



**Syllabus for Civil Engineering
Department
2017**



Syllabuses

In this section are given brief descriptions of the course offered in the civil engineering department. For convenience, the courses *classified as:*

Ge = General Engineering Sciences

Math = Mathematical

Phys = Physics

Chem = Chemistry

Arb = Arabic

Eng = English

Pol = Political

CE = Civil Engineering courses

EE = Electrical Engineering courses

TW = Technical Writing course

**Math 101: Mathematics I 4 Units**

Sets, relations, absolute value, functions; Algebra of functions, inverse function, parametric representation of a function. Limits, continuity, derivative, differential, higher derivative, extreme value theorem, intermediate value theorem, Rolle's Theorem and mean value theorem.

Math 102: Mathematics II 4 Units

L'Hopital's rule. Applications; Maxima and minima, curve tracing, related rates. Conic sections, polar coordinates. Complex number. Definite and indefinite integral. Fundamental theorem. Transcendental function, their derivation and integration. Techniques of integration – Area, length, volume and surface of solid revolution – sequences and series.

Phys 101: Physics I 3 Units

Mechanics: Linear and circular motion, Newton Laws of motion, Work, Energy, and Conservation laws of energy. Properties of Matter: Elasticity of matter, Hydrodynamics. Heat and Thermodynamics: Heat, thermodynamics, Laws, ideal gas. Waves and vibrations: Simple harmonic motion, waves, Propagation of waves, standing waves, Properties of optical waves.

Phys 103: Physics Lab I 1 Unit

Laboratory work includes experiments on the acceleration of gravity (g), Nook's Law, Young's modulus, surface tension, thermal conductivity and specific heat, Newton's Law of cooling, Sonometer, frequency measurements and the velocity of sound.

Phys 102: Physics II 3 UnitsElectricity and Magnetism:

Mirror lenses and their application. Charge, Coulomb's law, electric field, capacitors and dielectric, current, resistance, electromotive force, electric circuits, magnetic field, magnetic induction, Hall effect. Ampere's law, circular coils, self inductance, RC, RL circuits. Magnetic properties of materials. Oscillators electromagnetic waves, Maxwell's equations, Transmission lines, traveling waves, potential and alternating current. Waves and optical, optical waves, reflection and reflection laws, mirrors lenses and their application.

Phys 104: Physics Lab II 1 Unit

Verification of Ohms law, Determination of unknown resistance, Some measurement using a cathode ray tube, Determination of change magnetic field, Determination of the capacity, Measurement of focal length of an Inaccessible converging law. Measurement of Radii of curvature of converging lens, Measurement of focal length of diverging lens.

Chem 101: Chemistry I 3 Units

Atomic structure, periodic table, gas state, thermo chemistry, organic group. Isomerism and fundamental concepts structure and reactivity.

Chem 103: Chemistry Lab I 1 Units

Laboratory rules and techniques, common reagents, chemical equations, cations and anions, reactions of cations and anions, classification of cations and anions into groups, group reagents and group precipitate of cations, identification of cations and anions from simple inorganic compounds.

Chem 102: Chemistry II 3 Units

Radio activity, chemical bonding, covalent bond theory, classification component, element chemical behavior, thermodynamic, electrochemistry, solid state, organic alkene reaction, cycling alkene, alkane, alkyne, alkylhalid, alcohol, aldehyde, ketone with detail study for mechanism reaction, An analytical volumetric, using volumetric apparatus, standard solution, volumetric solution. Titration methods, indicator titration, using acid base, complex compound, oxidation reaction.

**Chem 104: Chemistry Lab II** **1 Units**

Volumetric Analysis: use of volumetric apparatus, standard solutions, volumetric calculations, procedure of titrations, indicators, titrations involving acid-base, argentometric, complexometric and oxidation-reduction reactions, determination of strength of unknown samples utilising the above methods of titration.

Arb 101and102: Arabic Language I and II **2 Unit**

The courses stress lingual approach to mastery of the language and include the study of basic grammar and selected readings in science and literature.

Eng 101 English I **2 Units**

Objective: The English I course for first year students has been designed to enable them to communicate in written and spoken English and to develop their ability to deal with concepts used in scientific discussion and writing.

Reading comprehension: Topics: Heat energy, atomic structure, ultrasonic, periodic table of elements, computers and some topics of general interest etc.

English in communication: Parts of speech, punctuation, simple sentence structure, tenses, passive voice, description of lab ware. Ordinal and cardinal numbers, simple geometry.

Laboratory report writing: Lay out of a report: title, abstract, aim, introduction/theoretical background, experiment and materials, procedure, results discussion of results, conclusions, references, appendices.

Eng 102: English II **2 Unit**

Objectives: The course is for those students who have gone through the first semester. It builds upon the work done in the previous semester and continues with the objectives to enhance the students ability to communicate in written and spoken English. The following areas of scientific English are specially stressed upon.

Reading comprehension: Topics: Latent heat, Bunsen burner, Spirit burner, computers, Kipp's apparatus, alloys, metals distillation, fire extinguishers, modern atomic theory, refining petroleum, refrigerators.

English in communication: Adjectival clauses, omission of relative pronouns, use of infinitive and gerund, (mathematical concepts: Powers and roots, dimensions of two/three dimensional figures, the use of graphs). Introduction to technical report writing. (Kinds of technical reports: The short informal report, the long informal report, the formal report (their format/structure and style).

Pol 101: Political Culture: **2 Units**

Introduction and concepts of political culture, the state (elements, theories, sovereignty, functions, unitary state, welfare state, federal state), Ancient political thought, Contemporary political thought, Comparative Western political systems (reference to USA and UK), Comparative Government and politics, Libyan political system (1952 – 1969), International organization (United Nation UN), Human rights.

Ge 101: Engineering Drawing I: **2 Units**

Introduction, definitions, terminology and general rules. Tools used in engineering drawing and methods of its use, geometrical processes, engineering curves, kinds of lines and it's applications, Arabic engineering alphabetic, English engineering alphabetic, drawing scale and dimension, isometric projection, inclined projection, normal projection (isometric and oblique drawing), deduction of third projection, sections and it's types (complete, half, revolved, partial and its application).

Math 202: Differential Equations **3 Units**

Differential equation of the first order and first degree; different forms, non-linear differential equations of the first order; linear differential equations of higher orders; differential operators; linear differential equations with constant coefficients; homogeneous case; method of inverse operator; method of variation of parameters; method of undermined coefficients, Laplace transform; basic theorems, convolution theorem, solution of differential equation by Laplace transform.


Comp 101: Introduction to computer and Programming: 3 Units

Theoretical Part: Computer definition, computer components, computer languages, flow charts, The steps of solving problems by computer, introduction visual BASIC, variables and constant, arithmetic operations, string operations, comparison operations, logical operations, operators, Control Statements, Arrays, Subroutines, Some of the V.B. Functions, The most important tools and some of their properties and events.

Laboratory Part: Work area, menu bar, form, and tool bar, project window, tool box, properties box.

CE 210: Construction Materials: 3 Units

Introduction and definitions, cement (Manufacturing, types, specifications), hydration of cement with water, aggregate (Characteristics and specifications), water (for washing, mixing and curing), admixtures, wood, steel, bituminous materials, miscellaneous materials.

CE 211: Construction Materials Lab: 1 Units

Aggregate tests to determine (Moisture content of fine aggregate, moisture content of coarse aggregates, Specific Gravity and Absorption of Fine Aggregate, Specific Gravity and absorption of coarse aggregates, Abrasion Test for coarse Aggregates using Los Angle Machine, Density and void Ratio for fine aggregates, bulk density and void ratio for coarse aggregates, sieve analysis for fine aggregates, sieve analysis for coarse aggregates, cement tests (The fineness of cement, the normal consistence, initial and final time of set, density and specific gravity of cement), bricks tests (Compressive strength, Absorption test)

Ge 103: Workshop Engineering 2 Units

Classification of engineering materials. Properties and applications of important engineering materials. *Primary manufacturing process:* casting, welding, forging extrusion, drawing, rolling and metal joining. Basic measurements and inspection. *Machining process:* basic cutting tools, the centre lathe, basic operations, turning, taper turning, thread cutting and drilling. Engineering management, industrial safety and professional health. Training on using hand tools and production management and maintenance.

GE140: Engineering Mechanics I 3 Units

Introduction (Definitions, Newton's laws, units), concurrent forces on a particle (Analyzing forces and determining the resultant of forces, concurrent forces in plane, concurrent forces in space), rigid bodies (Equivalent forces, principle of transmissibility, moment of a force acting on a rigid body about a point, moment of a force acting on a body about a given Axis, moment of a couple reduction of a system of forces on a body to a resultant force only). Equilibrium of rigid bodies (Forces acting on a rigid body and structures, kinds of supports and reacting, drawing free body diagrams and calculating reacting), analysis of trusses, (Method of joints, method of sections), determining the centroid (centre area) of certain area by dividing the area into certain area and by integration.

CE 212: Surveying I 3 Units

Basic principles of surveying, plan scales and ordinance of survey maps, linear surveying, simple optics, principal parts of survey instruments, leveling and vertical sections, contouring, random errors and theory of least squares.

Tw 307: Technical Writing and oral presentation 2 Units

Objective: The course is intended to develop the students' ability on the oral presentation skills and to deal with concepts in scientific discussions and writings. It is to improve their concepts of Technical English enabling them to write Technical Reports, Technical essays as well as Business letters. The course lays stress upon the following areas of technical English:

- Different types of technical reports: The short informal report, The long informal report and the formal report; their format structure and style (Foreword and summary: Organizing main points for Non-specialist readers; Details or discussion: Organizing details for specialist readers; The abstract; conclusions and recommendations, etc.); Feasibility and project report; articles on technical topics and business letters.



- Technical terms of importance to engineering, with emphasis on spelling, and usage in sentences; technical terms used in computer applications.
- Symbols, abbreviations, glossaries, nomenclature, titles and sub-titles, tabular, graphical and pictorial presentation of data and the like, with examples.
- The course also abreast the students with concepts of research. The following main points are stressed upon: Selecting a suitable subject, writing a tentative thesis sentence, developing a preliminary bibliography, - Taking notes, writing précis and paraphrases, developing the first draft, preparing the final documentation notes, formatting the final draft.

Math 203: Linear Algebra**3 Units**

Vector spaces, matrices and determinants, simultaneous linear equations, linear transformations, Eigen value problems, canonical forms, numerical linear algebra, linear differential equations, linear programming, inner product spaces applications in various areas such as control theory, Statistics, linear circuit and vibration theory, etc.

GE141: Engineering Mechanics II**3 Units**

Motion, velocity, and acceleration, uniform rectilinear motion, components of motion, relative motion, work and energy, impulse and momentum, mechanical vibrations, free and damped vibrations, forced vibration, static and dynamic friction.

CE 220: Concrete Technology**3 Units**

Definitions and classification, fresh concrete (Consistency, workability, bleeding), segregation of aggregate, hardened concrete strength (Compressive strength, tensile strength, shear strength, bond with reinforcement, factors affecting strength), elasticity, durability, creep and shrinkage of concrete. Mix design (Trial method, ACI method, British method)

CE 221: Concrete Technology Lab**1 Units**

Cement mortar tests (Compressive strength of cement mortar, tensile strength of cement mortar), fresh concrete tests (slump test, compacting factor test), hardened concrete tests (Cubic compressive strength, cylindrical compressive strength, split cylinder test), trial mix design, ACI method for mix design.

CE 223: Strength of Materials**3 Units**

Introduction and definitions, axial force, shear force and bending, moment in beams, engineering cross-section properties for structure members, determining of the centroid and second moment of area, simple stresses and simple strains, torsion of circular cross sections.

Bending stresses in beam, design of beams for bending, shearing stresses in beams, composite beams (Analysis of composite beams using transformed section method, reinforced concrete sections), equivalent and principal stresses, normal principal stresses, Mohr's circle of stresses (Analytical and graphical methods).

CE 224: Geology for Eng.**2 Units**

Introduction, origin and structure of the earth, minerals and rocks, igneous, sedimentary and metamorphic rocks, different process on rocks, earthquakes and volcanoes, rocks deformation types, engineering, geological solution, geological engineering for major projects.

CE 225: Civil Eng. Drawing**2 Units**

Introduction, the principle components of civil engineering construction, the components of building, footings, wall footing (Plain & reinforcement), isolated footing, combined footing (Rectangular and trapezoid), raft foundation with conversely beam (Up & down), piles footing, pier footing.

**CE 226: Surveying II** **3 Units**

Bearings, the direction of a line, theodolites, theodolite traverse, rectangular coordinates, tachometry, electronic distance measurement (EDM), curve ranging, horizontal and vertical curves, areas and volumes.

CE 301: Fundamental of Electrical Eng. **3 Units**

Kirchof's laws and applications, network theorems, applied electromagnetism and magnetic circuits, rise and fall of currents, in an inductive circuits, capacitance, charging and discharging of capacitors, stored energy, alternating voltages and currents, average and R.M.S voltages, phasors complex notation, R-L-C circuits, self and mutual inductances, principle of operation and applications of transformers.

CE 310: Insulation of building **2 Units**

Heat losses and gains in buildings. Thermal insulation materials. Calculations for thermal insulation. Insulation of buildings against water proofing systems. Sound insulation in buildings airborne and impact noises. Sound absorption and absorbent materials. Effects of fire on building materials and components. Fire proofing materials.

CE 312: Fluid Mechanics **3 Units**

Fluid properties, fluid pressure and its measurements, hydrostatics and its application, equilibrium of floating bodies, fluid masses subjected to acceleration, hydro-kinematics of fluids, Bernoulli equation and its application, momentum equation and its application. Types and specifications of flow, flow over weirs, losses of total energy of the flow, steady flow in pipes, uniform flow through open channels, dimensional analysis, model analysis.

Laboratory Part:

Properties of fluids; statics of fluids; principles of continuity, Bernoulli, energy, and momentum; viscous effects; free surface flow.

CE 313: Construction and Architecture **3 Units**

Introduction to building construction, architecture and its role, the factors that affected architecture (Climate, social, religion), types of buildings, architectural and structural details, damp proofing, sound insulation, heat insulation, finishing of walls and ceilings, doors and windows, means of moving between levels, stairs, lifts, ramps, moving stairs, joints in buildings, construction joints, expansion joints.

CE 314: Computer Aided Drafting in Civil Engineering **2 Units**

Introduction to CAD, structure of AutoCAD, principles of drafting using AutoCAD, integration of AutoCAD and numerical modelling, application of AutoCAD to structural, highway, hydraulic and environmental engineering.

CE 315: Structural analysis I **3 Units**

General introduction (Structural analysis, loads on structures), analysis of statically determinate structures (Beams, frames, arches, trusses), deflections in statically determinate beams (Basic methods), deflections of statically determinate beams and frames (Geometric methods (The moment area and conjugate beam methods), energy methods (Real and virtual work methods), deflections in statically determinate trusses.

CE 316: Soil Mechanics **3 Units**

Simple soil properties, particle size distribution, sedimentation, Atterberg limits, soil classification, permeability and seepage, flow nets, compaction of soils, stress in soils, consolidation and settlement, shear strength of soil.

CE 317: Soil Mechanics Lab **1 Units**

Moisture content, relative density, in-situ density, Atterberg limits, grain size analysis, standard and modified proctor test, California Bearing Ratio (CBR), consolidation, shear strength of soils, field collection of samples.



- CE 321: Structural analysis II** **3 Units**
 Introduction to statically indeterminate structures (Advantages and disadvantages, method of analysis), analysis of statically indeterminate beams and frames using the consistent deformation method, analysis of trusses using the consistent deformation method, the three moment equation for the analysis of continuous beams and frames, buckling and stability of columns, visits to some building of architectural interest.
- CE 322: Reinforced Concrete Design I** **3 Units**
 Review of properties of structural concrete and reinforcing steel, analysis and design of R.C beams using ultimate strength method, analysis and design of R.C. elements for shear, analysis and design of R.C. elements for torsion, bond, anchorage, and development length, design of continuous beams, short columns subjected to axial loads, detailing of reinforced concrete beams and columns.
- CE 323: Ground Water Hydrology** **3 Units**
 The hydrologic cycle, importance of ground water, source of ground water, types of layers containing ground water, ground water movement, sea water intrusion in coastal aquifers, wells, types of wells, design of wells.
- CE 324: Highway Engineering** **3 Units**
 Introduction, vehicle characteristics, resistance and driving force, highway types, preliminary design and highway design procedure, geometric design of highways, horizontal alignment of highways, types of horizontal curves, sight distance, widening of carriage way on curves, vertical alignment, types of vertical curves, design of vertical alignment, planning of longitudinal super elevation in cross section, computation of earthwork, area of various cross-section, computation of volumes, intersection and interchanges types. Highway materials, soils, soil classification for highway purposes, testing of soil strength, soil stabilization, aggregates, requirement of a good highway aggregate, binder for highway construction, bituminous materials, testing of bituminous materials, bituminous pavement, component parts of highway pavement structure, types of highway pavement, preparation of sub grade.
- CE 325: Environmental Engineering** **3 Units**
 Introduction sources of water, estimation of water demand, water quality analysis; modification of water quality (treatment) coagulation, flocculation, sedimentation, sand. Waste water flows, quantities and variations, waste water collection system, sewer design, storm water drainage, sewer appurtenance, sewage pumping and pumping stations,, waste water characteristics, waste water treatment, primary and biological treatment. Disposal of wastewater sludge- treatment and disposal.
- CE 326: Construction Engineering Management** **3 Units**
 Profile of the construction sector; company and site organization and types of contracts. Construction projects; estimating, tendering, planning and execution. Professional responsibility and engineering ethics. Productivity, quality, health and safety issues. Construction equipment; selection criteria, hourly cost determination and output analysis of excavators
- CE 411: Reinforced Concrete Design II** **3 Units**
 Analysis and design of one-way slab systems, analysis and design of two way slabs using ACI coefficient method, analysis and design of R.C. element for torsion, columns subjected to axial load and uniaxial or biaxial moments, design of concrete sections subjected to tension without or with bending, staircase, design project.
- CE 412: Design of steel structural** **3 Units**
 Introduction, types of steel structure, properties of steel, loads and specification, steel sections, limit state design, connections, design of tension and compression members, design of simply supported beams. Beams, compound beams, crane beams, purlins, sheeting rails, plate girders, beam columns, slide column for a single story industrial building, crane columns, column bases, trusses.

**CE 413: Irrigation and Drainage****3 Units**

Importance of irrigation, water consumption and plants irrigation requirements, irrigation systems, design of open channel irrigation system, surface irrigation, sprinkler irrigation, drip irrigation, subsurface irrigation, and importance for drainage for the cultivation land, subsurface drainage, tile drainage, and elevation drainage by wells.

CE 414: Traffic and transportation Engineering**3 Units**

Traffic studies, purposes of traffic studies, information to be collected during traffic studies, traffic volume study, objects of traffic volume study, collection of traffic volume count data, representation of traffic volume count data, traffic control devices, types of traffic control devices, traffic signs, markings, and signals, advantage and disadvantage of providing traffic signals, origin and destination, Urban transportation planning, transportation systems modeling, trip generation, trip distribution, mode split models, cost of highway transportation, present value concepts, operating expense, fixed and variable costs, rate of return, annual costs, capital recovery.

CE 415: Foundation Engineering I**3 Units**

Introduction to the footing, general principles of foundation design, types of footing, spread footing design, wall footing design, eccentrically loaded spread footings, combined footing design, cantilever or strap footing, tie-beams, raft foundation, settlement analysis of shallow foundation.

CE 416: Sanitary Engineering**3 Units**

Quantity of water and wastewater, aqueducts and water pipes, pumps and pumping stations, quality of water supplies, treatment of water-clarification and filtration miscellaneous water treatment methods, wastewater collection, sewers, flow in sewers and sewer appurtenances, design of sewer systems.

CE 421: Reinforced Concrete Design III**3 Units**

Design of long R.C. columns, analysis and design of two-way slab systems using the ACI direct design method, deep beams, corbels, analysis of R.C. sections using working stress method, serviceability, deflections and cracking, design project.

CE 422: Foundation Engineering II**3 Units**

Design of retaining walls, introduction to deep foundation, pile foundation (classification of piles, description of pile types, structural design of piles, static pile capacity, single piles, dynamic analysis, pile load test, pile groups), walls for excavations, drilled piers or caissons.

CE 423: Special Topic in Civil Engineering**3 Units**

This course may cover any area of civil engineering that is not covered by other courses of the program. A topic is selected for an in-depth study in the form of a semester course.

CE 424: Professional Practice in Civil Engineering**3 Units**

This course covers a variety of professional, non-technical issues pertaining to civil engineering practice. The topics covered include: work and careers of civil engineers; consequences of civil engineering; importance and requirements of professional licensure; management concepts for civil engineers; contemporary issues and engineering practice; leadership in civil engineering practice; life-long learning in modern engineering practice; concepts in business and public policy for civil engineers; communication skills for practicing engineers; and professional responsibilities and ethics. Guest speakers will be invited to address various issues relevant to Civil Engineering Practice. Students will generally be required to learn on their own, with guidance provided by the course coordinator.

CE 426: Specification and Contract**2 Units**

Legal aspects of construction contracts, classification of contracts, types of contracts, general and special conditions of contracts, claims and dispute resolution, standard contracts, specification of construction materials, standards, common used standards, quantity surveying for civil engineering work, estimating of construction prices and costs.

**Syllabuses****CE 417: Project methods and proposal 2 Units**

Oil field methods, data gathering, sampling methods, data preparation and classification, data presentation, spread sheets calculation and analysis of data, project proposal methods, referencing methods, software's practices, project methods, and project report structure, project writing formats, project proposal preparation and presentation.

CE 426: Graduation Project 4 Units

The class objective is to provide experience in the application of engineering principles to the solution of a specific problem in Civil Engineering. Students are required to select a topic and prepare a proposal, including a work programmed for a project to be undertaken under the supervision of a faculty member. Projects may include laboratory or field experiments, design problems, computer analysis or literature reviews. Students are expected to prepare a typewritten report and to make an oral presentation of their project.