كلية علوم البيئة وتقاناتها

قسم تقانات البيئة

المرحلة الأولى :

ت	اسم المادة	عدد الوحدات	المفردات
1	**Mathematics I**	6	Coordinates
			Graphics and lines
			Real numbers
			Sets and inequalities
			Absolute value
			Slope of a line
			Equations of straight lines
			Function and limits domain and range
			Arith operation on functions
			Composition function
			Limits and continuity
			Differentiation
			Techniques of Differentiation
			Integration
			The indefinite integral
			Half-year Break
			Integration by substitution
			Techniques of integration
			Techniques of integration

Integration by parts			
Logarithm an exponential and natural logarithm			
Trigonometric function			
The hyperbolic function			
Inverse trigonometric and hyperbolic function			
Inverse trigonometric and hyperbolic function			
Derivatives and integrals inverse trigonometric			
Derivatives and integrals involving hyperbolic fun.			
Integration powers of sine and cosine			
Integrating powers of secant and tangent			
Trigonometric substitution			
Polar coordinates			
Engineering drawing instruments & using	**4**	**Engineering Drawing**	**2**
Introduction & def.			
Types of engineering lines			
Basic of lettering			
Basic of lettering			
Regular shapes; ellipse, polygons			
Orthographic projection			
Orthographic projection			
Orthographic projection			
Isometric pictorial shapes			

Isometric pictorial shapes			
Principle free hands			
Dimensions			
Sanitary symbols			
Half-year Break			
Engineering drawing by AutoCAD program & how using 2D			
Monitor modifications			
Draw commands, point, line commands			
Draw commands, point, line commands			
Polygon command & practice			
Circle, Arc, Donut& practices			
Ellipse command & practices			
Modify command: break, trime…etc			
Rotate, move, mirror, scale, hatch & practices			
Rotate, move, mirror, scale, hatch & practices			
Exchange commands & practices			
Text commands & practices			
Dimensions commands & practices			
Principles of 3D drawing			
Practices on 3D drawing & exchange the shape & monitor			
General	6	**General Geology**	**3**
Holiday			

History of the earth			
Structure of the earth			
Crystals			
Minerals			
Petrology			
Igneous rocks			
Sedimentary rocks			
Sedimentary rocks			
Half-year Break			
Metamorphic rocks			
Rock cycle			
Weathering and soil			
Structural of geology			
Structural of geology			
Volcanoes			
Earth quick			
Land sliding			
Surface water			
Ground water			
Geographsics			
Geographsics			
Geological survey			

Environmental geology			
Environmental geology			
Lab. Experiment Assignments			
earth parameter			
Earth parameter			
Description of crystal			
Description of minerals			
Description of minerals			
Description of igneous rocks			
Description of Sedimentary rocks			
Description of Sedimentary rocks			
Half-year Break			
Description of Metamorphic rocks			
Description of Metamorphic rocks			
Type of soil			
Topographic maps			
Horizontal layer			
Vertical layer			
Dipping layer			
Area of regular shape			
Seismic survey			
Physics and measurements	**6**	**physics**	**4**

Motion in a straight line			
Motion in 2D			
Lows of translational motion			
Heat & temperature			
Thermodynamics			
Kinetic theory of gases			
Gases laws			
Properties of liquids			
Application in liquids			
Half-year Break			
Atomic nature			
Nuclear physics			
Radioactivity			
Wave motion			
Geometrival optics			
Reflection			
Refraction			
Laws of mirrors			
Laws of lenses			
Optical instruments			
Physical optics			
Diffraction			

Interference			
Electron microscope			
Spectroscopy measurements			
General review			
Lab. Experiment Assignments			
Instructions			
Measurements, results, reports			
Meas. of liquid density			
To verify Hooh's law			
Deter.of friction coeff.			
Meas. Of Young's modules for a wire			
To verify Boil's law			
Meas. Of specific heat			
Meas. Of surface tension of water			
General review			
Introduction in computer	**4**	**Computer**	**5**
Type of computer			
Department of computer			
Disks and type			
Virus and type			
Examination			
Windows XP			

Desktop in windows XP			
Star in windows XP			
Task bar in windows XP			
Mouse using			
Examination			
Microsoft Word 2007			
The main window for word 2007			
Printer			
Insert tables			
Half-year Break			
Microsoft Power Point 2007			
Lists the main window for power point 2007			
How to configure and view the slides			
Microsoft Excel 2007			
Introduction in Excel 2007			
Type of data in Excel 2007			
Work with cells			
Using equation			
Statistical and logical function			
Examination			
Internet			
Some of using internet and application			

examination			
Lab. Experiment Assignments			
Introduction in computer			
Application in computer			
Cell cycle control of cell	6	**Microbiology**	**6**
Cytoskeleton			
DNA replication			
Mutations			
Stem cells			
Mankers used to identify			
Cell culture			
Cell growth			
Bacterial count			
Animal cell culture			
Finite cell line			
Toxico genomies			
Microbes in air			
Factors affecting air microflora			
Major disease transmitted by air			
Air borne microorganisms			
Half-year Break			
Bactericidal vapour			

Prokaryotes			
Symbiotic microbs			
Exter mophiles			
Soil contamination			
Microbiological activities			
IPM			
Contamination of water			
Safe drinking water			
Parasites			
Chlorinated aliphatic aromatic			
Bacterial anzymes			
Biodegridations			
Biofertilizars			
Phytoplankton			
Introduction	**6**	**Analytical chemistry**	**7**
Application of analytical chemistry			
Molecular wt. & equivalent (molarity & normality)			
Analytical calculation			
Titrimetric analysis			
Acid-Base-titration			
Indicator theory			
Buffer capacity			

Masking & Demasking			
Redox-titration			
Ppt-titration			
Type of indi caturs			
Non-aquous titration			
Gravimetric analysis			
Titration with EDTA			
Statistical calculation (results treatment)			
Half-year Break			
Instrumental analysis			
Colorimetric analysis			
UV.visible spectrophometry			
Turbity & nephelometry			
Solvent extraction			
Flame photometry			
Atomic absorption			
Refractometry			
Polarometry			
Ion-exchange			
Type of chromatography			
Organic spectrophotometry			
In organic analysis			

Heavy metal analysis			
Electrometric methods			
Refrectometry,polarometry			
Lab. Experiment Assignments			
Preparation of primary standard solution			
Standaration of solution & acid-base titration			
Oxidation-reduction titration			
Determination of ferron ion			
Determination of metals ion by EDTA			
Determination of mixture of Ca, Mg, Al, Fe			
Iodometry titration of reducing agent with sodium sulphate			
Determination of hardness, permante. Temp & total			
Specto photometric determination of Iron			
Used of diazonin salt for determination of amine			
Potametric determination of oxi-redution substance			
Half-year Break			
Determination of Ph for some solutions			
Used of thin layer chromatography to separate some organic or inorganic substance			
Determination the capacity of ion exchangersion			
Determination of some metals by pption like Na with dimetal glyoxime			
Determination of alkal by flame photometric			

Determination of heavy metal by atomic absorption			
Used of spectro photometric for determination of pKa (indicator dissociation constant)			
Human rights	**4**	**Human Rights**	**8**
Human rights definitions and characteristics			
Human rights definitions			
Humanrights characteristics			
The historical developing of human rights			
Human rights in the ancient civilization			
Human rights in the Egyptian & greek civilizations			
Human rights in the Mesopotamia civilizations			
Human rights in laws & religions			
Human rights in the Christianity & Judaism religions			
Human rights in the Islamic rights			
Human rights sorts			
Citizen & political rights			
Cultural ,social & economical rights			
Human rights sources			
International sources			
National sources			
Human rights insurances			
The international human rights insurances			

Human rights insurances in the Islamic religion			
Human rights future			
Technical advance & its effecting on rights			
Globalization & human rights			
The administration invalidity phenomena effecting on human rights			
The administration invalidity phenomena definition & its sorts			
The administration invalidity phenomena reasons & factors			
The reflections of the phenomena on the human rights in society			
The perfect processes to prevent & protect the society child &human rights with democracy			

المرحلة الثانية :

ت	اسم المادة	عدد الوحدات	المفردات
1	**Mathematics II**	**6**	Solution of a set of Linear equation
			Matrices and determinants
			Addition and subtraction of matrices
			Multiplication and transpose of matrices
			Adjoint of a square matrix
			Inverse of a square matrix
			Gramer's rule
			Vectors in plane
			Vectors in space
			Dot and cross product
			Lines and planes in three dimensional space
			Partial derivatives
			Chain rule
			Double integration rectangular coordinate
			Triple integrals in rectangular coordinates
			Half-year Break
			Infinite series

sum of an infinite series			
Geometric series			
Arithmetic series			
Harmonic series			
Nth term test for divergence			
Convergence of p-series			
The ratio test			
The nth root test			
Test of Integral			
Absolute and conditional convergence			
Power series			
Power series convergence			
Taylor and Maclaurin series			
Differentiation and integration of power series			
Nature of statistic and using it	**6**	**Statistic**	**2**
Statistical notations			
Collection data			
Tabular presentation			
General rules for constructing frequency table			

Cumulative distribution			
Graphical presentation			
Kind of frequency distribution			
Measures of central tendency			
Mean, geometric, harmonic, quadratic, mod, medium			
Examination			
Measure of dispersion or variation			
Examination			
Regression and correlation			
Simple, partial, multiple and rank correlation coefficient			
Simple and multiple regression			
Half-year Break			
Sampling theory			
Sample designs			
Probability theory			
Defined, kind, laws of probability			
Random variables			
Examination			
Discret probability distribution			
Binomial and poisson distribution			

Continuous distribution like normal distribution			
Examination			
Test of hypothesis			
Test of concerning mean and paired sample			
Examination			
Analysis of variance			
One-way and two-way analysis			
Test of Duncan			
Lab. Experiment Assignments			
Introduction in program SPSS			
Lists the main window for program SPSS			
Application on computer			
Fluid mechanic fundamentals	**5**	**Fluid Mechanics**	**3**
Physical characteristic unit			
Density, weight density			
Relative density, compressibility			
Viscosity, surface tension			
Capillarity, fluid statics, pressure			
Height relation, density, absolute & gauge pressure			
Manometer, forces on submerged plane			

surface			
Force on submerged curved surface, buoyancy			
Flotation, fluid masses subedit to acc.			
Constant linear on acceleration			
Fluid motion, steady & unsteady flow			
One & tow & three dimension flow			
Velocity & acceleration			
Equation of continuity equation			
One & tow dimension circulation			
Half-year Break			
Velocity & rotation flow of idea fluid			
Euler equation, Bernoulli's equation			
Energy equation application of Bernoulli's			
The impuls momentum principle			
Development of the principile			
controkvolume			
Pipe, bend, enlargement			
Enlargement contraction			
Structure in open channel, abreast enlargement			

The oblique standing use			
Dimensional analysis & similitude			
Physical quantities in fluid flow			
Dimensional homogenous equation			
Characteristic of homogenous equation			
Buckingham theorem modes scale			
Similitude			
Lab. Experiment Assignments			
Open channel flow			
Uniform flow			
Circular conducts flowing portly			
Specific energy			
Critical depth			
Channel transition			
Hydraulic jump			
Flow over notch			
Sharp crest weir			
Rectangular &triangular weirs			
Board crest weirs			
Submerged weirs			

Lateral spill way channel			
Lateral weir			
Sludge flow			
Pump-pipe line system analysis			
Half-year Break			
Fluid machinery			
Centrifuge pump			
Homologous pump			
Center of pressure			
Archimedes principles			
Reynolds number			
Bernoulli's equation			
Flow throw on orifice			
Flow over weirs			
Hydraulic jump			
Water cycle	**6**	**Environmental Chemistry**	**4**
Carbon cycle			
Oxygen cycle			
Nitrogen cycle			
Phosphor cycle			

Metal cycle			
Mercury			
Lead			
Air pollution			
Water pollution			
Half-year Break permanent hardness			
Para metrics			
Tigris River			
Pollution study case			
Recommend level			
Environmental			
Chemical			
Analysis			
Water supply			
Raw wade			
Treatment			
Sewage			
Lab. Experiment Assignments			
Temperature			
Ph-unit			

Turbidity			
Dissolved oxygen			
Electrical conductivity			
Total solid			
Total volatile solid			
Total dissolved solid			
Total volatile dissolve solid			
Suspended solid			
Total hardness			
Temporary hardness			
Half-year Break permanent hardness			
Calcium			
Magnesium			
Sodium			
Potassium			
Sulphate			
Chloride			
Nitrate			
Phosphate			
Chemical oxygen demand			

Biochemical oxygen demand			
Oil crease			
Heavy metals			
Preface	4	Surveying	5
Measurements			
Measurements errors2 mistake			
Measurements errors2 mistake			
Types of obstacles			
Obstacles overcome			
Traversing			
Error in traversing			
Field works			
Office works			
Booking & symbols			
Type of maps			
Contour lines			
Drawing of contour maps			
Contour maps, application			
Half-year Break			
Leveling introductions			

Types of leveling instruments			
Checking of leveling instruments			
Series reading surveying			
Rise-fall surveying			
Calculation & checking			
Longitudinal section			
Traverse sections			
Application longitrave			
Areas			
Method of area calculation			
Volumes			
Area vol. application			
Angles			
Area surveying			
Lab. Experiment Assignments			
Surveying Tools			
Tape measurements			
Fixing points			
Layout points			
Obstacles measurement			

Buiding layout			
Right angles			
Optical square			
Traversing			
Errors correction			
Traversing 2			
application			
Half-year Break			
Level instrument			
Level focusing			
Series surveying			
Rise-fall surveying			
Longitudinal section			
Traverse sections			
Hydrological cycle	**6**	**Hydrology**	**6**
Hydrological cycle			
Rainfall analysis			
Rainfall analysis			
Stream flow and measurements			
Stream flow and measurements			

Run off			
Run off			
hydrograph			
hydrograph			
Classification of streams			
Effective rainfall			
Direct runoff			
Direct runoff			
Flood frequency			
Flood frequency			
Half-year Break			
Water harresting			
Water harresting			
Ground water (forms)			
Geological formation			
Water table			
Characteristics of Aquifers			
Characteristics of Aquifers			
Darcy low			
Darcy low			

wells			
Free flow			
Confined flow			
Characteristics of wells			
Drilling of weels			
Drilling of weels			
Drilling of weels			
Lab. Experiment Assignments			
Average rainfall in stations			
Intensity-duration analysis			
Morphological analysis of basins			
Discharge measurement in rivers			
Separation of hydrographs			
Frequency analysis of flood			
Half-year Break			
Flood routing			
Measurement of flow in Aquifers			
Seepage in hydraulic structures			
Flow line			
Concept of ecology	**4**	**Environmental science**	**7**

Components of ecosystem			
Types of ecosysetm			
Ecosystem homeostasis			
Succession			
Food chain and food web			
Ecological pyramids			
Productivity			
Ecological efficiences			
Carbon cycle			
Nitrogen cycle			
Phosphorus cycle			
Sulpher cycle			
Biosphere			
Half-year Break			
Tolerence levels			
Ecological factors			
Ecological indicators			
Aquatic biomes			
Environmental problems			
Radiation pollution			

Sources of water pollution			
Noise pollution			
Air pollution			
Solution of examples			
Solid waste pollution			
Hazard waste pollution			
Self purfication			
Waste water treatment			
Alkanes	**3**	**Organic chemistry**	**8**
Alkenes			
Alkynes			
Aromatic (Benze)			
Aromatic compounds			
alcohols			
alcohols			
Aldehydes			
Ketones			
Carboxylic acid			
Detervatives of carboxylic			
Acids			

Amines			
Amines			
Lab. Experiment Assignments			
Deter. 08 M.P. & b.p.			
Distillation			
Normal distillation			
Steam distillation			
Puri & ication, recystallizeation			
Extraction			
Sublimation			
Reaction of c=c with Br_2 and $KMNO_4$			
Test for functional groups (OH, c=o, c=c, …)			
Half-year Break	**2.5**	**Water quality**	**9**
Why water is important?			
Distribution of water			
How water resources are managed			
Water characteristics			
Chemical analysis of water			
Major cautions & anions resources			
Water pollution, Water pollutant			

Pollution treatments			
Water classification			
Graphical presentation, Water standards			
Environmental concerions			
Salt water intrusion			
Change in land & water use			
Effect of draught and floods			

المرحلة الثالثة :

ت	اسم المادة	عدد الوحدات	المفردات
1	تحليلات هندسية وطرق عددية	4	Definitions, Various types of matrices
			Properties of matrix multiplication
			Property of adjoint A
			Inverse of a matrix,rank
			Solution of simultaneous equations
			Characteristic root or eigen values
			Defferential equations ,order and degree of differential equation
			Formation of differential equation ,solution of differential equation
			Variables separable,homogeneous differential equation
			Linear differential equation ,exact differential equation
			Method for finding the complementary function
			Rules to find particular integral, general method of finding the particular integral
			The homogeneous linear equations ,methods of variation parameters
			Simultaneous differential equation, Method of forming partial differential equations,
			lagrangs linear equation,method of multipliers
			partial differential equation non-linear ,linear homogeneous

partial differential			
Half-year Break			
Solution of difference equation			
Complementary function,particular integral			
Newtons forward interpolation formula			
Newtons backward interpolation formula			
Lagranges interpolation formula for unequal interval,newtons divided difference interpolation formula			
Trapezoidal rule			
Simpsons rule			
Gaussian integration formulas,eulers method			
Modufided eulers method			
Runge-kutta method			
Un-determine weight coefficient			
Graphical method,interation method			
False position method			
Newton –rap son method			
Bisection method			
Introduction about sanitary engineering	**6**	**Water Supply**	**2**
Quality of consumption factors affecting upon consumption			
Consumption for fire			
Sources of water collection of water			

Distribution of water ,distribution system			
Methods of collecting water			
Hardy cross method 1			
Hardy cross method 2			
Intakes type ,design criteria			
Pumping			
Sedimentation			
Types of semintation 1			
Types of semintation 2			
Settling velocity			
Theory of coagulation and flocculation			
Types of coagulants			
Half-year Break			
Secondary settling tanks			
Filtration			
Filtration and washing			
Design of filters			
Disinfection			
Chlorination			
Advanced treatment			
Removal taste and odor			
Water softening 1			

Water softening 2			
Removal of iron and manganese			
Lab. Experiment Assignments			
Method of forecasting population 1			
Method of forecasting population 2			
Fire demand			
Design of intake elements 1			
Design of intake elements 2			
Estimation of ground water 1			
Estimation of ground water 2			
Hardy cross method 1			
Hardy cross method 2			
Calculation concentration of suspended solids			
Settled matter			
Filtered matter			
Calculation of settling velocity			
Discrete settling			
Flocculant settling 1, flocculant settling 2			
Half-year Break			
Hindered settling			
Compression settling			
Estimation of coagulant dose 1			

Estimation of coagulant dose 2			
Filteration 1			
Filteration 2			
Chlorination ,break point			
Technology and techniques	4	**Measurements techniques**	**3**
Measurment quantities and units			
Instrumental analytical techniques			
Energy and electromagnetic spectrum			
Atomic spectrum			
Moleculaer spectrum			
Nuclear spectrum			
Types of radiation			
x-ray spectrometry			
XRF & XRD			
SEM& TEM Radiation detectors			
Electron and neutron diffraction			
Radiation detectors			
Nuclear activation analysis			
Neutron activation analysis			
dosimetry			
Half-year Break			
UV-visible spectroscopy			

Flame emission spectrmetry			
Chromatography			
Gas Chromatography			
HPLC			
Potentiometry			
Ion-selective electrode			
Atomic absorbtion spectroscopy			
Mass spectroscopy			
Magnetic resonance spectrocopy			
NMR-spectrocopy			
Auger spectroscopy			
Field –ion microscopy			
Mossbauer spectroscopy			
Position annhilation spectroscopy			
Review			
Review of syllabus	**6**	**Geographic and Environmental Information system**	**4**
Definition of GIS			
The beginning and the establishment of the system, methodology, specialization, the contribution and the relationship of the other sciences			
Component of GIS			
First sources of data(remote sensing)			

Secondary sources of data(variou of base maps)			
types of data in the GIS			
Spatial data			
Attribute data			
Digitizing and building data in GIS			
Projections and coordinate systems			
Universal transfer Mercator (UTM) projection			
Concept of Datum (WGS 84).			
Data base structure in GIS			
Reviewing some of GIS functions			
Reviewing some of GIS functions			
Half-year Break			
Topics Covered			
Classification data			
Classification data			
Mapping representation of data in GIS			
Quantitative Cartographic representation			
qualitative Cartographic representation			
Spatial and statistical analysis by GIS			
geomorphological maps			

geomorphological maps			
Hydrological maps			
Review of advance important functions in GIS			
Review of advance important functions in GIS			
isoline maps(Geostatistical analysis applications)			
Changing the extensions of the raster data into…. etc			
Fundamental lof Design maps			
Fundamentalof Design maps, final representation of maps			
Lab. Experiment Assignments			
install steps of Arc GIS 9.3 , GLOBAL MAPPER 10 Program			
Definition and Review of Arc GIS 9.3 important functions (Arc Map, ArcCatalog, Arc toolbox, Arc Hydro, Arc Scene).			
Tools of Arc Map			
Tools of Arc Catalog			
Georefresing for the initial maps.(spatial refrence).			
Georefresing for the initial maps.(spatial refrence).			
Input and building data in Arc GIS 9.3 Programe			
Sketch tools			
Sketch tools of (polygon drawing			
Sketch tools of (polygon drawing)			
Sketch tools of (polyline drawing)			

Sketch tools of points drawing			
Selection of projection and datum map			
Signature of spatial data according to scale			
Examination			
Half-year Break			
Lab.Experiment Assignments			
Building of data base (Attribute data)			
Building of data base (Attribute data)			
The possibility of using calculator data in Arc Map			
The possibility of using geometrical calculator data in Arc Map			
Select by Attribute (query)			
Select by Attribute (query)			
Select by location (query)			
Symbology tools Application of			
Classification data			
Dealing with **DEMs**			
Slope maps ,Aspect map			
Hill shade , three dimensions (tin) model			
Examination			
Application of Fundamental l of Design maps			
Application, final representation of maps			
Introduction –solid waste definition-global nature-ancient Iraq solid waste –solid waste	4	**Solid waste**	**5**

status in mosul			
Types of solid waste-domestic solid waste-commercial solid waste-industrial-agriculteral-workshop solid waste-radioactive solid waste-demolition /construction-street solid waste-medical /health care solid waste			
Physical-chemical and biological characterization of solid waste			
Solid waste generation rate and composition variation			
Solid waste composition ,a decade comparision			
Factors affecting solid waste characteristics			
Solid waste health hazards and problems,collection and transportation of solid waste collection evaluation ,factors affection solid waste collection			
Obstruction of introducing developed techniques in dealing with solid waste management in developing countries			
Solid waste problems and challenges-land fill sites-population growth-environmental constrains-urban planning –financial restrictions-scheduling –lack of ISWM –awareness-others			
Obstruction of solid waste management			
Obstruction of solid waste management			
ISWM Definition-merits			
Private sector rules in solid waste management –why private sector-works done by private sectors			
Landfill Introduction –definition-necessity			
,Landfill stages Poen-controlled-engineering-sanitary			

Landfill types Above ground –underground-combination			
Half-year Break			
EIA of landfill ,landfill requrment –soil investigation –			
solid waste survey, Geological and hydrogeological incestegations-			
meteorological data			
-land fill area calculations			
Soil investigation –parameters of interest-gradation-soil chemical characterestics			
Physical characterestics of soil-atterberg limits-hydraukic conductivity-specific gravity			
Solid waste survey-questionnaire-collection,transfer and sorting Calculations needed			
Landfill selection –site protection-land fill components			
System of preventing water to site			
Landfill construction infrastructures for landfill			
Soil Pollution: Definition , Introduction to environment quality , Sources and nature of soil pollution and its harmful effects	3	**Soil Pollution**	**6**
Soil structure, Physical and chemical properties of soil composition , soil organic matter ,Soil water types			
Soil micro-organisms and their functions			
Soil salinity ,Sources of soil salinity			
Industrial waste effluents and heavy metals, their interactions with soil components			

Cadmium, Copper, Lead Zinc, and Iron			
Soil nitrogen and soil quality			
Soil phosphorus and sulfur			
Organic pollution			
Radioactive pollution			
Biological soil pollution			
Petroleum hydrocarbons pollution			
Oil and Greases soil pollution			
Different insecticides, fungicides and weedicides in soil, their effects on soil components			
Bioremediation of soil contamination			
Lab. Experiment Assignments			
General lab. information , Guide to chemical hazards, Calibration curves			
sampling as analysis of soil quality, Soil types			
Soil acidity and alkalinity - pH, Electrical conductivity- EC, Cation exchangeable capacity – - CEC			
Soil extraction procedures			
Total phosphorus			
Estimation of micro and macro elements			
Nitrate and Nitrite			
Organic material measurement			
Soil radiation measurement instruments			

Oil and Greases soil pollution			
Petroleum hydrocarbons			
Microbial measurements			
Insecticides, fungicides and weedicides in soil			
Waste land fill work			
Introduction,some of concept and difinition	2	**Thermodynamic**	**7**
Pressure ,temperature and its measurment			
First law of thermodynamic ,equation of state			
Closed system processes(constant volume ,pressure,temperature,adiabatic and polytropic processes)			
Open system processes ,steady flow energy equation and its application			
Revisible and irrevisible processes ,heat engine,reversed heat engine ,heat pump			
The second law of thermodynamic ,carnotcycle,reversed carnot cycle ,entropy			
Modes of heat transfer			
One dimensional conductional heat transfer ,heat transfer by the walls			
Thermal constant resistance			
Unsteady state heat transfer			
Heat transfer by forced and natural convection			
Introduction for heat transfer by radiation			
Half-year Break	3	**Biochemestry**	**8**
Introduction of Biochemistry			

Monosaccharide			
Oligosaccharides			
polysaccharides			
The commo amino acids of proteins			
The rare amino acids of proteins / non protein amino acids			
The peptides of physiological			
Proteins/ classification/ functions of protein			
Levels protein structure			
Lipids/ saturated & unsaturated fatty acids			
Neutural lipids & phospholipids			
Sphingolipids & steroids & lipoproteins & glycolipids			
Nunleicacids/ pyrimidine & purine bases			
Nucleosides/ nucleotides			
Nucleicacid/ RNA & DNA			
The effect of pollutants in biomolecules			
Lab. Experiment Assignments			
Introduction of biochemistry			
Carbohydrates			
Colour detections of scacharides			
Hydrolysis of disaccharides & polysaccharides			
Detection of unknown			
Estimation of lactose in milk by Nalson's method			

Colour detection of amino acids or colour reaction			
Colour detection of proteins or colour reaction			
Colour detection of priteins & amino acids			
Detection of unknown			
Precipitation of proteins			
Estimation of protein concentration by Folin method			
Detection of lipids			
Determination of peroxide value in lipids			
Determination of acide value in lipids			
Determination of lodine number in lipids			

المرحلة الرابعة :

ت	اسم المادة	عدد الوحدات	المفردات
1	Wastewater and sludge Treatment	8	Fundamentals, types of wastewater, concept of treatment, treatment methods
			Selection of treatment systems, functions of treatment plant unit.
			Strength and characteristics of waste water, flow rates and their fluctuations, concept of mass load.
			Concept of design criteria, hydraulic retention time, horizontal velocity, Settling velocity.
			Surface loading rate, weir loading rate, organic loading, Food to microorganism ratio.
			Mean cell residence time, hydraulic loading ,volumetric loading, hydraulic flow diagram.
			General procedure for design calculations ,objective, types of treatment units, sizing of units.
			Reactions and reactors, concept of reactions, concept of reactors.
			Design of sump and pump wells of pumping stations, design of approach channel.
			Design of equalization basins, screen chamber, grit chambers.
			Flotation, concept of removal mechanism.
			Biological treatment of waste water aerobic processes, classification
			Bio-kinetic coefficients, determination of bio-kinetic coefficients
			Design application of bio-kinetic constants, design considerations.
			Solids content , organic content, food to microorganisms ratio, effluent quality

Half-year Break			
Design of secondary biological treatment units ,suspended growth units , activated sludge process.			
Extended aeration system, oxidation ditch, aerated lagoons.			
Waste stabilization ponds, removal mechanism, Classification			
Designs of aerobic biological units attached growth processes, trickling filters.			
Classification of trickling filter, design equations.			
Rotating biological contactors.			
Anaerobic biological wastewater treatment (1).			
Anaerobic biological wastewater treatment (2).			
Anaerobic biological wastewater treatment (3).			
Sludge treatment , concept, sludge sources			
Sludge quantities, sludge quality and characteristics			
Volume –weight relationship for the sludge.			
Sludge digestion, anaerobic sludge digestion, types of digesters			
Design considerations, design criteria Design methods			
Quantity of methane gas produced			
Lab. Experiment Assignments			
MLSS			
MLVSS and MLNVSS			
Imhoff Cone			

Hindered Settling			
SVI and Density Index			
F/M Ratio			
Oxygen Utilization Rate			
Density and Moisture Content of the Sludge			
تعريف الادارة البيئية	4	ادارة وتكاليف بيئية	**2**
مجالات وانواع الادارة البيئية			
مكونات الادارة البيئية			
وظائف الادارة البيئية			
مستويات الادارة البيئية			
الموارد الطبيعية واصنافها			
استدامة المصادر الطبيعية			
iso 14001 تعريف الايزو			
مبادئ الادارة البيئية			
تطور مفهوم المسؤولية الاجتماعية			
تعريف المسؤولية الاجتماعية			
اهم المؤشرات التي تقيس الاداء الاجتماعي			
الهيالكل التنظيمية الادارية وانواعها			
الخطط وانواعها			
طريقة المسار الحرج			
الخطط المتكررة			
Half-year Break			

تعريف الاقتصاد الهندسي			
قانون انخفاض العائدة			
الاختيارات الاقتصادية الانية			
الاندثار			
طرق حساب الاندثار			
الاندثار السريع			
معدل الريح الظاهري			
حلول امثلة			
مدة استرجاع راس المال			
حجم العائد السنوي من راس المال			
نسبة العائد من راس المال			
التنبؤ			
المعدل المتحرك			
معدل النماذج الموزونة			
Definition of Remote sensing	6	**Remote sensing**	**3**
The beginning and the establishment of the system, methodology, specialization, the contribution and the relationship of the other sciences			
Component of (RS)			
Sources of data in the (RS)			
Sources of data in the (RS)			
Aerial Photography			
Aerial Photography			

Statelite Imagery			
Statelite Imagery			
Resolution and number bands of Statelite Imagery			
Thermal Infrared properties			
Thermal Infrared properties			
Active and passive microwave remote sensing			
Active and passive microwave remote sensing			
Enhancement of Statelite Imagery			
Half-year Break			
Enhancement of Statelite Imagery			
Classification data of remote sensing			
Anderson classification			
Anderson classification			
Unsupervised Classification			
Unsupervised Classification			
supervised Classification			
supervised Classification			
supervised Classification			
Application of remote sensing			
Application of remote sensing			
Application of remote sensing			
Relationship between the data of RS and GIS			

Representation of final data			
Application between remote sensing and Geographical information system			
Application between remote sensing and Geographical information system			
Lab. Experiment Assignments			
install steps of ERDAS IMAGINE 9.1			
Definition and Review of ERDAS IMAGINE 9.3 important functions			
Definition and Review of ERDAS IMAGINE 9.3 important functions			
Review of some extensions in Arc GIS 9.3			
Review of data in ERDAS IMAGINE programe			
Geomatric Correction			
Review of aerial photography types			
Review of Statelite Imagery types			
Mosaics of Statelite Imagery			
Selection of bands			
composite bands			
Dealing with DEMs			
Application of dems data			
Application of dems data			
Application Enhancement of Statelite Imagery			
Half-year Break			
Application Enhancement of Statelite Imagery			

Application Enhancement of Statelite Imagery			
Steps of classification			
Application of Unsupervised Classification			
Application of Unsupervised Classification			
Application of supervised Classification			
Application of supervised Classification			
Application of supervised Classification			
Classification of land cover			
Application			
Application			
Application			
Established from the results of classification			
Exporting the data to GIS programes			
Converting of the data from raster data to many kinds			
Converting of the data from raster data to many kinds			
Introduction- definitions - Scope and objectives	4	Air pollution	4
Effect and Sources of air pollutants			
Effect and Sources of air pollutants			
Air pollution control regulation			
Particulate–introduction-sources collection			
Primary &secondary air pollutants			

Gaseous pollution control equipment			
Control for specific industries			
Social and economic aspect of air Pollutant			
Meteorology Dispersion of Pollutant in the Atmosphere			
Meteorology Dispersion of Pollutant in the Atmosphere			
Acid rain.			
Ozone layer			
Green house effect			
Pollutant standards index			
Adsorption process& absorption devices (scrubbing)			
Half-year Break Particulate contaminates Gravitational settling chambers Centrifugal collectors Cyclone& dynamic precipitators Filters (fabric & fibrous mat collectors) Wet collectors (scrubbers)			
Electrostatic precipitators			
Gravity spray tower			
Distribution pollutants			
Mobile sources			
General notions on Environmental, Environment, Pollution, International	2	**Environmental Legislation**	**5**

Efforts to Determine the Concept of Environmental Pollution			
Environmental Pollution in National Legislations, The Law of Environment, What is Meant of Environmental law			
Source of Environmental International Law Rules, The legal nature of environmental international law rules, The source of environmental international law			
International and Arab concern about Environmental Pollution Issue, International concern about Environmental Pollution Issues			
Arab concern about Environmental Pollution Issues, Reasons of Environmental Pollution			
Industrial and Technology Progress, Social Behavior, indsofenvironmental pollution, pollution of water environment			
Pollution of land environment and desertation, Legal protection of environment from pollution			
International protection of Atmosphere and Ozone and Climat change, protection of environment from Atomic and dangerous wastes			
International protection of water from pollution, constitutional protection environment from pollution, Criminal protection of environment from pollution			
Civil protection ,means of protecting environment, International practices in protecting environment ,Activating international agreements in national legislations			
Internal procedures for protecting environment, Role of civil community in protecting environment, Authorities concerned with protecting environment			
Governmental international organizatios,non- Governmental international organizations, governmental authorities, The concept of legal responsibility			
international responsibility for damages, The basis of international			

responsibility for environmental damages, Theory of Illegal international practice, mistake or ignorance theory, risk theory			
Terms of international responsibility for damages resulting from environmental pollution, illegal practice, damage, assigning practice to state			
Effects of international responsibility ,Cessation of internationally illegal practice, Real compensation, Financial compensation, Civil responsibility for damages, the basis of civil responsibility			
dimensionsofcivil responsibility,,mistake,damage,casual relationship, objective or substantial responsibility, The concept of legal responsibility,international esponsibility for damages , The basis of international responsibility for environmental damages			
Definitions	2	Irrigation principles & practices	6
Definition of irrigation process			
Soil water relation			
water movement through unsaturated soils			
Water requirments			
irrigation effeciencies			
Water duty delincation			
design irrigation canals			
Water measurements			
Concept of drainage process			
Water movement through saturated soils			

Drainge studies			
Saline and alkine soils			
Design of open and closed drains			
Half-year Break	2	Renewable Energy	7
Renewable energy definition and importance			
types of renewable energy, solar energy			
solar energy			
hydropower			
wind power			
Tidal and wave power			
Geothermal power			
Biofuel			
Liquid biofuel			
Solid biomass			
Biogas			
Nuclear energy			
Nuclear energy			
Hydrogen production			
renewable energy economy			
Half-year Break	2	**تخطيط حضري**	**8**
مقدمة عامة			

تاثير البيئة على المجتمع			
توزيع المنشات الصناعية والدور السكنية بيئيا			
التاثير المتبادل بين البيئة والطريق			
الاثار البيئية لحركة وتشغيل المركبات			
السلامة المرورية			
حوادث الطريق			
التقييم الاقتصادي لسلامة الطرق			
تاثير حركة المركبات على البيئة من الناحية الصحية ,الناحية الجمالية			
الضوضاء والتلوث البيئي , التاثير النفسي			
السلامة المرورية, تعريفها			
وسائل زيادة الامان في استخدام الطريق وتاثير تصميم المركبة على شدة الحوادث			
التوعية المرورية وتاثيرها على التقليل من نسبة الحوادث			
تحليل الحوادث المرورية			
المقارنة الاقتصادية			
Types of radiation		Radioactive pollution	9
Ionizing radiation			
Radiation sources			
Natural radiation			
Radioactivity			
Nuclear radiation			
Interaction of radiation with matter			

Nuclear reactions			
Radioactive waste			
Air pollution			
Water pollution			
Soil pollution			
Radiation measurement			
Effect of radiation			
Radiation safety, dose			
Radiation limits, applications			
Introduction		Wastewater reuse	10
Land treatment system			
Reuse in irrigation			
Reuse in rapid infiltration			
Over land flow system			
Wastewater reuse in aquaculture			
Effluent disposal and reuse			
Disposal into lakes			
Disposal into rivers			
Oxygen sag-curve			
Eddy diffusion			
Industrial recycling and reuse			

Ground water recharching			
Reuse in recuration			
Other waste water reuse			
applications			