze and design prestressed concrete members to resist loads in flexure, shear, torsion, deflection, tension and compression
4. Deflection calculations for prestressed concrete slabs; design of tension and compression members;
5. Advantages and disadvantages of prestressed continuous members.

Course Content:

Principles and method of prestressing, prestressing materials and equipment; design for flexure, shear. Torsion; prestress, deflection calculations for prestressed concrete slabs; design of tension and compression members; advantages and disadvantages of prestressed continuous members. Deflection calculations for reinforced and prestressed concrete structures. Pre-requisite: CEG 342.1.

CEG 548.1: Civil Engineering Design (2 credits)

Course Learning Outcome

At the end of the course, students are expeted to:

1. Review the evolution of civil engineering design philosophies.
2. Design road pavements, culverts, canals, and bridges.
3. Produce designs of river training works.
4. Design sheet piles for foundations.
5. Generate structural detailing and bar dending schedules.

Course Content:

The evolution of civil engineering design philosophies, Design of road Pavements, Design of bridges, Design of culverts, Design of canals, Design of river training Works, Design of sheet piling, Advanced topics in limit state design of structural elements in steel and concrete –: Walls in reinforced concrete buildings, Torsion in concrete, Element assemblies in structural steelwork, Structural detailing; bar bending schedules. Pre-requisite(s): CEG 461.1, CEG 446.1, CEG 445.1, CEG 444.1

CEG 549.2: Structural Analysis (2 Credits)

Course Learning Outcome

At the end of the course, students are expeted to:

1. Explain the concept of elastic instability in compression members.
2. Develop Euler's buckling load for compression members under different boundary conditions.
3. Design element and global stiffness matrices to solve simple problems in structures.
4. Apply polynomial and trigonometric series to solve simple problems in structures.
5. Apply finite difference and finite element methods to estimate displacements, moments and shears at nodal points in structural members.

Course Content:

Matrix methods of structural analysis. Elastic instability. Continuum of plane strain, elastic flat and torsion. Solution of series, finite difference and finite elements.

CEG 562.1: Traffic and Transportation Engineering (3 Credits)

Course Learning Outcome

At the end of the course, students are expeted to:

1. Define the terms, traffic studies and analysis; traffic legislation.
2. Identify traffic devices and how they function.
3. Illustrate how to conduct traffic flow capacity analysis.
4. Outline data collection procedures and traffic generation distribution.
5. State the different transportation modes and terminals as well as the interaction of the different modes

Course Content:

Traffic studies and analysis; traffic legislation. Introduction to traffic devices. Introduction to traffic flow theory, capacity analysis. Urban transportation process; data collection procedures, land use forecasting procedures, traffic generation distribution, assignment and mode choice. Transportation modes (land, air, water). Transportation terminals (airports, harbours, railways) and interaction of the different modes. Pre-requisite. ENG 301.1

CEG 563.2: Highway Bridges and Culverts (3 Credits)

Course Learning Outcome

At the end of the course, students are expeted to:

1. Review the concepts of bridge planning, types, trends, economics, aesthetics, and alternative bridge designs.
2. Generate bridge loads.
3. Analyze bridge deck.
4. Design concrete slab bridge decks, and concrete slab and beam bridge decks.
5. Produce design for steel girder bridges and substructures.

Course Content:

Overview and Introduction – Bridge planning, types, trends, economics, aesthetics, and alternative bridge designs, Bridge Loads, Bridge Deck Analysis Methods, Design of concrete slab bridge decks, Design of slab and beam bridge decks, Design of steel girder bridges, Substructures, Bridge Equipment, Bridge inspection and assessment, hydraulic Design of Bridges, Culvert Design – Hydraulic and structural Design.

CEG 571.2: Civil Engineering Measurements and Construction (3 Credits)

Course Learning Outcome

At the end of the course, students are expeted to:

1. Recognize different standards of measurements in civil engineering.
2. Generate BEME for civil engineering structures.
3. Prepare project scheduling data for civil engineering structures.
4. Apply crashing in civil engineering construction works.
5. Evaluate civil engineering structures for billing.

Course Content:

Civil Engineering standard Method of Measurement (SMM); Bill of Engineering Measurements and Evaluation (BEME); work classification –demolition, excavation and earthwork. Tender and contract document. Construction methods and practices, application and limitation; factors involved in selection of plant, equipment and materials; factors affecting equipment output, Introduction to construction methods for common civil Engineering structures such as foundations, buildings, road, bridges, tunnels, drains. Contract administration. Financial scheduling and management of time. Construction safety and health.

CEG 572.2: Construction Site Management (2 Credits)

Course Learning Outcome

At the end of the course, students are expected to:

1. Analyze construction documents for planning and management of construction processes.
2. Analyze professional decisions based on ethical principles.
3. Analyze methods, materials, and equipment used to construct projects.
4. Creat construction project schedules.

Course Content:

This course is designed to expand the practical side of engineering knowledge. This course concentrates on the practical side of the construction field. In the field, the construction work will be completed with the assistance of contract documents such as contract drawing, specification, BEME, shop drawing, method statement, and inspection test and plan. In this course, samples of different contract documents will be reviwed, and the importance of these documents and how to use them will be discussed.

CEG 584.1: Computer –Aided Design in Civil Engineering (2 Credits)

Course Learning Outcome

At the end of the course, students are expected to:

1. Demonstrate basic concepts of the AutoCAD software
2. Apply basic concepts to develop construction (drawing) techniques
3. Ability to manipulate drawings through editing and plotting techniques
4. Understand geometric construction

5. Produce template drawings and 2D orthographic projections.

Course Content:

The use of computer aided design packages in Civil Engineering design- hydraulics, structure, geotechnical Engineering, Work Scheduling.

CEG 585.1: Risk analysis and reliability-based design (2 Credits)

Course Learning Outcome

At the end of the course, students are expected to:

1. Review of probability based design concept.
2. Identify the importance of risk and uncertainty consideration in civil infrastructural designs.
3. Apply first-order statistical analysis for systematic analysis of uncertainties.
4. Use failure probability as a measure of risk and safety.
5. Apply practical methods for risk assessment.

Course Content:

Existing probability bases of reliability analysis and reliability-based design are summarized. The importance of risk and uncertainty considerations in civil infrastructure evaluation and design is emphasized, and practical methods for risk assessment in terms of failure probability and for development of reliability-based design criteria are described and developed. The systematic analysis of uncertainty through first-order statistical analysis, and the explicit use of failure (or survival) probability as a measure of risk and safety, to fully realize the potentials of probability theory in structural evaluation and design.

CEG 591.1: Technical Seminar (2 Credits)

Course Learning Outcome

At the end of the course, students are expected to:

1. Identify a research problem or research question.
2. Outline the methodology of working with primary sources and performing patent searches.
3. Design the main body of any research work.
4. Describe their research work.
5. Appraise the research works of other students.

Course Content:

Research tools. Aspects of a technical paper. Referencing styles. Structuring a literature review. Critique. Presentation skills. Plagiarism check tools. Paraphrasing techniques. Introduction to software that ease the writing of quality papers. Qualities needed in public speaking. Presentation of design and/or Industrial Training Reports. Each student presents a report on some aspect of a design/or in work experience during the Fourth year Industrial Training. Students will investigate cutting edge research in the environmental engineering field including experimental studies, current environmental policy changes, and current literature, and/or laboratory experimentation.

CEG 592.2: Final Year Project (6 Credits)

Course Learning Outcome

At the end of the course, students are expected to:

1. Initiate worthwhile projects of a research or professional nature.

2. Analyze the project problem and develop creative proposals for the solution.
3. Execute the proposal for the solution to the problem.
4. Develop clear and persuasive communication skills, both orally and written.

Course Content:

Each student in the final year carries out an individual project. The choice of the project is made at the end of the fourth year from a list compiled by academic staff of Civil Engineering Department. Alternatively, after consultation with a relevant member of staff, students may carry out a project in an area chosen entire by them. The choice of topic enables the student to study, in depth a field in which he/she is interested. Each student spends at least 6 hours a week on his/her project and is responsible for the planning, design, construction, experimentation, analysis and presentation of a report. Each member of staff acts as a supervisor for three or four final year project. A written report on the project is submitted at the end of the second semester in the final year and this form a basis for a one hour oral examination with the Board of Examiners.

Environmental Engineering Programme – Schedule of Courses

Year One

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
GES 100.1	Communication Skills in English	3	0	3
GES 102.1	Introduction to Logic & Philosophy	2	0	2
CHM 130.1	General Chemistry I	2	3	3
PHY 101.1	Mechanics & Properties of Matter	3	0	3
PHY 102.1	Physics Laboratory I	0	3	1
MTH 110.1	Algebra and Trigonometry	3	0	3
MTH 120.1	Calculus	3	0	3
ENG 101.1	Engineering Drawing I	1	3	2
Total		**17**	**9**	**20**

Second Semester				
Course Code	**Course Title**	**L**	**P**	**C**
GES 101.2	Computer Appreciation and Application	2	0	2
GES 103.2	Nigerian Peoples and Culture	2	0	2
CHM 131.2	General Chemistry II	2	3	3
CHM 132.2	Principles of Organic Chemistry	3	0	3
PHY 112.2	Electricity and Magnetism	3	0	3
PHY 103.2	Physics Laboratory II	0	3	1
MTH 124.2	Co-ordinate Geometry	3	0	3
ENG 102.2	Engineering Drawing II	1	3	2
ENG 103.2	Engineer in Society	1	0	1
ENG 104.2	Manufacturing Tech/Workshop Practice	1	3	2
Total		**18**	**12**	**22**

Year Two

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
EVE 201.1	Environmental Engineering Microbiology	2	0	2
EVE 202.1	Environment and sustainable development	2	0	2
PHY 216.1	Vibration, Waves & Optics	3	0	3
ENG 201.1	Engineering Mathematics 1	3	0	3
ENG 202.1	Engineering Mathematics II	2	0	2
ENG 203.1	Engineering Mechanics	2	0	3
ENG 204.1	Basic Engineering Materials	2	0	2
ENG 210.1	Basic Electrical Engineering	3	0	3
ENG 212.1	Community Service	0	3	1
ENG 213.1	Computer Programming for Engineers	2	3	2
Total		**19**	**6**	**23**

Second Semester				
Course Code	**Course Title**	**L**	**P**	**C**
EVE 203.2	Public Health Engineering & Radiology	2	0	2
EVE 204.2	Environmental Engineering Chemistry	2	0	2
EVE 205.2	Environmental Pollution and Ecology	2	0	2
ENG 205.2	Engineering Laboratory I	1	3	1
ENG 206.2	Engineering Mathematics III	3	0	3
ENG 207.2	Basic Fluid Mechanics	2	0	2
ENG 208.2	Basic Strength of Materials	2	0	2
ENG 209.2	Basic Thermodynamics & Heat Transfer	3	0	3
ENG 211.2	Engineering Laboratory II	1	3	1
CEG 231.2	Engineering Geology	2	0	2
Total		**20**	**6**	**20**

Year Three

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
EVE 301.1	Introduction to Geochemistry	2	0	2
ENG 301.1	Engineering Mathematics IV	3	0	3
ENG 302.1	Engineering Communication	2	0	2
CEG 311.1	Fluid Mechanics	3	0	3
CEG 321.1	Strength of Structural Materials	3	0	3
CEG 323.1	Civil Engineering Materials	2	0	2
CEG 332.1	Soil Mechanics I	2	0	2
CEG 351.1	Engineering Surveying and Photogrammetry I	2	0	2
Total		19	0	19

First Semester Vacation				
Course Code	**Course Title**	**L**	**P**	**C**
CEG 352.1	Survey Camp – 1st semester	0	6	2

Second Semester				
Course Code	**Course Title**	**L**	**P**	**C**
GES 300.2	Entrepreneurship	2	0	2
CEG 312.2	Engineering Hydrology	2	0	2
CEG 333.2	Soil Mechanics II	3	0	3
CEG 353.2	Engineering Surveying & Photogrammetry II	3	0	3
EVE 302.2	General Biology	2	0	2
EVE 303.2	Chemical Engineering Material & Energy Balances	2	0	2
EVE 304.2	Biological Fundamentals of Environmental Engineering	2	0	2
EVE 305.2	Fundamentals of Environmental Engineering and Science	3	0	3
ENG 303.2	Engineering Mathematics V	3	0	3
Total		**22**	**0**	**22**

Long Vacation				
Course Code	**Course Title**	**L**	**P**	**C**
ENG 300.3	Industrial Training I	-	-	-

Year Four

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
ENG 401.1	Engineering Mathematics VI	3	0	3
ENG 402.1	Engineering Economics	2	0	2
EVE 401.1	Chemical Fundamentals of Environmental Engineering	2	0	2
EVE 402.1	Water and Wastewater Engineering	2	0	2
EVE 403.1	Introduction to Air Pollution	2	0	2
EVE 404.1	Air Pollution Control Methods	2	0	2
EVE 405.1	Hydraulic Engineering	3	0	3
EVE 4xx.1	Innovative Course	2	0	2
Total		**18**	**0**	**18**

Second Semester and Long Vacation				
Course Code	**Course Title**	**L**	**P**	**C**
ENG 400.2	Industrial Training II	0	27	9
GES 400.2	Fundamentals of Entrepreneurship	0	6	2
Total		**0**	**33**	**11**

Innovative Courses				
Course Code	**Course Title**	**L**	**P**	**C**
EVE 406.1	Sustainable Infrastructure and Environmental Systems Analysis	2	0	2

Year Five

First Semester				
Course Code	**Course Title**	**L**	**P**	**C**
CEG 502.1	Geotechnical Engineering	2	0	2
ENG 501.1	Engineering Professional Practice & Procedure	2	0	2
ENG 502.1	Engineering Management	2	0	2
EVE 501.1	Sanitary Engineering Design	3	0	3
EVE 502.1	Research in Environmental Engineering	1	0	1
EVE 503.1	Senior Design Project	3	0	3
EVE 504.1	Environmental Law and Regulations	2	0	2
EVE 505.1	Remediation of Contaminated Groundwater and Soil	3	0	3
Total		**17**	**0**	**17**

Second Semester				
Course Code	**Course Title**	**L**	**P**	**C**
EVE 506.2	Public Health Engineering	2	0	2
EVE 507.2	Waste Management Engineering	2	0	2
EVE 508.2	Environmental Systems Modelling	2	0	2
EVE 509.2	Water Resources and Environmental Engineering	2	0	2
EVE 510.2	Environmental Risk Assessment and Management	2	0	2
EVE 511.2	Environmental Assurance/QC & Safety	2	0	2
EVE 5xx.2	Innovative Course	2	0	2
EVE 520.2	Project	6	0	6
Total		**20**	**0**	**20**

Innovative Courses				
Course Code	**Course Title**	**L**	**P**	**C**
EVE 514.2	Economy and Resource Recovery from waste	2	0	2

4.3 Environmental Engineering Programme – Course Contents

4.3.1 General Studies Courses (GES)

GES 100.1: Communication Skills in English (3 Credits)

Study skill and methods including use of language and use of the library. Listening comprehension skill. Reading skills. Using grammar in reading and writing. Writing skills. Examination techniques.

GES 101.2: Computer Appreciation and Application (2 credits)

History of computers. Generations and classification of computers. IPO model of a computer. Components of a computer system hardware and software. Programming languages, organization of data. Data capture techniques. Introduction to computer networks. Software and its application. Use of keyboard as an input devices. DOS, windows, word processing, spreadsheets. Application of computers in medicine, social sciences, humanities, education and management sciences.

GES 102.1: Introduction to Logic and Philosophy (2 credits)

The nature, definition and branches of philosophy. Philosophy and other disciplines. Nature and branches of philosophy. Periods in the history of philosophy. Philosophy and national development. Types of argument and reasoning. Inferences.

GES 103.2: Nigerian Peoples and Culture (2 credits)

The concept of culture. Pre-colonial cultures and languages of Nigeria. Principles of kinship, descent and marriage in Nigeria cultures. Nigerian development in Nigeria. Religion in Nigerian culture. Culture, environment and health practices in Nigeria.

GES 300.2: Fundamentals of Entrepreneurship (2 credits)

The course discusses the concept, history and the development of entrepreneurship; the entrepreneur qualities and characteristics; the entrepreneur and business environment; identifying business opportunities; starting and developing new business ventures; legal forms of business ownership and registration; types of business ownership; feasibility studies; role of small and medium scale enterprise (SME) in the economy; role of government on entrepreneurship; business location and layout; accounting for SME; financing SME; managing of SME; marketing in SME; risk management of SME; success and failure factors of SME; prospects and challenges of entrepreneurship and intrapreneurship, ethical behaviour in small business.

GES 400.2: Entrepreneurship Project (2 credits)

The course focuses on engaging the student in individual or group project to select product(s) or service(s), conduct a feasibility study, design and develop the product/service, design its manufacturing system and marketing strategies, and determine the modalities for establishing and operating an enterprise based on the product/service. It is expected that the knowledge and experience gained in the Entrepreneurship Project would evolve in the desire and capability of the students for self-employment as small-scale-industry (SME) entrepreneurs. Pre-requisite: GES 300.2.

4.3.2 Sciences Courses [CHEMISTRY (CHM), PHYSICS (PHY), MATHEMATICS/COMPUTER SCIENCE (MTH)]

CHM 130:1: General Chemistry I (3 credits)

Basic principles of matter and energy from the chemist's point of view. A broadly based course suitable for students from various schools as well as those from the faculty of sciences. Topics to be covered will include atomic theory and molecular structure stoichiometry, the periodic classification of the elements, atomic structure, chemical bounding, properties of gases, solids, liquis and solutions, chemical equilibrium, ionic equilibria, chemical thermodynamics, electro-chemistry and chemical kinetics. (includes laboratory sessions.)

CHM 131.2: General Chemistry II (3 Credits)

Application of the principles of chemical and physical change to the study of the behaviour of matter and the interaction between matters. Course content includes the chemistry of representative elements and their common compounds with emphasis on gradation of their properties-brief chemistry of the first series of transition elements, general principles of extraction of metals; introductory nuclear chemistry (includes lab session).

PHY 101.1: Mechanics and Properties of Matter (3 Credits)

Topics covered in this course will include the following: motion in one dimension, motion in a plane, work and energy, conservation laws, collisions, solid fraction, rational dynamic, equilibrium of rigid bodies oscillations, gravitation, fluid statics and fluid dynamics. Surface tension, elasticity and viscosity. Pre-requisite: WASC credit in physics, PHY 300 or equivalent.

PHY 102.1: Physics Laboratory I (1 Credits)

Laboratory exercises drawn from PHY 101.1

PHY 112.2: Electricity and Magnetism (3 Credits)

This is an introductory course on electricity and magnetism. Topics covered will include the elastic field. Gauss law. Electric potential, capacitors and dielectric, current and resistance, electromotive force and circuits, the magnetic field, Ampere's law, Faradays law of induction.

PHY 103.2: Physics Laboratory II (1 Credits)

The experiments carried out in this course will cover areas discussed in PHY 112.2. These experiments includes verification of the laws of electricity. Measurement of the electrical properties of conductors; D.C. and A.C circuit properties, series and parallel resonant circuits; transformer characteristics; and other electrical circuit problems.

PHY 216.1: Vibration, Waves and Optics (3 Credits)

This course is an introduction to oscillations and waves phenomena. Topics covered will include vibrations and waves, types of waves, sound waves and wave optics.

MTH 110.1: Algebra and Trigonometry (3 Credits)

Elementary notion of set, subset, union. Intersection, complements; ven diagram. Real numbers, integers. Rational and irrationals, mapping of a set. Real functions and their compositions. Quadratic functions. Cubic function. Roots of quadratic and cubic functions. Partial fractions. Equations with complex roots. Complex number, geometric representation of complex numbers. De moirvers, series and sequences. Principles of mathematical induction. Binomial theorem. Trigonometric function of angles. Circular functions. Addition theorems. Double and half angles.

MTH 120.1: Calculus (3 Credits)

Function of a real variable, graphs, limits and idea of continuity. The derivation as limit of rate of change. Techniques of differentiation. Methods of change. Techniques of differentiation: methods of integration. Definite integrals. Application of areas, volumes.

MTH 124.2: Coordinate Geometry (3 Credits)

Straight lines, circles, parabola, ellipse, hyperbola. Tangents, normal. Addition of vectors. Scalar and vector products. Vector equation of a line and plane. Kinematics of a particle. Components of velocity and acceleration of a particle moving in a plane. Force, momentum, laws of motion. Under gravity, projectiles, resisted particle motion, elastic, string, simple pendulum impulse. Impact of two smooth sphere, and a sphere on a smooth sphere. Addition of vectors.

4.3.3 Engineering Science Courses (ENG)

ENG 101. 1: Engineering Drawing I (2 Credits)

Introduction to drawing instruments, scales, draughting aids and their proper use. Size of paper and drawing layout. Dimensioning, line work and lettering. Geometrical constructions and engineering graphics. Development of geometric figures and intersection of solid and curves. Introduction to projections.

ENG 102.2: Engineering Drawing II (2 Credits)

Orthographic projections in first and third angles. Isometric projection; sections and sectioning, auxiliary views and staggered sectioning. Freehand sketching. Conventional practices with simple examples, including threads and threaded fasteners, cam profile and assembly drawing from detailed components. Pre-requisites ENG 101.1.

ENG 103.2: Engineer-in-Society (1 Credit)

History of engineering and technology and the philosophy of science. Development of the engineering industry up to the present dat. Safety and health at work. The role of engineers in nation building. Food production, housing, transportation, employment opportunities, energy supply, communication and social infrastructure, etc. The choice of Engineering solutions and decision-making process, risk analysis, etc. lectures by invited professionals

ENG104.2: Manufacturing Technology /Workshop Practices (2 Credit)

Manufacturing methods with metal materials (cold and hot workings) such as deep drawing; wire drawing; spinning and rolling; extrusion. Machine-tool manufacture (turning, milling and shaping, etc., metal-casting; manufacture of plastic products (moulding and blowing). Use of hand tools, bench work and measuring instruments. Fitting and joining processes (soldering, brazing) wood-working and machinery. Surface finishes, forging etc.

ENG 201.1: Engineering Mathematics I (Mathematics Analysis) (3 Credits)

Functions of several variables: functions of 2,3 or more variables, partial derivatives, differential, total differentials, application to approximate computations. Higher-order partial derivatives and differentials. Differentiation of composition, and implicit functions several variables. Exterma and conditional extremum. Change of variables. Multiple integrals: double and triple integrals, analysis in Cartesian coordinates, change of variable to polar, cylindrical, and spherical coordinates, curvilinear coordinates, application to problems of mechanics. Integral dependent on parameters, improper integrals, line integrals, green's formula, conditions for independence of line integral on path, application of problems of mechanics and thermodynamics. Surface integrals, fluid flux across a surface, properties, stroke's formula. Fluid theory, vector field and vector lines. Applied series: expansion of power series, application of Taylor's series, Fourier series orthogonal system of functions, the Parseval's relation. Hilbert space, orthogonality with weight function, Fourier integral, Fourier transformation, applications. Special functions, gamma, beta, error, Bessel, legendre and hypergeometric functions. Introduction to analytic functions, Cauchy-Riemann equations, conformal mappings. Pre-requisite: MTH 120.1; ENG 202.1: Engineering Mathematics II

ENG 202.1: Engineering Mathematics II (Linear Algebra & Analytic Geometry) (2 Credits)

Surfaces and curves in space, cylinders, cones, and surfaces of revolution. First and second-order algebraic surface, ellipsoids, hyperboloids and paraboloids. Systems of linear equations. Determinants, minors and cofactors, evaluation methods. Vectors space, linear spaces, Euclidean space, orthogonality, change of basis, inverse matrix, eigenvectors and eigenvalues of matrix, rank. Linear mapping, symmetric, bilinear and quadratic forms. Differentiation and integration of matrices. Application of matrix algebra pre-requisite MTH 110.1 and 124.1.

ENG 203.1: Engineering Mechanics (Statics and Dynamics) (3 Credits)

Basic concepts and principles of mechanics, equilibrium of particles in 2 and 3 dimensions, moment and couple, system of forces, equilibrium of rigid bodies, friction wedges, screw, wheel bolts and statically determinate structure-beams, trusses, frames and mechanics. Linear and curvilinear motions, acceleration, kinetics of parties, Newton's second law, impulse, momentum, impact and restitution, work, energy, power and efficiency. Pre-requisite: PHY 101.1 and MTH 120.1

ENG 204.1: Basic Engineering Materials (2 credits)

Atomic and crystal structure, crystal imperfections and impurities in solids. Fundamentals of crystallography. Atomic vibration and diffusion. Mechanics properties engineering and true stress strain curves, ultimate strength, ductility, impact strength, hardness. Electrical properties-conductivity, semi-conductivity and super conductivity. Optical and magnetic properties of materials. Simple phase diagrams of alloys, with emphasis on the iron-iron carbide system. The relationship between structure and properties. Creep, fatigue. Heat treatment processes. Stability of materials in the services environment corrosive media, sub-zero and elevated temperature, irradiation. Basic criteria for the selection of materials for engineering applications. Engineering properties of wood, concrete, ceramics, polymers and non-ferrous metals and alloys. Pre-requisite: CHM 131.2 and MATH 124.2

ENG 205.2: Engineering Laboratory I (3 Credits)

Assigned laboratory exercises to reflect the basic engineering courses in applied mechanics, materials science, fluid mechanics, strength of materials. Thermodynamics and heat transfer. Guidance on specific experiments and calculation will be provided by the various lecturers.

ENG 206.2: Engineering Mathematic III (Differential Equations) (3 Credits)

Ordinary differential equations; first-order equation, examples of Engineering model, equations with variables separable, Bernoulli's equation; exact equations; the envelops of a family of curves, singular solutions, Clairaut's and Lagrange's equations, orthogonal and isogonal trajectories. Second-and higher-order equations and system of first order equations, first integrals. Linear equations, general theory, boundary value problems. Euler's equations, geometrical and physical interpretation of solutions. Operators and the operator method of solving equations, system of linear equations. Operational calculus, Laplace transforms theory and application to initial-value problems. Introduction to partial differential equations elliptic, hyperbolic and parabolic equations. Pre-requisite: MTH 120.1 and 124.2

ENG 207.2: Basic Fluid Mechanics (2 Credits)

Fluid properties, fluids statics, principles of fluid flow and applications, flow measurements. Real fluid flow, curvilinear flow (two-dimensional). Dimensional analysis and similitude. Pipe flow and friction factors. Boundary layers and drag. Pre-requisite: PHY 101.1 and ENG 211.1

ENG 208.2: Basic Strength of Materials (2 credits)

Force equilibrium free body diagrams, centroids and second moment of area. Concept of stress and stain; stress diagram. Axially loaded members, composite bars; temperature stresses; relation between elastic constants. Thin cylindrical spherical and conical pressure vessels, cylindrical shells with rings, torsion of circular shaft and power transmission of shafts. Axial force, shear force and bending moment diagrams. Pure bending of beams, bending stresses in composite beams, shearing stresses in beams, complex stresses; principal stresses. Pre-requisite: ENG 211.1

ENG 209.2: Basic Thermodynamics and Heat Transfer (3 Credits)

Engineering thermodynamics: basic concepts definitions, thermodynamic properties; the thermodynamic system units; equations of state for perfect and real gases, and gas mixtures, thermodynamics work and heat; the first law of thermodynamic, energy equations and analysis; basic thermodynamic, energy equations and analysis; basic thermodynamics and introduction to irreversible relations; the second law of thermodynamics and introduction to irreversible processes. Heat transfer basic concepts, heat transfer modes and rate processes. Fourier's law of heat conduction; Newton's of cooling; Stephan-Boltzmann law of thermal radiation and configuration factor algebra; stationary heat conduction in simple geometries and composite bodies; correlational equations for convective heat transfer, boiling and condensation; heat transfer by combined modes; insulation and intensification of heat transfer; electrical and triple analogies; introduction to heat exchangers. Pre-requisite: PHY 101.1

ENG 210.1: Basic Electrical Engineering (3 Credits)

Circuit elements (R,L,C) DC and AC circuits and signal electrostatics and electromagnetism, basic circuit laws and theorems. Three phase circuits, power and power factor. Electrical and electronic measurements and measuring instruments. Introduction to machines. Introduction to electronics; semi-conductor. Pre-requisite PHY 101.1

ENG 211.2: Engineering Laboratory II (1 Credit)

Assigned laboratory exercise to reflect the basic engineering course in electrical/electronics. Guidance on specific experiments and calculations will be provided by the lecturer.

ENG 212.1: Community Services (1 Credit)

Civil work beneficial to the university community and its environs including but not limited to farming, road building and maintenance, landscaping, planting of flowers and hedges, grass-cutting and general cleaning of campus and its environs. Concreting and laying of seating and footpath slabs.

ENG 213.1: Computer Programming for Engineers (2 Credits)

Computers, computing and engineering, algorithms, flour chart and pseudo code. Computer languages, programming in Fortran? Or later versions. Debugging techniques. Computer code security. Laboratory: hands-on experience on computer through the use of compliers to run programs and to solve simple analysis problems in fluid, the thermodynamics, heat transfer and electrical systems.

ENG 300.3: Industrial Training I (Pass or Fail)

The practical exposure of the student through direct participation in the work of an industry, to real like working condition. During the training, the student acquires a familiarity with engineering works, organization. Physical layout, and the flow of information, materials and operations. This information is expected to complement and integrate the student's classroom instruction and laboratory/workshop exercise. Duration: 3 months.

ENG 301.1: Engineering Mathematics IV (Probability and Statistics) (3 Credits)

Theory of probability: motivation, probability models, probability axioms, combinatorial problems. Conditional probability, independence of events, Bernoulli trials. Discrete and continuous random variables, mass, distribution, and generating functions, random vectors, independent random variables, exponential distribution, reliability, failure density, hazard function, some important distributions, functions of two random variables, transform methods, computation of means time to failure, inequalities and limit theorems. Conditional distribution and expectation, stochastic process, Bernoulli, Poisson, and renewal processes, availability analysis, random incidence. Instruction to discrete and continuous Markova chains. Measures of central tendency. Statistical inference, parameter estimation, hypothesis testing. Regression, correlation and analysis of variance. Elements of experimental design. Pre-requisite: ENG 201.1

ENG 302.1: Engineering Communication (2 Credits)

Data gathering and presentation. Technical correspondence; letter of inquiry and replies, letter of application and memoranda. Illustrating technical writing using tables, graphs, diagrams, equations and appendices. Report writing: progress reports, proposals, students project, thesis and dissertations, oral and visual presentations. Computer –aided technical writing and presentation; words processing and words-processing software packages.

ENG 303.2: Engineering Mathematics V (Numerical Methods and Computer Application) (3 Credits)

Review of the number systems and error analysis. Numerical schemes, error analysis, computer algorithms and program for the solution of the following problems of linear equations, determinants and matrix eigenvalue problems; approximations; data fitting, orthogonal polynomials, least-squares, splines and fast Fourier transforms; differentiations and integration; difference equation; differential equations by Rubge-Kutta and other methods; boundary-value problems in ODE. Introduction to the finite-difference method for partial differential equations. Pre-requisite: ENG 202.1 & ENG 206.

ENG 400.2: Industrial Training II (9 Credits)

The practical exposure of the student through direct participation in the work of an industry, to real like working condition. During the training, the student acquires a familiarity with engineering works, organization. Physical layout, and the flow of information, materials and operations. This information is expected to complement and integrate the student's classroom instruction and laboratory/workshop exercise. Students give a presentation of their experience and submit a report at the end of the training. Duration: 6 months.

ENG 401.1: Engineering Mathematics VI (Mathematical Modelling and Operation Research) (3 Credits)

Basic concept methodology, structures, information support and systems approach. Synthesis, analysis, validation and computer simulation of mathematical methods. Mathematical modelling of engineering problems at micro, micro and meta-level. Inverse problems; unconstrained and constrained problems. Introduction to operation research. Sensitivity analysis; linear, integer, goal, geometric, dynamic, nonlinear and stochastic mathematical programming. Allocation, routing, searching, project scheduling, sequencing, replacement, inventory, gaming and queuing problems. Computer aided mathematical modelling of engineering systems, processes and operations. Application software packages. Pre-requisite: ENG 206.2, ENG 301.1 & ENG 303.2

ENG 402.1: Engineering Economics (2 Credits)

Scope of engineering investment decisions, compounding, discounting and economic equivalence; cash flow analysis and inflation. Choosing between alternatives; methods for evaluating investments; depreciation, taxes, and cost of capital; comparing alternative investment; replacement analysis budget and budget control, evaluation of public

projects. Decision and cost analysis; lease-or-by decisions; economic feasibility study of engineering projects. Computer-aided engineering economics. Pre-requisite: ENG 301.1

ENG 501.1: Engineering Professional Practice & Procedure (2 Credits)

Registration of engineering, duties and code of conduct and practice. Ethics, professional responsibilities and practice of Engineering in Nigeria. Typical problems and solutions in various areas of engineering. Engineering projects, planning, feasibility studies and their relevance, guide pre-design survey and stages of engineering design project scheduling. Law: sources and branches of Nigeria law, courts and tribunals. Law of contracts, the engineer as an expert witness. Industrial legislation concerned with incapacity or injury, working conditions, wages, redundancy, trade unions, structure, right and liabilities. Industrial disputes, safety and environmental protection. Pre-requisite: good academic standing.

ENG 502.1: Engineering Management (2 Credits)

Organization structure, goals and functions. Project planning and control. Cost engineering; capital and operating cost estimating, contingencies and allowances. Production forecasts. Phases and constraints, decline functions. Productivity improvement. Purchasing and materials management. Maintenance management. Contract management. Pre-requisite: Good academic standing.

4.3.4 Civil Engineering Programme Courses (CEG)

CEG 231.2: Engineering Geology (2 Credits)

Geological and Mechanical Principles: Geology and (Civil) Engineering, Rock forming minerals, Rock Types and Soil Types, Soil and rock properties. **Geological Structure Analysis:** Geological structures, Plate Tectonics, Geological Time (relative and absolute geological age), Geological Maps and Sections, Discontinuities Analysis (Hemispherical projection). **Processes in Engineering Geology:** Weathering and Soils, Surface Processes (Floodplains and Alluvium, Glacial Deposits, Climatic Variants), Coastal Processes, Groundwater flow. **Geological and Geophysical Site Investigation:** Site Geological Investigation; Boreholes, Airphoto and Remote Sensing. Engineering Geophysics. **Engineering Geology in Practice:** Assessment of Difficult Grounds, Rock Excavation, Tunnel and Underground Spaces, Foundation of Structures (Buildings, Bridges, Roads & Rails and Dams). **Applied Engineering Geology:** Slope Failure and Landslides (Types, Effect of Groundwater, Stabilization, and Hazard). Subsidence (Land Subsidence, Mining Subsidence, Subsidence in Karstic Areas), Earthquakes, Rock as Construction Materials (Dimension Stone & Aggregates). **Case Studies:** Nigeria Geology

CEG 311.1: Fluid Mechanics II (3 Credits)

Boundary layer Concepts; Turbulent pipe flow and simple pipeline design problems; Pipe flow systems – pipes in series, parallel and branch pipes; Uniform open channel flow – Flow in partly full pipes, Design of unlined channels; Non-uniform open channel flow – critical flow, rapidly varied flow, gradually varied flow; Hydraulic structures – weirs, culverts, overflow spillways, stilling basins and channel transition.

CEG 321.1: Strength of Structural Materials (3 Credits)

Advanced topics in bending moment and shear force in beams, theory of bending beams, Deflection of beams, Unsymmetrical bending and shear center, Applications, Strain energy, Bi-axial state or stress, Transformation of stresses, Mohr's circle, Failure theories. Springs. Creep. Fatigue fracture and stress concentration. Combined stress in bending and torsion; Elements of the compound and composite cross-sections in bending and compression, thick cylinders. Bending and curved bars of small initial curvature, open-coiled and arrangements of springs. Theory of column; critical load and critical stress; Euler's theory and its limitations; short, medium and long struts.

CEG 323.1: Civil Engineering Materials (3 Credits)

Composition of concrete. Properties of concrete making materials: Portland cement, aggregate, water, admixtures and miscellaneous materials. Design and theodolite traversing. Traverse computations adjustment. Triangulation and trilateration. Principles of leveling and sources of errors.

CEG 332.1: Soil Mechanics I (3 Credits)

General Engineering considerations: Soil description: index properties, phase relationships; origin of soils: process of soil formation; soil classification; soil as construction materials; clay mineralogy. Water flow in soils: permeability and seepage; flow nets and method of construction of flow nets. Filter and seepage control; Principles of effective stress.

CEG 351.1: Engineering Surveying and Photogrammetry I

Introduction to surveying: Basic definition and classification. The figure and shape of earth's surface.Uses& care of basic surveying instruments.Basic mathematical calculations used in surveying: Concept of Units & scales in surveying measurements. Introduction to plane rectangular co-ordinate systems.Basic Surveying Measurements: Linear& Angular measurements.Distance measurements with Tapes, EDM, Total Station and GPS. Corrections applicable to measured distances. Angle measurementson plane surface with compass, theodolite and total stations.Methods of Horizontal control establishment: Co-ordinates determination by methods of traversing, triangulation, trilateration, intersection, resection and GPS. Height determination by levelling process: Principles & Processes involved in spirit & trigonometrical levelling. Uses & Application of levelling in civil engineering works. Introduction to tacheometry: Distance and height measurements by tacheometric principle.

CEG 352.1: Survey Camp (2 Credits)

This 2-week camp in the field is intended for students studying for the Civil and Environmental degrees respectively. This camp will either take place during the Easter vacation, or immediately after the first semester examination of every session. The aim of the camp is to consolidate on the knowledge and skills learnt in the course CEG 351.1, and to further teach problem solving skills in relation to practical surveying problems, and to equip the student with group work skills and engender tolerance of diversity of opinions. In addition, the course will further equip the students with simple technical report writing skills. The content of the course will be in project form, which will be based on the basic surveying operations such as traverse, levelling and tacheometry, with the preparation of a site plan or map for civil engineering design. Other tasks may be performed in addition to the above, depending on the resources available and this will vary from year to year. Pre-requisite: CEG 351.1.

CEG 312.2: Engineering Hydrology (2 Credits)

Fundamental theories on hydrological cycle (water balance, atmospheric water, subsurface water, surface water), measurements and data collection. Precipitation analysis, evaporation and evapotranspiration processes, hydrograph analysis, rainfall runoff modelling (unit hydrograph), hydrological flow routing, infiltration, ground water movement (Aquifers; types and properties and properties), hydrological statistics and hydrological design. Flow nets; hydraulic wells; pumping test. Pre-requisite: CEG 311.1.

CEG 333.2: Soil Mechanics II (3 Credits)

Stress distribution in soils: Elastic equilibrium, boundary loads Bousinesq's and Westergard theories; volume change and compressibility; Consolidation; Time rate of consolidation; Consolidation settlement; Mohr circle; stress paths; stresses and strains; shear strength of soils; pore pressure parameters; problems of stability in soil; Introduction to numerical solutions to typical soil mechanics problems. Introduction to earth pressure distribution. Introduction to critical state soil mechanics. Pre-requisite: CEG 332.1.

CEG 353.2 Engineering Surveying & Photogrammetry II (3 Credits)

Route location surveys and designs: Review of levelling process and its applications in civil construction works. Longitudinal profiles and cross sections. Grade for roads, sewers, pipeline, bridges, culverts and tunnels. Computation of areas from coordinates. Calculation of volume of earthworks from cross-sections. Calculations from mass haul diagrams. Curves & curve geometry: Horizontal curves. Design and setting out calculations of simple, compound and reverse circular curves. Design and setting out of transition curves. Geometry of vertical curves including design and setting out. Sight distance and slope staking. Use of Digital Terrain Models (DTMs) for route planning and designs. Setting out for construction works such as route way, buildings, drains, kerb lines, etc. Elements of Hydrographic surveying for civil engineering works involving water borne operations like dredging works, coastal and shore protection works, dams & irrigation schemes, flood control, etc. Application of Photogrammetry & Remote sensing principles to construction and environmental planning.

4.3.5 Environmental Engineering Programme Courses (EVE)

EVE 201.1: Environmental Engineering Microbiology (2 Credits)
Introduction to the fundamental aspects of microbiology and biochemistry that are pertinent to environmental engineering and science. Overview of the characteristics of Bacteria, Archaea, unicellular Eukaryotes (protozoa, algae, fungi), and viruses. Cell structure, bioenergetics and metabolism, and microbial genetics. Pathogens; disease and immunity; environmental influences on microorganisms; roles of microbes in the carbon, nitrogen, and sulfur cycles; enzymes; bioremediation, bioenergy, molecular microbiology; and microbial ecology. Water and wastewater microbiology. Degradation metabolism of compounds by microorganisms. Enzyme kinetics. Batch growth kinetics. Recycling of minerals and nutrients.

EVE 202.1 Environment and Sustainable Development (2 Credits)
Environmental resources – renewable and non renewable. SUDS and climate change. Peak oil theory. Growth models, resources depletion models, predator-prey model. Concept of sustainable development as a response to global crises of ecology and human development. the role of engineering systems in achieving sustainable development. The problems of sustainability as a challenge to the modern divide between nature and culture.

EVE 301.1 Introduction to Geochemistry (2 credits)
Application of basic chemical principals towards investigations of element distributions in geologic systems. Emphasis on origin of elements in our Solar System, element distribution during planetary formation, phase equilibria, rock- water interactions, thermodynamic principles, environmental and isotope geochemistry.

EVE 401.1 Chemical Fundamentals of Environmental Engineering (3 Credits)
Introduction to the key chemical and physical concepts integral to environmental systems and processes. This course provides a fundamental background in those chemical and environmental engineering principles that are common to all environmental engineering.

EVE 402.1 Water and Wastewater Engineering (3 Credits)
A study of the engineering design principles dealing with the quantity, quality and treatment of water, and the quantity, characteristics, treatment and disposal of wastewater.

EVE 403.1 Introduction to Air Pollution (3 Credits)
Introduction to the field of air pollution dealing with sources, effects, federal legislation, transport and dispersion and principles of engineering control.

EVE 404.1 Air Pollution Control Methods (3 Credits)
Study of the design principles and application of the state-of-the-art control techniques to gaseous and particulate emissions from fossil fuel combustion, industrial and transportation sources

EVE 405.1 Hydraulic Engineering (3 Credits)
A study of applied hydraulics to design of systems used for collection or distribution of water. Emphasis on open channel flow, hydraulic machinery, design of supply systems, drainage systems, and hydraulic transients.

EVE 406.1: Sustainable Infrastructure and Environmental Systems Analysis (2 Credits)
Analytical tools and methods for assessing and improving the sustainability of systems for meeting societal needs. Circular economy, life cycle assessment, environmental systems analysis, environmental economics, GIS, system thinking and multi-objective analysis. Technology assessment, design analysis and planning of systems (e.g., built environment, energy systems, mobility) for enhancing their sustainability performance. Topics include green development, energy systems analysis, renewable energy modeling, GHG emissions and carbon footprint analysis, market-based sustainable product design, and urban sustainability.

EVE 501.1 Sanitary Engineering Design (3 Credits)
Functional design of water and waste water treatment facilities.

EVE 502.1 Research in Environmental Engineering (1 Credit)
Students will investigate cutting edge research in the environmental engineering field including experimental studies, current environmental policy changes, and international environmental issues. Investigation to include live research seminars, reading current literature, and/or laboratory experimentation.

EVE 503.1 Senior Design Project (3 Credits)
Open-ended design projects involving one or more areas of engineering. Planning design projects, philosophy of design, and application of engineering principles to design problems.

EVE 504.1 Environmental Law and Regulations (3 Credits)
This course provides comprehensive coverage of environmental laws and regulations dealing with air, water, wastewater, and other media. The primary focus is permitting, reporting, and compliance protocols. The course topics include Nigerian and international legal systems and judicial processes, liability, enforcement, Clean Air Act, Clean Water Act, Safe Drinking, Water Act, etc. Case studies will be emphasized.

EVE 505.1 Remediation of Contaminated Groundwater and Soil (3 Credits)
Course covers current in-situ and ex-situ remediation technologies. Current literature and case studies are utilized to provide the focus for class discussions and projects.

EVE 203.2: Public Health Engineering and Radiology (2 Credits)
Environment and diseases. Transmission of disease. Vectors, parasites and their control. Principles of toxicology. Epidemiological studies. Development of health criteria. Application to home, work and community environment. Problems associated with radiation; exposure and effects; measurement and protection; radiation as a factor of environmental health. Epidemiology and control of diseases. Biological safety.

EVE 204.2: Environmental Engineering Chemistry (2 Credits)
Scope of Environmental Chemistry. Discussion of important relevant concepts of chemistry, and introduction of basic environmental chemical concepts including pH, alkalinity, hardness, dissolved oxygen, Biochemical Oxygen Demand (BOD), and Chemical Oxygen Demand (COD). Acid-base chemistry and its significance in environmental engineering. Dissolution and precipitation chemistry, and chemical precipitation reactions in water and wastewater treatment. Coordination chemistry, electrochemical reactants, chemical reactants, solution preparation- Normality, molarity, equivalence etc. Theory of gasses, chemical kinetics, thermodynamics

EVE 205.2: Environmental Pollution and Ecology (2 Credits)
Freshwater ecology, marine ecology, estuarine ecology, stratification of water bodies, terrestrial ecology, eutrophication, natural resources and their management. Functional parts of ecosystem, energy flows, nutrient cycles. Significance of pollution in the ecosystem. Radiation ecology. Air pollution ecology. Global warming potential, GWP. Toxicology and water quality criteria. Microbial ecology

EVE 302.2 General Biology (3 Credits)
A comprehensive study of the general principles of the biology of plants, animals, and protists including population biology and regulation mechanisms.

EVE 303.2 Chemical Engineering Material & Energy Balances (3 Credits)
The application of mathematics, physics and chemistry to industrial chemical processes. The use of equations of state, chemical reaction stoichiometry, and the conservation of mass and energy to solve chemical engineering problems.

EVE 304.2 Biological Fundamentals of Environmental Engineering (3 Credits)
Introduction to the function of organisms related to environmental engineering. The course focuses on both the application of organisms to removing contaminants and the effects of contaminants on organisms.

EVE 305.2 Fundamentals of Environmental Engineering and Science (3 Credits)
Course discusses fundamental chemical, physical, and biological principles in environmental engineering and science. Topics include environmental phenomena, aquatic pollution and control, solid waste management, air pollution and control, radiological health, and water and wastewater treatment systems.

EVE 506.2 Public Health Engineering (2 Credits)
A comprehensive course dealing with the environmental aspects of public health.

EVE 507.2 Waste Management Engineering (2 Credits)
Quantity and quality of sewage, including important parameters for the determination of quantity and qualities. Sewage system planning, design, construction and maintenance. Sewage treatment processes, including various unit operations. Non-conventional sewage treatment processes including sewage farming, waste stabilization ponds, aerated lagoons and oxidation ditch. Sewage disposal methods including water-dependent and water-independent methods. Water pollution control, solid waste quantity and quality determination, collection, transportation and disposal methods. Institutional arrangements for management. Management of toxic and hazardous waste.

EVE 508.2 Environmental Systems Modelling (3 Credits)
Introductory course in modelling environmental systems. Course will focus on contaminant fate and transport in the environment. Models will be developed that will include physical, chemical and biological reactions and processes that impact this fate.

EVE 509.2 Water Resources and Environmental Engineering (3 Credits)
Water Resources: the hydraulics of open channels and wells: drainage: hydrograph analysis: reservoir and flood-routing: hydrological forecasting: hydraulic structures, i.e. dams, dykes/levees, weirs, docks and harbours, spillways, silting basins, man holes and coastal hydraulic structures, etc.: engineering economy in water resources planning.

Environment Engineering: the work of the Sanitary Engineer: water supply, treatment and design; waste water collection; treatment; disposal and design; solid waste collection, treatment, disposal and design of systems, air pollution and control.

EVE 510.2: Environmental Assurance / QC & Safety (2 Credits)
Introduction. Principles of quality of materials. Practical considerations in developing QA/QC systems. various QA/QC guidelines & standards. Scientific approach to QA/QC engineering (5W &H model). Quality aspects of a project/ QC in production processes. Non-destructive test. Concept of reliability and maintainability in QA/QC. Vendor development in QA/QC. Quality inspection. Benefits of a quality control. Computer Aided Quality Control (CAQC) . HSE – critical activities. Potential hazards in the industry. System/process safety. Cost benefit analysis of Hazard management. Risk assessment/controls. Safety policy and laws.

EVE 511.2: Environmental Risk Assessment and Management (2 Credits)
Baseline and environmental sensitivity studies, Concepts of environmental impact assessment. EIA assessment procedure – identification, prediction and evaluation, methodologies, statement and report preparation. Applications of mathematical models to environmental impact assessment cases involving soil, water and air quality problems. Preparation of environmental impact statement. Case studies. Environmental Risk assessment. Principles of developing national environmental quality standards and compliance measures. Concept of environmental loading and prevention of significant deterioration in ecological balances. Current national and international standards. Principles of developing risk-based land-use planning. Needs analysis for new industrial facilities. Baseline assessment. Social corporate responsibility.

EVE 514.2: Economy and Resource Recovery from waste (2 Credits)
By recovering resources from waste materials, we can reduce our dependence on virgin feedstock that may not be sustainable as well as reducing the quantity of material going to landfill sites. Aim to introduce systems thinking to the field of waste and resource management. The use of biogeochemical processes in resource recovery to the application of engineered nanomaterial.

EVE 520.2 Project (6 Credits)
For proper guidance of the students, projects will depend on the available academic staff expertise and interest but the projects should be preferably of investigatory nature.

B. POST GRADUATE PROGRAMMES

The Department of Civil and Environmental Engineering runs the following degree programmes:

1. Masters of Engineering (M.Eng.) in Civil Engineering
2. Masters of Engineering (M.Eng.) in Environmental Engineering
3. Doctor of Philosophy (PhD) in Civil Engineering
4. Doctor of Philosophy (PhD) in Environmental Engineering

The Civil Engineering Programmes are in the following areas of specialization:

i. Soil Mechanics and Geotechnical Engineering
ii. Highway and Transportation Engineering
iii. Structural Engineering
iv. Water Resources Engineering

Specialization in any of these areas is achieved by combining core courses with appropriate interdisciplinary courses and solving a chosen problem.

1. MASTER OF ENGINEERING (M.ENG.) DEGREE PROGRAMMES

1.1 Programme Objectives

The aim of the M.Eng. (Civil Engineering) and M.Eng. (Environmental Engineering) programmes is to prepare students for professional work at a more advanced level than the Bachelor's degree in the various areas of specialization in Civil Engineering or Environmental Engineering practice; or for further study leading to the Doctor of Philosophy (PhD) Degree in the various areas of specialization in Civil Engineering or Environmental Engineering.

1.2 Programme Requirements and Criteria for the Award of the M.Eng. Degree

To realize the programme objectives and qualify for the award of the M.Eng. degree, the student must complete and pass all the prescribed courses in the chosen area of specialization, participate in and present research seminars and produce a supervised dissertation on an approved research topic. In addition, the general University requirements for studies leading to the Masters' degree and other departmental requirements for the programme must be fulfilled by the candidate.

1.3 Entry Requirements

To be admitted into any of the specializations in the M.Eng. Degree programme of the Department, a candidate must satisfy the general Graduate School requirement of possessing a minimum of Second Class (Honours) degree in Civil Engineering, with a minimum Cumulative Grade Point Average (CGPA) of 3.0 on a %-point scale, obtained from the University of Port-Harcourt or any other approved University. However, the Department gives preference to those with a CGPA of 3.5 and above (corresponding to Second Class Honours, Upper Division and higher).

1.4 Programme Duration

The programme will normally require a minimum of 12 (twelve) calendar months and a maximum of 24 (twenty-four) calendar months of full-time study to complete. Part time candidates on the other hand, will be required to spend a minimum of 24 (twenty-four) calendar months and a maximum of 48 (forty-eight) calendar months to complete the programme.

1.5 Course Registration

The list of required courses for the different areas of specialization available in the programme are given below. Registration of courses must be done in consultation with the candidate's academic adviser who, in turn, must ensure that the candidate meets both the University and Departmental requirements for the M. Eng. (Civil Engineering) or M.Eng. (Environmental Engineering) degree programme as the case may be.

1.6 Specialization Codes for M.Eng. (Civil Engineering/Environmental Engineering) programme

CEG 81XX- Geotechnical Engineering
CEG 82XX- Highway and Transportation Engineering
CEG 84XX- Structural Engineering
CEG 85XX- Water Resources Engineering
EVE 81XX- Environmental Engineering programme

1.7 Course Listing

Course listing consist of the Compulsory courses and Electives. Details of the courses are presented subsequently for the different areas of specialization.

1.7.1 CEG 81XX: Geotechnical Engineering Specialization

1ST Semester

Course Code	Course Title	Credit Units
CEG 810.1	Geotechnical Modelling and Computer Applications	3
CEG 811.1	Earth Structures and Slopes	3
CEG 812.1	Embarkment Dam Engineering and Seepage	3
CEG 813.1	Engineering Behaviour and Properties of Soils	3
CEG 814.1	Rock and Tropical Soil Engineering	3
CGS 801.1	ICT and Research Methods	2
	Total	17

2nd Semester

Course Code	Course Title	Credit Units
CEG 815.2	Soil Dynamics and Earthquake Engineering	3
CEG 819.2	Special Topics in Geotechnical Engineering	3
XXX	Elective	3
CGS 802.2	Entrepreneurship and Management	2
CEG 801.2	Graduate Seminar	2
CGS 802.2	Graduate Research and Thesis	6
	Total	19

XXX: Elective Courses

Course Code	Course Title	Credit Units
CEG 816.2	Probabilistic and Reliability Methods in Geotechnical Engineering	3
CEG 817.2	Theoretical Soil Mechanics	3
CEG 818.2	Tunnel Engineering	3
CGS 847.2	Expert Systems and Computer Aided Design in Civil Engineering	3
CEG 856.2	Groundwater Hydrology and Exploration	3

1.7.2 CEG 82XX: Highway and Transportation Engineering specialization

1ST Semester

Course Code	Course Title	Credit Units
CEG 821.1	Transportation Modelling and Planning	3
CEG 822.1	Advanced Pavement Design	3
CEG 823.1	Road Geometric Design	3
CEG 824.1	Advanced Pavement Construction and Equipment	3

CEG 811.1	Earth Structures and Slopes	3
CGS 801.1	ICT and Research Methods	
	Total	17

2nd Semester

Course Code	Course Title	Credit Units
CEG 827.2	Pavement Materials and Mix Design	3
CEG 819.2	Special Topics in Geotechnical Engineering	3
XXX	Elective	3
CGS 802.2	Entrepreneurship and Management	2
CEG 801.2	Graduate Seminar	2
CGS 802.2	Graduate Research and Thesis	6
	Total	19

XXX: Elective Courses

Course Code	Course Title	Credit Units
CEG 826.2	Highway Economics & Pavement Evaluation	3
CEG 834.2	Project Appraisal & Management Techniques	3
CEG 812.2	Embarkment Dam Engineering & Seepage	3
CEG 847.2	Expert Systems and Computer Aided Design in Civil Engineering	3
CEG 829.2	Special Topics in Highway and Transportation Engineering	3

1.7.3 CEG 84XX: Structural Engineering specialization

1ST Semester

Course Code	Course Title	Credit Units
CEG 841.1	Advanced Structural Analysis	3
CEG 842.1	Advanced Structural Mechanics	3
CEG 843.1	Advanced Concrete Design	3
CEG 844.1	Structural Dynamics and Stability	3
CEG 811.1	Earth Structures and Slopes	3
CGS 801.1	ICT and Research Methods	2
	Total	17

2nd Semester

Course Code	Course Title	Credit Units
CEG 847.2	Structural Reliability and Risk Analysis	3
CEG 819.2	Special Topics in Geotechnical Engineering	3
XXX	Elective	3
CGS 802.2	Entrepreneurship and Management	2
CEG 801.2	Graduate Seminar	2
CGS 802.2	Graduate Research and Thesis	6
	Total	19

XXX: Elective Courses

Course Code	Course Title	Credit Units
CEG 846.2	Advanced Steel Design and Analysis	3
CEG 845.2	Expert Systems and Computer Aided Design in Civil Engineering	3
CEG 848.2	Advanced Civil Engineering Materials	3
CEG 849.2	Special Topics in Highway and Transportation Engineering	3
CEG 852.1	Finite Element Methods & Computer Applications	3

1.7.4 CEG 85XX: Water Resources Engineering specialization

1ST Semester

Course Code	Course Title	Credit Units
CEG 851.1	Surface water Hydrology & Reservoir Operations	3
CEG 852.1	Finite Element methods in Water Resources I	3
CEG 832.1	Water Treatment & Supply Engineering	3
CEG 856.2	Groundwater Hydrology and Exploration	3
CEG 854.1	Advanced Water Resources Engineering	3
CGS 801.1	ICT and Research Methods	2
	Total	17

2nd Semester

Course Code	Course Title	Credit Units
CEG 853.2	Advanced Hydraulics	3
CEG 834.2	Design of Wastewater Treatment Systems	3
XXX	Elective	3
CGS 802.2	Entrepreneurship and Management	2
CEG 801.2	Graduate Seminar	2
CGS 802.2	Graduate Research and Thesis	6
	Total	19

XXX: Elective Courses

Course Code	Course Title	Credit Units
CEG 857.2	Optimization and Simulation in Water Resources Systems	3
CEG 858.2	Special Topics in Water Resources Engineering	3
CEG 855.2	Irrigation Engineering	3
CEG 859.2	Design of Drainage Systems	3

1.7.5 CEG 85XX: Environmental Engineering specialization

1ST Semester

Course Code	Course Title	Credit Units
EVE 810.1	Aspect of Environmental Science and Ecology	3
EVE 811.1	Unit Operations in Environmental Engineering	3
EVE 812.1	Pollution Prevention and Control	3
EVE 832.1	Water Treatment and Supply Engineering	3
EVE 813.1	Oil Industry and Pollution	2
CGS 801.1	ICT and Research Methods	2
	Total	16

2nd Semester

Course Code	Course Title	Credit Units
EVE 816.2	Environmental Management	2
EVE 834.1	Design of Wastewater Treatment Systems	3
XXX	Elective	3
EVE 814.2	Air Quality and Environmental Noise	2
CGS 802.2	Entrepreneurship and Management	2
EVE 801.2	Graduate Seminar	2
EVE 802.2	Graduate Research and Thesis	6
	Total	20

XXX: Elective Courses

Course Code	Course Title	Credit Units
EVE 819.2	Optimization and Simulation in Water Resources Systems	3
CEG 859.2	Design of Drainage Systems	3
EVE 821.2	Water Quality Modelling	3

2. DOCTOR OF PHILOSOPHY (PhD) DEGREE PROGRAMME IN CIVIL ENGINEERING

2.1 Programme Objective

The aim of the PhD (Civil Engineering) and PhD (Environmental Engineering) programmes is to provide students an opportunity to acquire in-depth understanding of basic engineering and scientific principles underlying their areas of interest in Civil engineering or Environmental Engineering; and hence enable them develop the capability to apply the principles creatively through advanced methods of research, analysis and synthesis.

2.2 Admission Requirements

Candidates for admission into the PhD (Civil Engineering) and PhD (Environmental Engineering) must possess the Master of Engineering or Master of Science degree in Civil Engineering or Environmental Engineering from the University of Port-Harcourt or any other recognized University with at least an average score of B grade. In addition, every applicant must provide:

a) Two letters of reference (at least) from persons qualified to comment on his or her academic work. Preferably, the supervisor at the master's programme should be one of the referees;
b) A copy of his or her Masters' degree transcript; and
c) Four copies of his or her proposed research plan in the chosen area of specialization.

Final selection of candidate will be based on the evaluation of the above documents as well as interview performance.

2.3 Departmental Requirements and Regulations

In addition to the general University requirements for the PhD degree, the following regulations also apply for all areas of specialization in the PhD (Civil Engineering) degree programme:

i. On provisional admission every PhD student will be assigned a supervisor and later a PhD committee made up of the supervisors and four (4) senior academic staff.
ii. A PhD student will be required to take and pass prescribed courses in consultation with members of his/her committee.
iii. The student will take a Qualifying/Comprehensive examination after a minimum of one semester in the programme. The pass grade in his examination shall be 70% and only success in it will confirm the student's status as a PhD student.
iv. After a minimum of two semesters of work, the PhD student, in consultation with the supervisors, shall apply to the Department to make a formal presentation/oral defence of his or her research proposal. If the presentation is successful, the student becomes a candidate for the PhD degree and is allowed to continue with his research work to the end.
v. On completion of the research work, the PhD candidate is required to prepare a dissertation and submit to the Head of Department. Thereafter he/she is expected to successfully pass an oral examination in defence of the dissertation before a panel of examiners set up in accordance with the Graduate School Regulations.
vi. The Department shall normally expect the PhD student, as a normal PhD degree requirement, to participate in and present seminars to the Departmental Graduate Studies Committee in the course of the research work. He should also produce, from the work, at least two conference papers and two journal articles accepted for presentation and publication in reputable academic conference proceedings and journals. Months and a maximum of 60 calendar months

2.4 Programme Duration

Full-time candidates will be required to spend a minimum of 36 calendar months, while part-time candidates will be required to spend a minimum of 60 calendar months and a maximum of 84 calendar months to complete the PhD (Civil Engineering Programme.

2.5 General University Regulation

All the foregoing regulations are subjected to the general University regulation covering PhD degree programmes.

2.6 Specialization Codes for PhD (Civil Engineering/Environmental Engineering) Programme

CEG 91XX- Geotechnical Engineering
CEG 92XX- Highway and Transportation Engineering
CEG 94XX- Structural Engineering
CEG 95XX- Water Resources Engineering
EVE 90XX- Environmental Engineering

2.7 Prescribed Courses for PhD programmes

2.7.1 CEG 91XX: Geotechnical Engineering Specialization

1ST Semester

Course Code	Course Title	Credit Units
CEG 910.1	Advanced Modelling and Numerical Techniques in Geomechanics	3
CEG 913.1	Advanced Concepts in Engineering Behaviour of Soils	3
CEG 915.1	Earthquake Engineering and Foundation Vibrations	3
CEG 916.1	Reliability of Geotechnical System	3
	Total	12

2nd Semester

Course Code	Course Title	Credit Units
CEG 918.2	Tunnel Engineering	3
CEG 917.1	Advanced Concepts in Theoretical Soil Mechanics	3
CEG 901.2	Seminar	3
CEG 902.2	Research and Dissertation	12
	Total	21

2.7.2 CEG 84XX: Structural Engineering specialization

1ST Semester

Course Code	Course Title	Credit Units
CEG 940.1	Design of Tall Buildings	3
CEG 941.1	Bridge Design	3
CEG 945.1	Advanced Methods in Theory of Elasticity	3
CEG 946.1	Advanced Theory of Plates	3
	Total	12

2nd Semester

Course Code	Course Title	Credit Units
CEG 948.2	Stability of Structures	3
CEG 947.1	Theory of Shells	3
CEG 901.2	Seminar	3
CGS 902.2	Research and Dissertation	12
	Total	19

2.7.3 CEG 95XX: Water Resources Engineering specialization

1ST Semester

Course Code	Course Title	Credit Units
CEG 951.1	Finite Element Methods in Water Resources II	3
CEG 953.1	Advanced Hydraulics II	3
CEG 955.1	Advanced Groundwater Hydrology	3
CEG 956.1	Computer Methods in Water & Wastewater Engineering	3
	Total	12

2nd Semester

Course Code	Course Title	Credit Units
CEG 952.2	Advanced Surface Water Hydrology	3
CEG 954.2	Coastal Engineering & Shore protection	3
CEG 901.2	Seminar	3
CEG 902.2	Research & Dissertation	12
	Total	19

2.7.4 CEG 90XX: Environmental Engineering specialization

1ST Semester

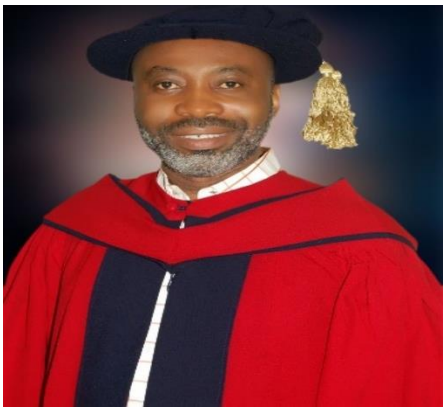
Course Code	Course Title	Credit Units
EVE 903.1	Advanced Wastewater Treatment	3
EVE 904.1	Advanced Water Treatment	3
EVE 905.1	Noise Pollution Modelling	3
EVE 906.1	Oil and Gas Pollution	3
	Total	12l

3. 2nd Semester

Course Code	Course Title	Credit Units
EVE 907.2	Meteorology & Air pollution	3
EVE 909.2	Hazardous & Radioactive Waste Management	3
EVE 901.2	Seminar	2
EVE 902.2	Research & Dissertation	12
	Total	20

STAFF PROFILE

a. Academic staff



Name: Temple Chukwumeka Nwofor
Rank: Professor
Option: Structural Engineering
Other position: Director, Centre for Geotechnical and Coastal Engineering Research
Email: temple.nwofor@uniport.edu.ng
Research activities: Civil and Structural Engineering Materials, Development of Plate Solutions, Numerical and Finite Element Methods

Name: Eme, Dennis Budu
Rank: Professor
Option: Highway and Transportation Engineering
Other positions: Assistant Director, Quality Assurance/Quality Control Unit
Email: dennis.eme@uniport.edu.ng
Research activities: Highway materials and mix design, intelligent transport systems, transportation systems optimization, multi-decision transportation problems, innovative pavement design procedures

Name: Nwaobakata, Chukwuemeka
Rank: Professor
Option: Highway and Transportation Engineering
Email: nwaobakata.chukwuemeka@uniport.edu.ng
Research activities: Pavement materials and mix design, highway design and construction, traffic engineering and management, transportation planning and policy

Name: John N. Ugbebor
Rank: Professor
Option: Environmental Engineering.
Other position: Director, Centre for Occupational Health Safety and Environment.
RESEARCH ACTIVITIES: Published 173 journal papers in international journals and National journals; 2 Books and several chapters in international books.
E-mail: john.ugbebor@uniport.edu.ng

Name: Ejikeme Ugwoha
Rank: Reader
Option: Environmental Engineering
Other Position: Assistant Director, Centre for Occupational Health, Safety and Environment (COHSE)
E-mail: ejikeme.ugwoha@uniport.edu.ng
Research Activities: Pollutant transport and fate as well as remediation within the environment. Has developed experimental approaches to evaluating fate and transport of petroleum pollutants in both soil and water and have been involved in many environment-related researches as underpinned by his publications and conference presentations/proceedings.

Name: Dr. Samuel Sule (PhD.)
Rank: Reader
Option: Structural Engineering
Other Position: Ag. Head of Civil and Environmental Engineering
E-mail: samuel.sule@uniport.edu.ng
Research Activities: Concrete Properties and Concrete Mixture Optimization, Reliability of Concrete, Steel and Timber Structures

Name: Udeh, Ngozi Uzor (PhD.)
Rank: Reader
E-mail: ngozi.udeh@uniport.edu.ng
Research Activities: Remediation of Crude Oil polluted soil using locally sourced materials; Development of adsorbents from locally sourced materials used for wastewater treatment; Treatment and Modelling of Pollutants Migration in Soils and Water bodies; Development of air pollution models and many other environmental related researches.

Name: Chioma Temitope Gloria Awodiji (PhD.)
Rank: Senior Lecturer
Option: Structural Engineering
E-mail: chioma.awodiji@uniport.edu.ng
Research activities: Concrete technology and optimization of the concrete mix design process; reliability analysis.

Name: Engr. Dr. Chiedozie Francis Ikebude
Rank: Senior Lecturer
Option: Water Resources Engineering
Other Position: Assistant Director Center for Geotechnical and Coastal Research
Research activities: Spatial and temporal modelling of water quality in coastal region of Nigeria (The Niger delta region).Geo- spatial mapping of coastal area, water quality indexes, Contaminant transport in surface water and Dispersion Modelling. Modelling climate change impact on the water resources of the Nigeria with special reverences to the rivers of the Niger Delta. Investigating the hydro-electric power potential of the rivers of the Niger Delta(power generation capacity of the Rivers of the Region). Sediment accumulation and transport in Rives and investing the effect of heavy metals (Pb, Cr etc) on the quality of river sediments….

Name: Victor Amah (PhD.)
Rank: Senior Lecturer
Option: Environmental Engineering
E-mail: victor.amah@uniport.edu.ng

www.linkedin.com/in/victor-amah-27503623b

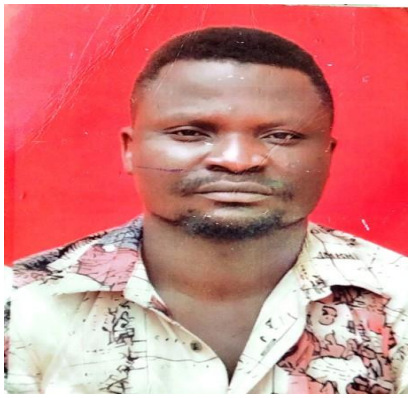
About:
Dr. Victor Amah is a Senior Lecturer at the University of Port Harcourt, Department of Civil Engineering. Dr. Amah has overseen numerous undergraduate and postgraduate projects since becoming employed in 2014. A significant number of his students have since achieved advancements in their professions within the environmental sector. Dr. Amah has served on numerous committees throughout his professional career. Over the past decade, Dr. Amah has devoted a substantial amount of professional time to a variety of environmental-related research projects, including wastewater treatment, environmental modelling, pollution control (water, noise, and air), and sludge treatment. Numerous of these works have been published in reputable peer- reviewed journals.

Name: Chikaodi Awuse Onu (PhD.)
Rank: Lecturer I
Options: Environmental Engineering, Surveying & Geoinformatics
E-mail: chikaodi.onu@uniport.edu.ng
Research Activities: Dr. Onu is a lecturer in the department of Civil and Environmental Engineering, University of Port Harcourt, who transited from Chief Technologist to the lecturing cadre. He is registered by COREN as an Engineer and by SURCON as a Surveying & Geoinformatics professional. His major research activities are: the use of natural non-chemical agents for the purification of dirty water, focusing on the waters of the Niger Delta Region; the use of natural waste materials, such as egg shells, for the partial replacement of Portland cement used for construction; and Surveying and mapping the natural environment, using modern techniques and high-tech equipment.

Name: Yorkor, Banaadornwi (PhD)
Rank: Lecturer 1.
Option: Environmental Engineering
Email: yorkor.banaadornwi@uniport.edu.ng.
Research Activities: Air Pollution and Noise studies.

Name: Eghosasere Oluwaseyi Rowland-Lato (PhD.)
Rank: Lecturer I
Option: Structural Engineering
Research activities: Concrete Compressive Strength, and Durability, Finite Element Analysis and modeling of Structures; Soil – Structure Interaction.
Email: eghosa.rowland-lato@uniport.edu.ng

Name: Mohammed, Ganiyu Oluwaseun
Rank: Lecturer I
Option: Geotechnical Engineering
E-mail: ganiyu.mohammed@uniport.edu.ng
Research activities: deep foundations, ground improvements, reliability of geotechnical structures, soil – structure interaction, characterization of soils, residual soils of tropical region.



Name: Ohwerhi, Kelly Erhiferhi
Rank: Assistant Lecturer
Option: Highway and Transportation Engineering
Email: kellyohwerhi@gmail.com

Research activities: Application of advanced techniques in optimizing the performance of highway systems, asphalt pavement modification with sustainable and friendly materials, production of green concrete, intelligent transport systems.

C. Non-Academic Staff

Name: Osamudiamen, Osahon Paul
Rank: Assistant Chief Technologist
Option: Soil and Water Engineering
Email: paul.osamudiamen@uniport.edu.ng
Research activities: groundwater quality modelling, soil strength properties prediction, soil erosion and flood control.

Name: Kosia B. Yobe
Rank: Assistant Chief Technologist
Option: Structures & Materials and Asphalt
Other position:
Research activities: Comprehensive Strength of Concrete and Construction Materials, Improvement of Asphalt Pavement Materials, in civil Engineering.
Email: kosia.yobe@uniport.edu.ng

Name: Menezor S. Geremene
Rank: Principal Technologist
Option: Water Resources and Environmental Engineering
Email: menezor.geremene@uniport.edu.ng; www.linkedin.com/in/menezor-geremene-96b129111
Research activities: Water quality, groundwater-surface water Interactions, and its resilience, microbial and heavy metal evaluation in River water and sediments.

Name: Agbo, Chidi Emmanuel
Rank: Principal Assistant Registrar
Position: Administrative Secretary
Email: chidi.agbo@uniport.edu.ng

Name: Mkpa Baridoo
Rank: Caretaker
Position: Office help
Email:

Name: Diepiriye Ine Ekine
Rank: Principal Executive Officer I
Email: diepiriye.ekine@uniport.edu.ng