## Table (2) A Plan of Study For B.Sc. In Civil Engineering

### *(Second Year) Sophomore Year*

| No. | Course No. | Course Title | Type | Weekly hours | | | Units |
|---|---|---|---|---|---|---|---|
| | | | | *Theoretical* | *Tutorial* | *Practical* | |
| First Semester | **CE201** | Strength of Materials I | Eng. Science | 3 | 1 | – | **3** |
| | **CE203** | Mathematics III | Math | 2 | 2 | – | **2** |
| | **CE205** | Engineering Surveying I | Eng. Science | 2 | 1 | 2 | **3** |
| | **CE207** | Concrete Technology I | Eng. Science | 2 | – | 2 | **3** |
| | **CE209** | Buildings Construction I | Eng. Science | 2 | – | 1 | **2** |
| | **CE211** | Fluid Mechanics I | Eng. Science | 2 | – | 2 | **3** |
| | **ER201** | Fortran Programming | Comp. Science | 1 | – | 2 | **2** |
| | **UR201** | Principles of Democracy | Social Science | 1 | – | – | **1** |
| | **ER203** | Technical English Language II | Humanity | 2 | – | – | **2** |
| | **Sum** | | | **17** | **4** | **9** | **21** |
| | | | | **30** | | | |
| Second Semester | **CE202** | Strength of Materials II | Eng. Science | 3 | 1 | – | **3** |
| | **CE204** | Mathematics IV | Math | 2 | 2 | – | **2** |
| | **CE206** | Engineering Surveying II | Eng. Science | 2 | 1 | 2 | **3** |
| | **CE208** | Concrete Technology II | Eng. Science | 2 | – | 2 | **3** |
| | **CE210** | Buildings Construction II | Eng. Science | 2 | – | 1 | **2** |
| | **CE212** | Fluid Mechanics II | Eng. Science | 2 | – | 2 | **3** |
| | **CE213** | Structural Drawing by Computer | Eng. Science | – | – | 2 | **1** |
| | **ER204** | Visual Basic Programming | Comp. Science | 1 | | 2 | **2** |
| | **UR202** | Human Rights Principles | Social Science | 1 | – | – | **1** |
| | **Sum** | | | **15** | **4** | **11** | **20** |
| | | | | **30** | | | |

## II – 2nd. Year

**Course Number: CE201**
**Course Name: Strength of materials I**
**Credit hours: 4**
**Pre-requisite: Engineering Mechanics II**
**Course Contents:**

This course covers : Introduction , axial force , simple stresses (normal , shear , Bearing , thermal) , thin wall cylinder , strain (Definition, Hook's law , Poisson's ratio , thermal), Transformation of stress and strain (plane stress Equation , principal stress , Moher's circle of stress), Torsion(the torsion formula for solid circular shaft , Design of circular member in torsion , Angle of twist of circular member in torsion , Thin – walled hollow members , Solid non-circular section), connections.

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**Course Number: CE202**
**Course Name: Strength of Materials II**
**Credit hours: 4**
**Pre-requisite: Strength of Materials I**
**Course Contents:**

This course covers : force and moments (shear force , Bending moment Diagram ) , Stress in Beam (Bending stress , shear stress and compound stress), Deflection of beams (Governing differential equation for deflection of elastic beam , Double integration method , Moment area method ) , columns (Nature of the beam column, Euler buckling load).

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**Course Number: CE203**
**Course Name: Mathematics III**
**Credit hours: 4**
**Pre-requisite: Mathematics I, II**
**Course Contents:**

This course covers : Matrices(introduction), Basic Operations in Matrices, Determinant of Matrices, Rank of Matrices, Solving Linear Systems of Equations (introduction), Cramer's Rule, Inverse Matrix method. Vectors, Three-Dimensional Coordinate Systems, The Dot Product, The Cross Product, Lines and Planes in Space, Cylinders and Quadric Surfaces, Vector Functions, Modeling Projectile Motion, Arc Length and the Unit Tangent Vector T, Curvature and the Unit Normal Vector N, Torsion and the Unit Binormal Vector B, Planetary Motion and Satellites. Functions of Several Variables, Partial derivatives, Chain rule, Directional Derivatives and Gradient Vectors, Tangent Planes and Differentials, Extreme Values and Saddle Points, Lagrange multiplier, Partial Derivatives with Constrained Variables.

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**Course Number: CE204**
**Course Name: Applied Mathematics**
**Credit hours: 4**
**Pre-requisite: Mathematics I, II, Mathematics III**
**Course Contents:**

This course covers:- Differential Equations (Basic concepts, Ordinary Differential Equations(ODEs)), Separable First Order (ODEs), Homogenous First Order (ODEs), Exact First Order (ODEs), Linear First Order (ODEs), Second Order Linear Homogenous (ODEs) With Constant Coefficients, nTh Order Linear Homogenous (ODEs)With Constant Coefficients, The Method of Undetermined coefficients, The Method of Variation of parameter. Multiple Integrals (introduction), Double Integrals in Cartesian coordinate, Polar Coordinates, Double Integrals with Polar Coordinates, Applications of Double Integrals, Triple Integrals in Cartesian coordinate, Triple Integrals in Cylindrical coordinate, Triple Integrals in Spherical Coordinates, Application of Triple Integrals, Substitutions in Multiple Integrals, Sequences and Series, Tests of convergence, Power Series,Taylor Series, Maclaurin Series.

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**Course Number: CE205**
**Course Name: Engineering Surveying I**
**Credit hours: 5**
**Pre-requisite: None**
**Course Contents:**

This course covers : **Basic Fundamentals of Surveying** (Classification of Surveying, Mistakes and Errors, Scale, unites of measurements), **Measurements of Horizontal Distances – TAPING** (Taping measurements methods, Errors Sources and corrections in taping), **Measurements of Vertical Distances – LEVELING** (Leveling Methods, Leveling Applications, Errors Sources and corrections in leveling, Check leveling), **Longitudinal and Transverse Sections** (leveling, Computation, and Plotting), **Contour Maps**, **Area Calculation** (Area from Field Measurements, Area from Map Measurements, Area of Transverse Sections), **Volume Calculation** (Volume of regular figures, Volume of irregular figures).

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**Course Number: CE206**
**Course Name: Engineering Surveying II**
**Credit hours: 5**
**Pre-requisite: Engineering Surveying I**
**Course Contents:**

This course covers : **Directions and Angles** (Meridian, Direction systems, types of horizontal and vertical angles), **Angles Measuring Instruments** (Theodolite, Errors

Sources and corrections), **Coordinates Geometry** (Coordinates System, Coordinates Computations), **Traversing** (Travers types, Travers Field Operations, Traversing Computations), **Digital Total Station** (Standard measurements, survey data, and stakeout data), **Basic of Global Navigation Satellite System** (GNSS Segments, Types of GNSS, Methods of Positioning, and GNSS Applications), **and Route Surveying** (Survey for Planning, Route Geometric Alignment, Horizontal Curves, Vertical Curve, Spiral Curve, and Survey for Stakeout curves).

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**Course Number: CE207**
**Course Name: Concrete Technology I**
**Credit hours: 4**
**Pre-requisite: None**
**Course Contents:**

This course covers :Introduction about cement, cement manufacturing and compounds, cement mortar, volume of mortar of cement, cement test, types of cement, Portland cement, types of Portland cement, natural cement, sulfur high-resistance cement, stretching cement, alumni cement, stack, stack classification, properties of stack, sand accumulation, harmful materials in stack, stack stabilization, alkaline reaction, sieve analysis, practical graduation.

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**Course Number: CE208**
**Course Name: Concrete Technology II**
**Credit hours: 4**
**Pre-requisite: Concrete Technology I**
**Course Contents:**

This course covers :fresh concrete, test of fresh concrete, factors effecting on fresh concrete, concrete structure, operation ability and the methods of checking the influence of factors, concrete additive, concrete impaction, manufacturing of concrete in hot weather, manufacturing of concrete in cold weather, solid concrete, concrete resisting , type of concrete, factors effecting on concrete resistance factors effecting test result, concrete treatment, design concrete mixers, American method, modern British method, old British method, adjusting the materials due to damp, flexibility factors, volume change, swelling, detraction, extraction, advanced methods of concrete testing.

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**Course Number: CE209**
**Course Name: Building Construction I**
**Credit hours: 3**
**Pre-requisite: None**
**Course Contents:**

This course covers : Introduction, earth work, excavations, filling and brick works, stone works, concrete works, mixing transport, casting, finishing, form work, foundations and piles, water proofing of boiling, arches, lintels and sills, columns and piers, beams and

girders, floors and slabs, stairs, finishing's, door and windows, details of steel and wooden structures..

**Course Number: CE210**
**Course Name: Building Construction II**
**Credit hours: 3**
**Pre-requisite: Building Construction I**
**Course Contents:**

This course covers : Types of Buildings, earthwork, Footing and Foundations, Piles and Piling, Concrete Works, Bricks and Blocks works, Masonry Works, Forms and Scaffoldings, Floors and Roofs, Arches, Lintels and Sills, Damp Proofing, Finishing of Walls and Ceilings, Doors and Windows, Means of Moving Between Levels, Fire Places and Chimneys and Joints in Buildings.

**Course Number: CE211**
**Course Name: Fluid Mechanics I**
**Credit hours: 4**
**Pre-requisite: None**
**Course Contents:**

This course covers: Introduction to fluid science and General concept, Fluid mechanics in civil engineering, Fluid Properties and Definitions, Pressure Variations in static Fluid, Hydrostatic Force on Plane and Curved Surfaces, Buoyancy and Stability, Floating bodies, Accelerated Fluid Masses, Kinematics of Fluid Motion, Principles of Mass Conservation, Application of Energy Equations, Bernoulli Equation, Continuity equation, Momentum Equations, Similitude and Dimensional Analysis.

**Course Number: CE212**
**Course Name: Fluid Mechanics II**
**Credit hours: 4**
**Pre-requisite: Fluid Mechanics I**
**Course Contents:**

This course covers: Flow of Real Fluid, Flow Measurement, Laminar and Turbulent Flows, Fluid Flow in Pipes, Friction Losses, Minor Losses, Pipes in Series, Pipes in Parallel Network, Discharge measurement in pipes, Boundary-Layer Flow, Unsteady Flow, The phenomenon of water hammer, Pumps and turbines, Fluid Flow in Open Channels, The Momentum Equation and The Hydraulic Jump, Specific Energy and Transitions

**Course Number: CE213**
**Course Name: Structural Drawing by Computer**
**Credit hours: 2**
**Pre-requisite: None**
**Course Contents:**

This course covers : The Structural Drawing of the building ( beams, columns, slabs, foundations), explain the sections of the plans and 3d-dimension structures. preface and preparation of AutoCAD program and instrument : knowing AutoCAD commands like point, lines, rectangle polygon , poly line , Arc with their option to draw 2D engineering drawing , learning hatching , text, Dimensions creation and editing, modify command and layers for 2D engineering drawing and 3D Structures .

**Course Number: ER201**
**Course Name: Fortran Programming**
**Credit hours: 3**
**Pre-requisite: Computer Programming**
**Course Contents:**

This course covers : Introduction to programming in Fortran 90, Rules of Fortran 90, Variables and Constant Types, Assignment statement, Library Function, Input / output statement, Relational Operators and Logical Operands, Control Construct ( IF , Select Case), Loop Statement ( Do Construct), Engineering Examples.

**Course Number: ER202**
**Course Name: Visual Basic Programming**
**Credit hours: 3**
**Pre-requisite: Computer Programming**
**Course Contents:**

This course covers : Visual Basic programming, Arrays, One Dimension Arrays, Two Dimension Arrays, Arithmetic operation on Arrays, Sort Arrays, Search Arrays, Subprogram, Statement function, Functions, Subroutines, Modules, Derived Types, Engineering Examples.

**Course Number: UR201**
**Course Name: Principle of Democracy**
**Credit hours: 1**
**Pre-requisite: None**
**Course Contents:**

This course covers : The social rights and freedoms. The individual rights in the state security as the right of getting job. The administrative corruption. The equality in Islam. The equality in Law. The equality in Judiciary and Employment The financial corruption. The equality in the public costs and burdens. The rights of human in Iraqi law. The general rights of individuals especially those rights related to human morals. The individuals' freedoms related to their material interest. The Arab chart for human rights.

**Course Number: UR202**
**Course Name: Human Rights Principle**
**Credit hours: 1**
**Pre-requisite: None**

**Course Contents:**

This course covers : Introduction about human rights. The literal and linguistic definition of rights. The historic development of the human rights concept. appearance of Islam and the basis of human right. Europe and human rights. The concept of human in the material civilization. The concept of human in Islam. The status of human in the modem civilization. The status of human in Jurisprudence. The features of human rights in the Islamic intellectuals. The main rules that organize human rights. Admitting of rights under the authority of the modern state of law. The intellectual base of the principle of rights and freedoms in Islam. Properties and the nature of rights and freedoms in Islam. The non-organized rights and freedoms in Islam.

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**Course Number: ER 203**
**Course Name: Technical English Language II**
**Credit hours: 2**
**Pre-requisite: Technical English Language I**
**Course Contents:**

This course covers: **Grammar** (tenses, present simple and present continuous tenses, past simple and past continuous tenses, quantity, comparative and superlative adjectives, present perfect and past simple, time and conditional clauses, infinitives, passives, second conditional, present perfect continuous, past perfect for clarification). **Vocabulary**, **Reading**, **Writing (**informal letters, linking words, writing a postcard, relative clauses, formal letters, writing a story), **Listening and speaking skills.**

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