**COURSES DESCRIPTION FOR**

**Department of Electronic Engineering**

**College of Engineering**

**University of Diyala**

**Diyala, Iraq**

**First Year**

***Prepared by Department Academic Staff***

***Reviewed, revised and introduced by:***

***The Scientific Committee of the Department***

**First Year**

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| ***First Semester*** | | | | | ***Second Semester*** | | | | |
| ***Course Title*** | ***Credit***  ***Hours*** | ***Weekly hours*** | | | ***Course Title*** | ***Credit Hours*** | ***Weekly hours*** | | |
| ***Lec.*** | ***Tut.*** | ***Lab.*** | ***Lec.*** | ***Tut.*** | ***Lab.*** |
| ***Mathematics –I*** | ***3*** | ***3*** | ***1*** | ***-*** | ***Mathematics- II*** | ***3*** | ***3*** | ***1*** | **-** |
| ***Electronic Physics I*** | ***2*** | ***2*** | ***1*** | ***-*** | ***Electronic Physics II*** | ***2*** | ***2*** | ***1*** | ***-*** |
| ***Workshop Skills- I*** | 1 | ***-*** | ***-*** | ***2*** | ***Digital Technique II*** | ***3*** | ***2*** | ***-*** | ***2*** |
| ***Digital Technique I*** | ***3*** | ***2*** | ***-*** | ***2*** |
| ***Electrical Engineering Fundamentals I*** | ***4*** | ***3*** | 1 | ***2*** | ***Electrical Engineering Fundamentals II*** | ***4*** | ***3*** | ***1*** | ***2*** |
| ***Human Rights*** | ***1*** | ***1*** | ***-*** | ***-*** | ***Human Rights*** | ***1*** | ***1*** | ***-*** | ***-*** |
| ***Arabic Language*** | ***1*** | ***1*** | ***-*** | ***-*** | ***English Language*** | ***2*** | ***2*** | ***-*** | ***-*** |
| ***Engineering Drawing I***  ***(Basic)*** | ***2*** | ***1*** | ***-*** | ***2*** | ***Engineering Drawing-II(AutoCAD)*** | ***2*** | ***1*** | ***-*** | ***2*** |
| ***Computer Science*** | ***2*** | ***1*** | ***-*** | ***2*** | ***Programming*** | ***3*** | ***2*** | ***-*** | ***2*** |
| ***Engineering Mechanics-I***  ***(Statics)*** | ***2*** | ***2*** | ***1*** | ***-*** | ***Engineering Mechanics-II***  ***(Dynamics)*** | ***2*** | ***2*** | ***1*** | ***-*** |
| ***Total*** | ***21*** | ***16*** | ***4*** | ***10*** | ***Total*** | ***22*** | ***18*** | ***4*** | ***8*** |
| ***30*** | | | ***30*** | | |

**Course Number: U101**

**Course Name: Human Rights& Democracy I**

**Credit hours: (1-1-0-0)**

**Pre-requisite: None**

**Course Contents:** Introduction about human rights.The literal and linguistic definition of rights.The historic development of the human rights concept.The 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 modern 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.

**Course Number: U102**

**Course Name: Human Rights& Democracy II**

**Credit hours: (1-1-0-0)**

**Pre-requisite: None**

**Course Contents:** 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.The articles from (1-40) of the universal Declaration.The articles from (1-40) of the universal Declaration.The articles from (1-40) of the universal Declaration

**Course Number: U103**

**Course Name: Computer Science**

**Credit hours: (2-1-0-2)**

**Pre-requisite: None**

**Course Contents:** Introduction: Windows Operating System, creates new folder, selecting folders, finding folders or files copying and moving files and folders. How to start any program shut Down, scandisk, arranging icon, run, help, etc.; Win Word, Excel and Power point: All facilities, Description of its features and use, the function of toolbars and menu items (File, Edit, View, Format, Tools); Introduction to computer system &computer architecture, Algorithms and flowcharts. A brief history / importance of C++, Simple program of C++, Constants & variables, Operators, Arithmetic, logical Assignment, Relation of Operator bitwise, Input & output statement (cin>> statement, cout<<statement), Control statements (if, switch).

**Course Number: E107**

**Course Name: Programming**

**Credit hours: (3-2-0-2)**

**Pre-requisite: None**

Review to C++ programming language (Constants & variables, Input & output statement, Control statements**),** Loops (for, while, do….while), subprograms (functions), Arrays (1-D arrays initialization, declaration storing, Multidimensional arrays initialization, Declaration application), pointers (Creating pointer, Declaration pointer, initialization pointer & variable types, Application on pointers), files, introduction to structure.

**Course Number: U104**

**Course Name: English**

**Credit hours: (2-2-0-0)**

**Pre-requisite: None**

**Course Contents: *(New English course recommended by the Ministry council)*** *or*

This course is designed to enable the students to achieve academic oral and written communication to the standard required at university level. The course integrates all the language skills with emphasis on writing, and it stimulates students’ imagination, and promotes personal expression. Students, in this course, are trained to apply critical thinking skills to a wide range of challenging subjects from diverse academic disciplines. Course activities include writing various types of academic essays, acquiring advanced academic vocabulary, and getting involved in group discussions and debates. In addition, the course also includes other skills to consolidate the main skills, such as further readings and use of the Blackboard Suite.

**Course Number: U105**

**Course Name: Arabic languge**

**Credit hours: (1-1-0-0)**

**Pre-requisite: None**

**Course Contents:**Introduction : Arabic language –Origin, formal and slang , translations and usual mistakes. Basic Arabic writing skills and its major roles.Arabic dictionaries and how to use it. Sentences and their types in Arabic tongue. Arabic sentence structure and safe constructed sentence in Arabic language.How to write a paragraph. How to write a report using the wright Arabic sentences. Applications.

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**Course Number: E101**

**Course Name: Mathematics I**

**Credit Hours: (3-3-1-0)**

**Pre-requisite: None.**

**Course Content:** Inequalities: absolute value, greatest integer. Functions: domain and range operations on functions. (Algebraic functions), limits: definitions and its theorems, Continuity: definition and its theorems, Derivative: definition, rules of differentiation, chain rule, implicit differentiation, higher order derivatives, applications: related rates, maximum and minimum, concavity, graphs of functions, mean value and roll's theorems, Inverse function. Determents and matrices.

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**Course Number: E102**

**Course Name: Mathematics II**

**Credit Hours: (3-3-1-0)**

**Pre-requisite: Mathematics I**

**Course Content:** Trigonometric functions and their inverse functions. Complex numbers and complex geometry, Integration: definite and indefinite integrals, rules of integration. Applications on definite integrals: area, volumes, length of a plane curves and the area of surface of revolution, the fundamental theorem of integral calculus, The functions ln(x), exp(x) and their inverse functions, Method of integration, improper integrals, Conic sections, translation and rotation of axes, Vectors in the plane, vector valued functions velocity and acceleration.

**Course Number: E104**

**Course Name: Engineering Drawing I**

**Credit hours: (2-1-0-2)**

**Pre-requisite: None**

**Course Contents:** Introduction to engineering drawing and its uses as engineering language in industry dimensioning symbols and terms used in drawing, metric system, Types of Engineering Tools and Their Uses, Engineering Operations, names and dimensions of lines used in drawings. Projections, The Conclusion Projected third Projection Stereo. Isometric Projection. Drawing various types of geometrical patterns (Traeery), Various methods of drawing ellipses, various types of tangents., Drawing according to scale, drawing various views of an actual object, rejections of all views necessary for a given object, projection of views using first and third angle projection methods. Freehand sketching proper and reasonable proportion.

**Course Number: E105**

**Course Name: Engineering Drawing II**

**Credit hours: (2-1-0-2)**

**Pre-requisite: None**

**Course Contents:** The use of CAD in engineering drawing. Description of menu Bar and toolbars. Drawing Ellipse, Rectangle, line, Ray, Circle, point, Arc, ---- etc.CAD Electrical, Mechanical/ Special features. A using of various layers. Drawing electrical symbols on simple architectural plans.

**Course Number: E106**

**Course Name: Workshop Skills I**

**Credit Hours: (1-0-0-2)**

**Pre-requisite: None**

**Course Content:** The workshop training program is designed to satisfy the following objectives Teaching safety rules and regulations on-site in an industrial environment Proper use of working tools, instruments, and machines, Introducing basic workshop practices, production, labor, and time-requirements of workshop operations. The students are introduced to training programs in nine workshops: electrical wiring, welding, forging, fitting, turning and milling, carpentry, plumbing auto-mechanics, and casting. The student is to spend 6 hours of training in every workshop

**Course Number: EE101**

**Course Name: Digital Techniques I**

**Credit Hours: (3-2-0-2)**

**Pre-requisite: None**

**Course Contents: System Numbers: (**Decimal , Binary , Binary arithmetic , Octal and Hexadecimal Numbers, Conversions of System Numbers, Arithmetic Operations with Signed Numbers, , **Digital Codes** : (Binary coded decimal [BCD]Exc-3 code, Graycodes, **Logic Gates**:(Boolean algebra , De’Morgan theorems , Simplification Using Boolean Algebra, Standard Forms of Boolean Expressions( SOP and POS form), The karnaugh Map (Three, Four and Five- Variable Kamaugh Maps), The universal property of the NAND and NOR gates.

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**Course Number: EE102**

**Course Name: Digital Techniques II**

**Credit Hours: (3-2-0-2)**

**Pre-requisite: Digital Techniques I**

**Course Contents: Functions of Combinational Logic:** Adders, Subtracters, Parallel Binary Adders, Magnitude comparators, Encoders, Decoders, Multiplexers, Demultiplexers, Parity Generators/Checkers, **Flip-Flops:**(Latches, Edge-Triggered Flip-Flops).

**Course Number: EE103**

**Course Name: Electrical Eng. Fundamentals I**

**Credit Hours: (3-2-1-2)**

**Pre-requisite: None**

**Circuit Variables and Circuit Element:** System of units, Charge and Current, Voltage, Power and Energy, Circuit Elements, voltage and current sources, dependent and independent sources, electrical resistance and conductance, Types of resistors. **Circuit Transformations** Series Resistors and Voltage Division, Parallel Resistors and Current Division, Wye-Delta Transformations, Source Transformations**. Basic Laws** Ohm’s Law, Nodes, Branches, and Loops, Planar and Non-planar circuits. **Techniques of Circuit Analysis** Basic terminology, Kirchhoff’s Laws , Mesh Analysis, Nodal Analysis, Superposition, Thevenin’s Theorem, Norton’s Theorem, Maximum Power Transfer.

**Course Number: EE104**

**Course Name: Electrical Eng. Fundamentals II**

**Credit Hours: (3-2-1-2)**

**Pre-requisite: Electrical Eng. Fundamentals I**

**Sinusoidal Alternating Current Fundamentals:** Generation of Alternating Voltages and Currents, Equations of Alternating Voltages and currents, Simple and Complex Waveforms, Basic terminologies, Root Mean Square (R.M.S.)Value, Average Value, Form Factor and Peak Factor, Circuit Elements **Vectors and Phasors :** Vectors and Phasors Representation of Alternating Quantities, Mathematical Operations on Vectors, AC Current through Various Circuit Elements, Operations with Complex Number, PhasorDiagram.**AC Power Calculations**: Active, reactive and apparent power, power in complex form, power triangle, power factor. Series and Parallel Combinations of AC Circuits: Series Combinations of Various Circuit Elements , Parallel Combinations of Various Circuit Elements. Resonance in AC Circuits: Frequency response of various circuit elements, resonance in series and parallel circuits, quality factor, Half-power Bandwidth of a Resonant Circuit, Bandwidth B at any Off resonance Frequency, Determination of Upper and Lower Half-Power Frequencies, Values of Edge Frequencies, Q-Factor of a Resonant Series Circuit **Circuit theorem in AC circuits:** Kirchhoff’s Laws, Mesh Analysis, Nodal Analysis, Superposition, Thevenin’s Theorem, Norton’s Theorem, Maximum Power Transfer. 11- Magnetic Circuits Magnetic Circuit, Definitions, Magnetic Field Strength (H), Magnetic Potential, Flux per Unit. **Magnetic Circuits** Magnetic Circuit, Definitions, Magnetic Field Strength (H), Magnetic Potential, Flux per Unit Pole, Flux Density (B), Absolute Permeability (m) and Relative Permeability (mr), Intensity of Magnetization (I), Susceptibility (K), Composite Series Magnetic Circuit, How to Find Ampere-turns , Comparison Between Magnetic and Electric Circuits, Parallel Magnetic Circuits, Series-Parallel Magnetic Circuits, Leakage Flux and Hopkinson’s Leakage coefficient Magnetization curves.

**Course Number: EE105**

**Course Name: Engineering Mechanics I (Statics)**

**Credit Hours: (2-2-1-0)**

**Pre-requisite: None**

**Course Content:** Static: Force system, unit system, parallelogram law, force + components, Result of Coplanar force components of force in space, moment of A force, moment of couples, Equilibrium: free body diagram, coplanar system, analysis of trusses, friction nature of friction, theory of friction, coefficient of friction, centurions & center of gravity, centurions of area, Centurions determined by integration, moment of inertia: parallel Axes Theorem, 2nd moment of area by integration, radius, moment of inertia of Composite area. Strength of materials :Hooks law, tension and compression stress thin – walled cylinders and spheres, combined stress (Mohr's circle) shear and normal stress, stresses in beams (initial principal).

**Course Number: EE106**

**Course Name: Engineering Mechanics II (Dynamics)**

**Credit Hours: (2-2-1-0)**

**Pre-requisite: Engineering Mechanics I (Statics)**

**Course Content:** Dynamics: Kinetics of particle, rectilinear motion, curvilinear motion, rectangular components of curvilinear motion, normal and tangential component of Acceleration, kinetics: force, mass and acceleration, kinetics of particle Newton's 2nd law. Thermodynamics: Introduction, Active materials & their specification, work and heat in ideals gasses and steam 1st law thermodynamics practical law in steam and gasses, 2nd law of thermodynamics practical law in steam and gasses.

**Course Number: EE107**

**Course Name: Electronic Physics I**

**Credit Hours: (2-2-1-0)**

**Pre-requisite: None**

**Energy Levels and Atomic Structure:** The atom, model, wave nature of light **,**Dual nature of matter, wave function, Energy – band theory of metals, insulators and semiconductors Crystal structure, ionic, covalent and metallic bonding, energy hand of crystals. Internal structure of materials cell, packing miller indices Crystal planes and direction, brags law and x- ray diffraction, electronic ballistics**. Electrical conduction in metals:** Mobility and conductivity, The energy distribution of electrons, Fermi level, work function. **Semiconductors**: Semiconductor materials (SI, GE and compound semiconductors), Extrinsic semiconductors, Fermi – level in semiconductor diffusion and carrier lifetime Hall effect.

**Course Number: EE108**

**Course Name: Electronic Physics II**

**Credit Hours: (2-2-1-0)**

**Pre-requisite: Electronic Physics I**

**Semiconductor P-N junction:** P-N junction in equilibrium, current–voltage characteristics Charge–control description of a diode transition and diffusion capacitance diode switching times diode models, Small- signal model and load line concept introduction to hetero junctions and double heterojunctions. **Types of semiconductor diodes:** Varactor diode, tunnel diode, photo diode photovoltaic (solar) cell, light emitting diode, Principle and operation of semiconductor laser, metal, electronic palasilics semiconductor diode