وزارة التعليم العالي والبحث العلمي

جامعة الموصل

كلية هندسة النفط والتعدين

وصف المقرر الدراسي لقسم التعدين

للعام الدراسي 2022-2023

وزارة التعليم العالي والبحث العلمي

جامعة الموصل/كلية هندسة النفط والتعدين

مفردات منهج قسم هندسة التعدين

المرحلة الدراسية: الاولى

اسم المقرر: الرسم الهندسي

عدد الوحدات: 3 / سنوي

عدد الساعات: 3 عملي

لغة المقرر: ENGLISH الجزء العملي

مدرس المادة: سارة جمال + شهد سالم+ زينة نوفل

Week No.	Subjects
1	Introduction to engineering drawing. Instrument and accessories, folding of drawing sheets.
2	Drawing sheet layout and title block, type of lines, lettering.
3	Drawing a Parallel and perpendicular lines and drawing special angles.
4	Geometrical construction: bisecting a straight line and dividing a straight line into a given number of equal parts.
5	Bisect a given arc angle. Drawing a circle and tangents.
6	Drawing a tangent two lines, Drawing an arc tangent to a line and an arc.
7	Construction of an arc tangent of given radius to two given arcs.
8	Construction of line tangents two circles (open belt, closed belt). Drawing an arc tangent to a given point on the line.
9	Drawing an ogee curve.
10	Drawing ellipse by two methods: 1-Rhombus method (an approximate ellipse or four-centered method), 2-Parallelogram method.
11	Geometrical shapes: pentagon and hexagon in a given circle and construct a hexagon and pentagon by giving the length of the side.
12	Drawing an octagon, General method of drawing any polygon.
13	Dimensioning scales and unites.
14	First exam.
15	Orthographic projections: theory of Orthographic projections, the six principle views.
16	Object orientation, selection of views, spacing the selected views.
17	Alternate –position views, Hidden features, center lines.
18	Projection of parallel and perpendicular surfaces.
19	Projection of include surface.
20	Projection of a circle.
21	Freehand sketching.
22	Isometric drawing and sketching.
23	Drawing a non-isometric line, Boxing method, Offset method.
24	Angles and arcs in Isometric.
25	Inclined surfaces in Isometric.
26	Drawing a circle, in Isometric.
27	Finding the 3rd missing view.
28	Freehand sketching.
29	Isometric drawing from orthographic views.
30	Second exam.

اسم المقرر: برمجة 1 نظري

عدد الوحدات: 3 / سنوي

عدد الساعات: 2 نظري + 3 عملي

لغة المقرر: الانكليزية   الجزء العملي

مدرس المادة : زينب حازم

Week No.	Subjects
1	**Application about Environment**
2	**Application about Basic syntax**
3	**Application about Variables**
4	**Application about Commands**
5	**Application about M-files**
6	**Application about Data types**
7	**Application about Operators**
8	**Application about Decision making**
9	**Application about Loop types**
10	**Application about Commands**
11	**Application about Vectors**
12	**Application about Matrix**
13	**Application about Arrays**
14	**Application about Commands**
15	**Application about Commands**
16	**Application about Colon notation**
17	**Application about Numbers**
18	**Application about Strings**
19	**Application about Functions**
20	**Application about Data import**
21	**Application about Data output**
22	**Application about Plotting**
23	**Application about Graphics**
24	**Application about Algebra**
25	**Application about Calculus**
26	**Application about Differential**
27	**Application about Integration**
28	**Application about Polynomials**
29	**Application about Transforms**
30	**Review**

اسم المقرر: برمجة 1 عملي

عدد الوحدات: 2 / سنوي

عدد الساعات: 2 نظري + 3 عملي

لغة المقرر :الانكليزية   الجزء النظري

مدرس المادة: زينب حازم+ ريم مهدي+ هديل محمد

Week No.	Subjects
1	Environment
2	Basic syntax
3	Variables
4	Commands
5	M-files
6	Data types
7	Operators
8	Decision making
9	Loop types
10	Commands
11	Vectors
12	Matrix
13	Arrays
14	Examination
15	Commands
16	Colon notation
17	Numbers
18	Strings
19	Functions
20	Data import
21	Data output
22	Plotting
23	Graphics
24	Algebra
25	Calculus
26	Differential
27	Integration
28	Polynomials
29	Transforms
30	Examination

سم المقرر: جيولوجيا عملي

دد الوحدات: 3 / سنوي

دد الساعات: 3 عملي + 2 نظري

فة المقرر: ENGLISH الجزء العملي

Week No.	Subjects
1	Crystals
2	Minerals
3	Igneous rocks identification by hand specimens.
4-5	Sedimentary rocks identification by hand specimens.
6	Metamorphic rocks identification by hand specimens.
7	Clinometers compass and its uses - Representation of attitude of beds.
8	Introduction to geologic maps.
9-10	Contour maps Topographic maps
11-12	Contour maps and Geologic maps
14-15	Outcrops in geologic maps with Reference to slope and topography.
16-17	Contour maps and their interpretation
18	Exercises to predict trend of the outcrop of horizontal
19	Vertical and inclined beds with respect to topography
20	Deciphering dip and strike of outcrops
21-22	Construction of map when 3 points over a bedding plane are given
23	Construction of vertical section
24-25	Determination of ages of structures, Geological history.
26-27	Solving simple dip and strike problems by Trigonometrically and graphical methods
28	Determination of true thickness of beds by calculations
29-30	Three point problems by trigonometrically methods.

سم المقرر: جيولوجيا نظري
دد الوحدات: 2 / سنوي
دد الساعات: 2 نظري + 3 عملي

Week No.	Subjects
1	**First semester** **Introduction: Concept of geology, Importance of geology in mining.** **Origin of the Earth - Age of the Earth, Earth and Planetary system, size, shape.** **Structure and constitution of the interior of the earth; atmosphere and greenhouse effect; Isostasy; elements of seismology;**
2	**Physical properties of the interior of the earth; continents and continental processes**
3	**Physical oceanography; geomagnetism and pale magnetism, continental drift, plate tectonics.**
4	**Crystallography Scope,. Morphological characters of crystals - Faces - Forms Edge - Solid angles** **Interfacial angle.** **Crystal systems.** **Polymorphism and isomorphism, and miller Indices**
5	**Mineralogy** **Minerals – definition, formation and mode of occurrences.** **Identification – physical properties (like Form, Colour , Luster , Cleavage , Fractures , Hardness and specific gravity), chemical properties and Optical properties of some minerals. Classification of minerals.**
6	**Petrology** **Types of rocks, igneous, sedimentary & metamorphic** **Definition and scope, main classes of rocks forming minerals.**
7	**Igneous, sedimentary and metamorphic rocks – origin, characteristics, classification, uses and mining importance.**
8	**Sedimentary processes and environments, sedimentary faces, basin analysis**
9	**Significance of texture and structure of rocks on geomechanical properties of rock mass.**
10	**Stratigraphy** **Definition and scope. Stratigraphic correlation.**
11	**Standard stratigraphic scale. Fossils – conditions, mode of preservation and uses.** **Types of Stratigraphy (Types of Lithostratigraphy) and Type of Contact Line (unconformities).**
12	**Major geological formations of Iraq and their economic significance.**
13	**Geological Time Scale.** **Structural Geology:** **Stratified rocks and their structures.** **Attitude of strata. Outcrop and in crop**
14	**Plate Tectonic Theory**
15	**Types of Stress.** **Stress, Strain; Folds ; Faults ; Joints** **Engineering considerations and treatments.**
Week No.	**Subjects**
1	**Second semester** **Economic Geology**

		Definition; fuel, ores, industry rocks and Geohydrology
2		Type of Ore deposit and environment. Ore forming processes vis-à-vis ore-rock association (magmatic, hydrothermal, sedimentary and metamorphogenic ores); ores and metamorphism
3		Ores and gangue – genesis, classification and geological occurrences in Iraq.
4		Uses of important metallic and non-metallic minerals
5		Prospecting and Exploration Geological guides for prospecting of Ores (Petroleum, mineral deposits and Industry rocks).
6		Steps of Prospecting and Exploration.
7		Introduction to different methods of prospecting for Petroleum and mineral deposits – geological, geophysical, geochemical, geobotanical, aerial photography and remote sensing.
23		Exploratory drilling methods, Directional drilling. Drill hole - Well logging
24		Reservoir Estimation. Producing Stage and Ores mining
25		Trenching and pitting and Sampling grids.
26		Mining methods. Coal and petroleum geology; origin and distribution of mineral.
27		Role of geology in the construction of engineering structures including dams, tunnels and excavation sites
28		Fuel Geology Introduction, Petroleum, Coal, Lignite and other fuel geology.
29		Petroleum and natural gas formation of gas and oil basins, traps, reservoirs and occurrences in Iraq
30		Geohydrology Sources of water in mines. Classification of rocks based on porosity and permeability.

سم المقرر: فيزياء عملي

دد الوحدات: 4   / سنوي

Week No.	Syllabus
1-2	**Introduction**
3-4	**Characteristic of Silicon Diode**
5-6	**Half and Full Wave Rectifier**
7-8	**Characteristic of Zener Diode**
9-10	**The Diode Properties of the Transistor and Its IV Characteristic Curves**
11-12	**Common Emitter Transistor Amplifier Circuit**
13-14	**Common Base Transistor Amplifier Circuit**
15-16	**Common Collector Transistor Amplifier Circuit**
17-18	**Multi-Stage Transistor Amplifiers**
19-20	**Negative Feedback**
21-22	**The LC Oscillator**
23-24	**The RC Phase-Shift Oscillator**
25-26	**JFET Characteristic**
27-28	**The Junction Field Effect Transistor(JFET) Amplifier**
29-30	**Operational Amplifiers**

اسم المقرر: فيزياء نظري
عدد الوحدات: 3 / سنوي

Week No.	Subjects
1	**Semiconductors**
2	**Semiconductors**
3	**PN Junction**
4	**PN Junction**
5	**Rectifiers**
6	**Rectifiers**
7	**Filters**
8	**Exam**
9	**Transformers**
10	**Transformers**
11	**Power Supplies**
12	**Power Supplies**
13	**Protection**
14	**Protection**

Week No.	Subjects
1	Experimental qualitative analysis.
2 & 3	Experimental qualitative analysis (analysis of group I cations $^{(}$Ag$^+$,Pb^{+2},Hg$_2$$^{+2)}$) .
4 & 5	Analysis of group II (A,B) cations.(Hg^{+2}, Cu^{+2}, Bi^{+3} ,Pb^{+2} ,Cd^{+2}, Sn^{+2}, Sn^{+4}, As^{+3}, As^{+5}, Sb^{+3}) .
6 & 7	Analysis of group III cations (Al^{+3}, Cr^{+3}, Zn^{+2}, Fe^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}).
8 & 9	Analysis of group IVcations (Mg^{+2}, Sr^{+2}, Ca^{+2}, Ba^{+2}).
10 & 11	Analysis of group V cations (NH$_4$$^+$, K$^+$, Na$^+$).
12	Exam 1
13 & 14	Systematic analysis of the anions (SO3^{-2}, C$_2$O$_4$$^{-2}$, SO$_4$$^{-2}$, CrO$_4$$^{-2}$, S$_{-2}$, Cl$^-$, NO$_3$$^{-2}$).
15 & 16	Volumetric analysis (Some terms in volumetric titrations).
17 & 18	Apparatus for precisely measuring volume.
19 & 20	Classification of reactions in titrimetric analysis.
21 & 22	Methods of expressing concentration.
23	Neutralization reactions (acid _ base).
24	EXP No.1 (Standardization of the approximately 0.1N HCl.
25	EXP No.2 (Determination of (NaOH) by titration with standardized HCl.
26	Practical organic chemistry (Determination of melting point).
27	Determination of boiling point.
28	Distillation (Simple distillation).
29	Fractional distillation.
30	Exam 2

Week No.	Subjects
1	Matter and Energy, Atoms and Molecules, Structure Determines Properties, Solids, Liquids, and Gases, Heterogeneous Mixtures, Homogeneous Mixtures Physical Properties, Chemical Properties.
2	, Physical and Chemical Change, Separation of Mixtures Distillation: different boiling points ,Filtration: different solubility's, Exothermic Processes, Endothermic Processes.
3	Chemical Reactions, Experiencing Chemical Change, Combustion Reactions Precipitation Reactions, Reactions involve rearrangement and exchange of atoms, producing new molecules.
4	Evidence of Chemical Reactions, Evidence of Chemical Change, Chemical Equations, Conservation of Mass, Symbols Used in Equations, Writing Balanced Chemical Equations, Examples.
5	Aqueous Solutions, Predicting Whether a Reaction Will Occur in Aqueous Solution, Dissociation, Electrolytes, Types of Electrolytes, When Will a Salt Dissolve?, Precipitation Reactions, No Precipitate Formation = No Reaction.
6	Acid–Base Reactions, Other Patterns in Reactions, Oxidation–Reduction Reactions, Combustion as Redox, Classifying Reactions.
7	Solutions, Homogeneous mixtures, Heterogeneous mixtures, Solute, Solvent, Common Types of Solution, Solubility, soluble, insoluble, Like dissolves like, Classifying Solvents, Salt Dissolving in Water, Descriptions of Solubility, Supersaturated Solution, saturated Solution, un-saturated Solution.
8	Solubility and Temperature, Solubility of Gases: Effect of Temperature, Effect of Pressure, Solubility and Pressure, Solution Concentrations, Describing Solutions, Dilute solutions, Concentrated solutions, Molarity, Molality , Normality, Dilution, Dilution Formula.
9	Chemical Bonding, Bonding Theories, Lewis Bonding Theory, Lewis Symbols of Atoms, Lewis Symbols of Ions, Ionic Bonds, Covalent Bonds, Using Lewis Atomic Structures to Predict Bonding Between Nonmetal Atoms.
10	Single Covalent Bonds, Double Covalent Bond, Triple Covalent Bond, Bonding and Lone Pair Electrons, Multiplicity and Bond Properties, Trends in Bond Length and Energy, Polyatomic Ions, Bond Polarity, Electronegativity.
11	Liquids, Solids, and Intermolecular Forces, Interactions Between Molecules, The Physical States of Matter, Properties of the Gases States of Matter:, Properties of the Properties of the Liquids States of Matter, Properties of the Solid States of Matter: Why Is Sugar a Solid, But Water Is a Liquid?, Phase Changes: Melting, Boiling.
12	Properties of Liquids: Surface Tension, Viscosity, Evaporation, Evaporation and Condensation, Vapor Pressure, Boiling Point, Temperature and Boiling, Temperature and Melting, Sublimation, Intermolecular Attractive Forces, Effect of the Strength of Intermolecular Attractions on Properties, Attractive Forces and Properties, Dipole-to-Dipole Attraction, Attractive Forces, Intermolecular Attraction and Properties, Immiscible Liquids, Hydrogen Bonding, H-Bonds vs. Chemical Bonds.
13	Acids and Bases, Types of Electrolytes, Properties of Acids, Common Acids, Structures of Acids, Properties of Bases, Common Bases, Arrhenius Theory, Bronsted–Lowry Theory, Amphoteric Substances, Conjugate Pairs, Neutralization Reactions, Acid Reactions: Acids React with Metals, Acids React with Metal Oxides, Base Reactions.
14	Titration, Acid–Base Titration, Strong or Weak acids or bases, pH, pH of Common Substances, Complete the Table: pH, pOH, Buffers, How Buffers Work, A Buffer Made from Acetic Acid and Sodium Acetate, Nonmetal Oxides Are Acidic, What Is Acid Rain?, What Causes Acid Rain?, pH of Rain in Different Regions, Damage from Acid Rain.

15	ORGANIC CHEMISTRY, Carbon Bonding, Orbital Hybridization/ Molecular Shape / Structures, Hydrocarbon Backbones / Functionality / Nomenclature Isomerism: Constitutional, Geometric, Enantiomeric, Diastereomeric, Optical Activity.
16	HYDROCARBONS: Acyclic (without rings); Cyclic (with rings); Saturated: only carbon-carbon single bonds; Unsaturated : contains one or more carbon-carbon double and/or triple bonds, Bonding Arrangements, Orbitals / Bonding / Shape Atomic s and p orbitals, Orbitals / Bonding / Shape Mixing Atomic Orbitals, Hybridization of s and p orbitals, sp^3; The atomic orbitals used in bond formation determine the bond angles, sp^2 hybridization, A Triple Bond sp-hybridization.
17	Types of Hydrocarbons Alkanes, Alkenes, Alkynes, Aromatics, Resonance, Molecular Representations, Formulas & Kekulé / Condensed / Bond-Line Structures / Drawings, Naming Alkanes, Nomenclature: Alkanes, Names to Structures.
18	Different Kinds of Alkyl Carbon Atoms, Different Kinds of sp3 Carbon and Associated Hydrogen Atoms.
19	Unsaturated Hydrocarbons; Alkenes, Structures & Names. Unsaturated Hydrocarbons; Alkynes, Structures & Names .Unsaturated Hydrocarbons; Aromatics, Substituted Benzenes& Naming, Hydrocarbons / Oil Refining.
20	Functional Groups; Functionality" relates to a chemically distinct, generally reactive portion of a molecule, Common Functional Groups, Bond-line structures.
21	Functional Groups: Alcohols (R-OH), Ethers (R-O-R), Compounds with a Carbonyl Group.
22	Aldehydes & Ketones, Carboxylic Acids, Esters.
23	Reactions: Oxidation / Reduction / Esterification / Condensation.
24	Chemical Communication, Fats: Esters of glycerol, a molecule with three -OH groups.
25	Compounds with a Nitrogen atom: Amines & Amides.
26	Isomerism; Geometric Isomerism, Stereoisomerism, Enantiomers of 2-bromobutane, Optical Activity.
27	d,l-Carvone: Mint or Caraway Chirality & Carbon Atoms, Chirality, Enantiomers & Asymmetry, Enantiomers of Alanine, constitutional isomers , enantiomers, stereoisomers, diastereomers non-superimposable, non-mirror images, Multiple chiral carbons.
28	Polymers, Macromolecules which are made from small molecules, monomers, Nylon, Polyethylene.
29	Polymerization Mechanism, Waste / Recycling.
30	Exam.

سم المقرر: الرياضيات

دد الوحدات: 6 / سنوي

Week No.	Subjects
1	The derivative – Implicit diff. – chain rule – partial derivative and applications
2	The integral – definite and indefinite – line equation with slope – double and triple integral.
3	Application to definite integral: Area – Volumes – arc length.
4	Transcendental equation: exponential function with derivative and integral - logarithmic function with derivative and integral – Logarithmic differentiation.
5	Transcendental equation: trigonometric function with derivative and integral and its rules.
6	Transcendental equation: inverse Trigonometric function with derivative and integral.
7	Transcendental equation: Hyperbolic Trigonometric function and inverse Hyperbolic Trigonometric function with derivative and integral.
8	Methods of integral: Integration by part.
9	Methods of integral: Integration by Trigonometric subistitutation and completing squares.
10	Methods of integral: Integration by partial fractional.
11	Methods of integral: Integration by linear root contain 1st degree expressions.
12	Methods of integral: Integration by fractional function contains sine and cosine.
13	Methods of integral: Integration by odd and even and high power for trigonometric functions.
14	Polar coordinates: graphs – transformations – symmetric types.
15	Series: Taylor and Maclaurin series.
16	The Matrix and its operations.
17	The determinants and its applications - inverse matrix by cofactor.
18	Grammar method to solving linear system.
19	Encryption by using matrix.
20	Differential equation: separation of variables – homogenous equations.
21	Differential equation: linear cofactor - exact equations – integral factor.
22	Laplace Transformation.
23	Inverse Laplace transformation.
24	Initial value problem by using Laplace transformation.
25	Fourier series.
26	Complex numbers.
27	The vectors and applications.
28	Limit and Continuity
29	Domain and limit
30	Special functions: single factorial – Double factorial – Gamma fun. Beta fun.

Week No.	Subjects
1	**Basic Concepts.**
2	**Scalar and Vectors.**
3	**Newton's Law.**
4	**Force system.**
5	**2D force system.**
6	**2D force system.**
7	**Rectangular Components.**
8	**Mid Exam.**
9	**Moments**
10	**Couple & Resultants.**
11	**Couple & Resultants.**
12	**Equilibrium**
13	**Equilibrium**
14	**Center of gravity (Centroid).**
15	**Center of gravity (Centroid).**
16	**Moment of Inertia.**
17	**Moment of Inertia.**
18	**Friction**
19	**Mid Exam.**
20	**Kinematics of particles: rectilinear motion.**
21	**Plane curvilinear motion.**
22	**Normal and tangential coordinates.**
23	**Relative motion.**
24	**Kinetics of particles: Newton's second law.**
25	**Rectilinear motion.**
26	**Curvilinear motion.**
27	**Rectilinear Kinematics: Erratic Motion.**
28	**Curvilinear motion/ projectile motion.**
29	**Work and kinetic energy.**
30	**Work and kinetic energy.**

Week No.	Subjects
1	Pronouns
2	Exercises about pronouns.
3	Auxiliaries
4	Exercises about Auxiliaries.
5	Monthly exam.
6	Tenses with their sub classifications.
7	Exercises about tenses.
8	Reading Comprehension.
9	Test about reading comprehension.
10	Present tense/ simple, continuous, perfect.
11	Exercises about tenses.
12	Monthly exam.
13	Past tense/ simple, continuous, perfect.
14	Exercises about past tense.
15	Future tense/ simple, continuous, perfect.
16	Exercises about future tense.
17	Monthly exam.
18	Reading comprehension.
19	Exercises about reading comprehension.
20	How would you write a composition?
21	The structure of a composition.
22	Practice about writing composition.
23	Practice about writing composition.
24	Monthly exam.
25	The use of present tense in writing a composition.
26	The use of proverbs in writing a composition.
27	Exercises
28	Exercises
29	Exercises
30	Monthly exam

اسم المقرر: ديمقراطية وحقوق إنسان

رقم الاسبوع	الموضوع
1	مفهوم حقوق الانسان
2	خصائص حقوق الانسان
3	انواع حقوق الانسان
4	انواع حقوق الانسان
5	التطور التاريخي لحقوق الانسان
6	حقوق الانسان في بلاد ما بين النهرين
7	حقوق الانسان في الحضارة اليونانية
8	حقوق الانسان في ظل القانون الدولي
9	مراجعة عامة
10	امتحان تمهيدي 1
11	امتحان تمهيدي 2
12	مراجعة عامة
13	امتحان نهاية الكورس
14	عطلة نهاية الكورس
15	حقوق الانسان و عصبة الامم
16	حقوق الانسان في ظل ميثاق الامم المتحدة
17	الضمانات الدستورية لحقوق الانسان
18	النص الدستوري و الرقابة على دستورية القوانين
19	مؤسسات المجتمع المدني
20	الرأي العام
21	مراجعة عامة
22	مفهوم الديمقراطية
23	صور الديمقراطية
24	مقومات الديمقراطية
25	مبادئ الديمقراطية
26	اركان الديمقراطية
27	تقويم الديمقراطية
28	مراجعة عامة
29	امتحان تمهيدي 1
30	امتحان نهاية الكورس الثاني

وزارة التعليم العالي والبحث العلمي
جامعة الموصل/كلية هندسة النفط والتعدين
مفردات منهج قسم هندسة التعدين
المرحلة الدراسية: الثانية

Week No.	Subjects
1	**Properties of fluids**
2	**Properties of fluids**
3	**Calibration of pressure gauge**
4	**Calibration of pressure gauge**
5	**Hydrostatic pressure center**
6	**Hydrostatic pressure center**
7	**Reynolds Experiment**
8	**Reynolds Experiment**
9	**Bernoulli's Theorem**
10	**Bernoulli's Theorem**
11	**Impact of Jets (Flat plate deflector)**
12	**Impact of Jets (Hemispherical deflector)**
13	**Impact of Jets (Ө=60° deflector)**
14	**Impact of Jets (Ө=120° deflector)**
15	**Discharge measurement in pipes by Venturi meter**
16	**Discharge measurement in pipes by Venturi meter**
17	**Discharge measurement in pipes by pitot tube**
18	**Discharge measurement in pipes by pitot tube**
19	**Discharge measurement in pipes by Rotometer**
20	**Discharge measurement in pipes by Rotometer**
21	**Discharge measurement in pipes by orifice**
22	**Discharge measurement in pipes by orifice**
23	**Fluid Friction in Pipes**
24	**Fluid Friction in Pipes**
25	**Minor head losses in pipes**
26	**Minor head losses in pipes**
27	**Discharge measurement in the tank by the sharp orifice**
28	**Discharge measurement in the tank by the sharp orifice**
29	**Viscosity**
30	**Viscosity**

Week No.	Subjects
1	Dimensions and units analysis-concept of fluid
2	Fluid and their properties-difference between solids, liquids and gases, Ideal and real fluids
3	Capillarity, surface tension
4	Cavitation issue and it's solution
5	Compressibility and bulk modulus, Newtonian and non-Newtonian fluids
6	Viscosity, newton law of viscosity, dynamic viscosity, units of viscosity
7	Effects of temperature and pressure on viscosity, velocity and shear stress through pipes
8	Fluid static, concept of pressure, Pascal's law and its application, action of fluid pressure on a plane (horizontal. Vertical, and inclined)
9	Submerged surface, resultant force and center of pressure, force on a curved surface
10	Buoyancy and flotation, stability of floating and submerged bodies, metacentric height
11	Pressure distribution in a liquid subjected to constant horizontal/ vertical acceleration, rotation of liquid in a cylindrical container.
12	Fluid kinematics, Classification of fluid flows, velocity and acceleration of fluid particle, local and convective acceleration
13	Normal and tangential acceleration, streamline, path line and streak line, flow rate and discharge mean velocity
14	Continuity equation in Cartesian and cylindrical, polar coordinates. Rotational flows, rotation velocity and circulation, stream and velocity potential functions, flow net.
15	Fluid dynamic, Euler's equation, Bernoulli's equation and steady flow energy equation; representation of energy changes in fluid system,
16	Impulse momentum equation, kinetic energy and momentum correction factors,
17	Flow along a curved streamline, free and forced vortex motions.
18	Conservation of mass (mass balance)
19	Rayleigh's and Buckingham's Pi method for dimensional analysis.
20	Dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies
21	Flow regimes and Remolds number, flow classification
22	Critical velocity and critical Reynolds number, laminar flow in circular cross section pipes
23	Turbulent flows and flow losses in pipes, Darcy equation
24	Minor head losses in pipes and pipe fittings
25	Hydraulic and energy gradient lines.
26	Water hammering and it's solution
27	Fluid measurements devices
28	Fluid measurements devices
29	Problems solutions
30	Review

اسم المقرر : المساحة الهندسية عملي
عدد الوحدات : 2 / سنوي
عدد الساعات : 3 نظري + 2 عملي
صفة المقرر : عربي الجزء العملي
مدرس المادة : زينة نوفل محمد

رقم الأسبوع	عنوان المواضيع
1	تعريف الاجهزة المساحية
2	تعريف الاجهزة المساحية
3	التعرف على انواع الاشرطة
4	قياس المسافات الافقية
5	قياس المسافات المائلة
6	قياس المسافات المائلة
7	تصحيح اخطاء الشريط
8	تصحيح اخطاء الشريط
9	تطبيقات القياس بالشريط
10	تطبيقات القياس بالشريط
11	الرفع المساحي باستخدام الشريط
12	الرفع المساحي باستخدام الشريط
13	التوقيع المساحي باستخدام الشريط
14	التوقيع المساحي باستخدام الشريط
15	رسم الخرائط للمنشات
16	التسوية، التعرف على جهاز التسوية
17	حساب المناسيب
18	التسوية الطولية والقطاعات
19	التسوية الطولية والقطاعات
20	التسوية الشبكية
21	التسوية الشبكية
22	عمل الخرائط الكنتورية
23	عمل الخرائط الكنتورية
24	حساب المساحات باستخدام الطرق الترسيمية
25	حساب الحجوم من القطاعات
26	حساب الحجوم من التسوية الشبكية
27	حساب الحجوم من الخرائط الكنتورية
28	جهاز الثيودولايت، التعرف على جهاز الثيودولايت
29	المسح باستخدام جهاز المحطة الشاملة total station
30	المسح باتخدام ال GPS

اسم المقرر: المساحة الهندسية نظري
عدد الوحدات: 3 / سنوي
عدد الساعات: 3 نظري + 2 عملي
لغة المقرر: عربي الجزء النظري
مدرس المادة : علي عبد الامير حسين

رقم الأسبوع	عنوان المواضيع
1	تعريف المساحة, المبادئ الأساسية للمساحة
2	وحدات ونظم القياس
3	وحدات ونظم القياس
4	مقياس الرسم واعداد الخرائط
5	مقياس الرسم واعداد الخرائط
6	قياس المسافات
7	التصحيحات الخاصة بشريط القياس مع أمثلة
8	الاتجاهات والزوايا
9	التضليع استخدامه والحسابات الخاصة بالمضلعات
10	التسوية
11	آلة التسوية
12	ضبط جهاز التسوية
13	أنواع طرق التسوية واستخدام كل طريقة
14	أنواع طرق التسوية واستخدام كل طريقة
15	أنواع طرق التسوية واستخدام كل طريقة
16	المقاطع, المقطع الطولي, المقطع العرضي
17	المقاطع, المقطع الطولي, المقطع العرضي
18	المقاطع, المقطع الطولي, المقطع العرضي
19	المسح الطوبوغرافي
20	المسح الطوبوغرافي
21	عمل الخرائط الكنتورية
22	عمل الخرائط الكنتورية
23	المساحات, الطرق الترسمية لحساب المساحات الطرق الرياضية والهندسية و الميكانيكية لحساب المساحات
24	المساحات, الطرق الترسمية لحساب المساحات الطرق الرياضية والهندسية و الميكانيكية لحساب المساحات
25	الحجوم باستخدام نقاط التسوية وباستخدام الخطوط الكنتورية
26	الحجوم باستخدام نقاط التسوية وباستخدام الخطوط الكنتورية
27	الحجوم باستخدام نقاط التسوية وباستخدام الخطوط الكنتورية
28	جهاز الثيودولايت مصادر الأخطاء في جهاز الثيودولايت
29	المسح باستخدام جهاز المحطة الشاملة total station
30	المسح باستخدام الـ GPS

Week No.	Subjects
1	Applications a bout Plotting in Matlab
2	Applications a bout Commands
3	Applications a bout Simple Plotting & Defining arrays
4	Applications a bout Multiple Plots
5	Applications a bout 3D-Plotting
6	Applications a bout Contour plots
7	Applications a bout Surface plots
8	Applications a bout Mesh plots
9	Applications a bout Subplots
10	Applications a bout Exercises
11	Applications a bout Bodies of rotation
12	Applications a bout Linking a plot to the source data
13	Applications a bout 3D- Rotation
14	Applications
15	Examination
16	Applications a bout Image processing
17	Applications a bout Image types
18	Applications a bout Reading , Displaying and writing images
19	Applications a bout Operating on images
20	Applications about Creating images (grayscale & RGB)
21	Applications a bout Commands & Exercises
22	Applications a bout Converting images
23	Applications a bout Image resize
24	Applications a bout Rotating images
25	Applications a bout Segmentation , Variation & Negative of images
26	Applications a bout Commands
27	Application about the numerical analysis : Bisection method
28	Applications a bout False position & Newton Raphson method
29	Applications a bout Gauss-Jordan method & Jacobi method
30	Examination

Week No.	Subjects
1	Plotting in Matlab.
2	Commands
3	Simple Plotting & Defining arrays.
4	Multiple Plots
5	3D-Plotting
6	Contour plots
7	Surface plots
8	Mesh plots
9	Subplots
10	Exercises
11	Bodies of rotation
12	Linking a plot to the source data.
13	3D- Rotation
14	Exercises
15	Examination
16	Image processing.
17	Image types.
18	Reading, Displaying and writing images.
19	Operating on images.
20	Creating images (grayscale & RGB).
21	Commands & Exercises.
22	Converting images.
23	Image resizes.
24	Rotating images.
25	Segmentation, Variation & Negative of images.
26	Commands
27	Application about the numerical analysis: Bisection method.
28	False position & Newton Raphson method.
29	Gauss-Jordan method & Jacobi method.
30	Examination

Week No.	Subjects
1	**Introduction to mechanics of materials**
2	**Tension, Compression, and Shear.**
3	**Ccombined stress.**
4	**Shear Forces diagram**
5	**Bending Moment diagram.**
6	**Shear Forces and Bending Moments (tutorial)**
7	**Stresses in Beams.**
8	**Exam 1**
9	**Normal stress.**
10	**Strain.**
11	**Elongation, stress and strain for axial loads.**
12	**Strain. (tutorial)**
13	**Bending stresses of beams.**
14	**Bending stresses of beams. (tutorial)**
15	**Bending stresses of composite sections.**
16	**Exam 2**
17	**Shear stress in beams.**
18	**Shear stress in bolt.**
19	**Shear stresses (tutorial).**
20	**Shear center**
21	**Shear center (tutorial).**
22	**Exam 3**
23	**Torsion**
24	**Torsional deformations**
25	**Torsion (tutorial)**
26	**Deflections of Beams.**
27	**Deflections of Beams. (tutorial)**
28	**Statically Indeterminate Beams.**
29	**A comprehensive review of the course**
30	**Exam 4**

Week No.	Subjects
1	The Scope of Thermodynamics, Dimensions and Units, Measures of Amount or Size Force
2	Pressure, Work Energy and Heat
3	Joule's Experiments, Internal Energy, The First Law of Thermodynamics Energy Balance for Closed Systems
4	The Reversible Process, Constant-V and Constant-P Processes, Enthalpy, Heat Capacity
5	Mass and Energy Balances for Open Systems and Problems of chapter
6	First exam
7	PVT Behavior of Pure Substances, Virial Equations of State,
8	The Ideal Gas, isothermal and adiabatic process, irreversible process.
9	Application of the Virial Equations, Cubic Equations of State.
10	Generalized Correlations for Gases, Generalized Correlations for Liquids, Problems
11	Sensible Heat Effects , Latent Heats of Pure Substances, Standard Heat of Reaction
12	Standard Heat of Formation, Standard Heat of Combustion, Temperature Dependence of ΔH
13	Heat Effects of Industrial Reactions, *Problems*
14	Second exam
15	Statements of the Second Law, Heat Engines, Thermodynamic Temperature Scales.
16	Entropy, Entropy Changes of an Ideal Gas, Mathematical Statement of the Second Law
17	Entropy Balance for Open Systems, Calculation of Ideal Work, Lost Work
18	The Third Law of Thermodynamics, *Problems*.
19	Application of thermodynamics to flow process..
20	Duct Flow of Compressible Fluids, Turbines (Expanders).
21	Compression Processes, *Problems*.
22	Third exam.
23	The Steam Power Plant.
24	Internal-Combustion Engines.
25	Jet Engines; Rocket Engines.
26	The Carnot Refrigerator, Absorption Refrigeration.
27	The Vapor-Compression Cycle, Liquefaction Processes.
28	The Choice of Refrigerant.
29	The Heat Pump.
30	Fourth exam.

Week No.	Subjects
1	**Introduction in Numerical Analysis, errors and their analysis.**
2	**Sources of errors, finding the errors in numerical methods and effect of errors.**
3	**Solution of nonlinear equation, method of calculating the initial approximation of the roots.**
4	**Methods of solving nonlinear equations: - 1.Bracketing methods.**
5	**Open methods, Bisection methods.**
6	**Open methods comp. :2. False position methods 3.newton-raphson method**
7	**Open methods comp.: 4.Fixed point method. 5. Newton- Raphson system meth.**
8	**First month exam.**
9	**Linear system of equations**
10	**Direct method: Gauss elimination method.**
11	**Gauss Jordan method.**
12	**LU Decomposition.**
13	**Iterative methods for solving systems of linear equation:** **1. Jacobeans method.**
14	**2. Method of Gauss Seidel.**
15	**Second month exam**
16	**Introduction in Interpolation and extrapolations: Lagrange polynomials.**
17	**Lagrange's inverse interpolation formula.**
18	**2-Finite difference:- 1. Newton forward difference formula.**
19	**1. Finite difference comp.** **2. Newton Backward difference formula.**
20	**Central difference formula.**
21	**Divided difference formula.**
22	**Newton divided difference formula.**
23	**Third month exam.**
24	**Numerical Integration.** **1. Trapezoidal Rule 2. Simpson Rule.**
25	**3. Romberg Rule.**
26	**Numerical methods for solving ODE:-1-Euler's methods**
27	**2-Modified Euler method (Euler prediction-corrector).**
28	**3-Second-Ordinary Range - Kutta method. 4. Fourth-Order Range - Kutta met.**
29	**Ordinary differential equation, some physical phenomena, First order differential eqs.**

اسم المقرر : ادارة هندسية و ادارة مناجم
عدد الوحدات : 4 / سنوي
عدد الساعات : 2 نظري
لغة المقرر : عربي
مدرس المادة : رغد صبحي فتحي

رقم الأسبوع	عنوان المواضيع
1	مقدمة عامة لسفيهم الادارة , الادارة اليشدسية و ادارة السشاجم
2	الاصهل العامة للإدارة + مقدمة عن وظائف الادارة
3	وظائف الادارة : تفريل شامل لهظيفة التخطيط + التشعيم
4	وظائف الادارة : تفريل شامل لهظيفة التهظيف + التهجيو + الرقابة
5	مفابيم عامة لإدارة السذاريع اليشدسية (ادارة السذروع +جدولة التشفيذ +وثائق السذروع)
6	برنامج ضبط الجهدة وضسان الجهدة للسذاريع اليشدسية
7	ادوات جدولة التشفيذ للسذروع اليشدسي البيانية (مخططات القزبان +خطهط التهازن +مشحشيات التدارع
8	ادوات جدولة التشفيذ للسذروع اليشدسي التحليلية (السخططات الذبكية طريقة السدار الحرج +)امثلة محلهلة-
9	اسئلة متشهعة محلهلة + امتحان شيري
10	العهم وانهاعو وطرق حدابو في السخططات الذبكية + امثلة محلهلة
11	ادوات جدولة التشفيذ للسذروع اليشدسي التحليلية (طريقة +) PERT امثلة محلهلة
12	الطرق الاحرائية لحداب لسقاسات التسركز والتذتت لزمن انجاز السذروع والانذطة السكهن مشيا
13	امثلة ومدائل محلهلة ليذه الطرق الاحرائية
14	دراسات الجدوى للسذروع اليشدسي(مفيهم وتعريف وخطهات د ا رسة الجدوى +السرحلة الاداربة +السرحلة التشفيذية
15	مشاقذة عامة + امتحان شيري
16	مراحل دررسة الجدوى الاقترادية (الد ا رسة التسييدية + الد ا رسة التفريلية)
17	مثال لسفيهم السذروع اليشدسي لسشجم وخطهات د ا رسة الجدوى الاقترادية لإنذاء السشاجم(عشاصر وبيكل د ا رسة الجدوى)
18	مفيهم الاقتراد اليشدسي (تخريص وانهاع السهارد الاقترادية وكفاءة استخداميا)للسذروع اليشدسي
19	مفيهم العرض والطلب + مشحي العرض ومشحشي الطلب والطرق التحليلية والإحرائية لايجادسا +امثلة محلهلة
20	مفيهم السرونة في العرض والطلب وطرق ايجادسا + امثلة محلهلة
21	اسئلة متشهعة محلهلة + امتحان شيري
22	الاستشار في السذاريع اليشدسية(السفيهم السالي+ السفيهم الاقترادي ,)ادداف وانهاع وادوات الاستشار
23	اسية الاستشار في السذاريع اليشدسية(الانهاع+ السجالات +الدوافع +السحددات)والعهامل السذجعة للاستشار
24	خرائص الانعسة الاقترادية في الاستشار +انهاع الربح (البديط والسركب +)امثلة محلهلة
25	ادارة التكاليف في السذاريع اليشدسية (السفيهم + عشاصر التكاليف+ طرق تقدير التكاليف +العهامل السؤثرة على التكاليف
26	عرض للجداول السدتخدمة لإدارة التكاليف في السذروع اليشدسي +مثال لسذروع انذاء مشجم
27	اسئلة متشهعة محلهلة +مشاقذة عامة
28	حداب نقاط التعادل في ادارة التكاليف + امثلة محلهلة
29	اسئلة متشهعة محلهلة + امتحان شيري

وزارة التعليم العالي والبحث العلمي
جامعة الموصل/كلية هندسة النفط والتعدين
مفردات منهج قسم هندسة التعدين
المرحلة الدراسية: الثالثة

Week No.	Subjects
1	**Introduction to Ore Processes**
2	**Mining Methods underground mining open pit mining**
3	**Mining Methods underground mining open pit mining**
4	**Calculation of the Concentration factors and plot the concentration**
5	**Calculation of the volume of the crust that yield Cu**
6	**Calculation of the volume of the crust that yield Cu**
7	**Calculation of the Concentration using Solubility product**
8	**Determination the Concentration of the chalcophile elements**
9	**Determination the Concentration of the chalcophile elements**
10	**Calculation of the Concentration of the chalcophile elements in Mol/I^{-1}**
11	**Exam. Term 1**
12	**Calculation of the tonnages of ore & elemental Copper in a hypothetical Copper**
13	**Calculation of the tonnages of ore & elemental Copper in a hypothetical Copper**
14	**Calculation of the tonnages of ore & elemental Copper in a hypothetical Copper**
15	**Finding the temperature of formation of minerals**
16	**Finding the temperature of formation of minerals**
17	**Finding the temperature of formation of minerals**
18	**Determination of the origin of the mineralization fluids**
19	**Determination of the source of materials necessary in the ore deposits**
20	**Calculation of the oxygen isotopic composition of the fluid at the above temperature – plot the values of the δO_{H2O} and δD_{H2O} for the available samples.**
21	**Calculation of the oxygen isotopic composition of the fluid at the above temperature – plot the values of the δO_{H2O} and δD_{H2O} for the available samples.**
22	**Calculation the temperature of formation of the Aberfeldy ore deposits using the given sulfur isotope fractionation equations of mineral pairs**
23	**Calculation the temperature of formation of the Aberfeldy ore deposits using the given sulfur isotope fractionation equations of mineral pairs**
24	**Exam. Term 2**
25	**Calculation the sulfur isotopic composition δS^{34} of the sulfate and sulfide minerals**
26	**Calculation the overall shape of ore body and the volume of ore**
27	**Cement process**
28	**Phosphate process**
29	**Iron process**
30	**sulfur process**

Week No.	Subjects
1	Introduction to Mineral Process
2	Characterization of mineralogical of separation
3	Delineation analysis and evaluation of separation
4	Principles of separation
5	The mass balance
6	The Particle Size analysis
7	Method of Separation
8	Crushing: Crushing machine
9	Gridding : gridding machine
10	Cyclonic separation
11	Method of Mineral Processes
12	Exam. Term 1
13	Thickening Method
14	Filtering Method
15	Thermal Drying method
16	Physical Methods of Separation
17	Magnetic Separation
18	Chemical Methods of Separation
19	Iron Ores: Introduction
20	Types of Iron Ores
21	Sources of Iron Ores Deposits
22	Mining Processes of Iron Ores
23	Aluminum Ores: Introduction
24	Types of Aluminum Ores
25	Sources of Aluminum Ores Deposits
26	Exam. Term 2
27	Mining Processes of Aluminum Ores
28	Silica Ores: Introduction
29	Sources of Silica Ores Deposits

30	Mining Processes of Silica Ores

Week No.	Subjects
1	Calculation of porosity theoretically, Calculation Permeability by Darcy's Law, measurement the fluid saturation, Average Saturation.
2	Find formation resistivity factor (F), water saturation Sw estimation by Archie equation.
3	Find formation temperature, Geothermal Gradient
4	Uses chart for adjusting fluid resistivity for temperature. (Schlumberger, 1998).
5	Determination of mud cake thickness by caliper log,
6	Application of SP Log: Determination of formation water resistivity (Rw),
7	Determination of volume of shale.
8	Application of GR Log: Calculate Volume of Shale, Mineral Identification.
9	Using the porosity tools (Density, Neutron, Sonic) to compute porosity, Quick-look
10	lithology and porosity, lithology and porosity in complex formation, porosity in unconsolidated formation, the effects of shale and hydrocarbon, computation secondary porosity
11	Neutron-Density Cross plot, M-N Cross plot.
12	Saturation determination: using Archie equation, saturation from Rw.
13	Determination of coal bed methane by well logs.
14	Using NeuraLog and Interactive Petrophysics V3.5 software.
15	Exam

Week No.	Subjects
1	**Definition of wire-line logging, Basic Rock Properties: Rocks type, Porosity: type of porosity, ways of measurement.**
2	**Permeability: type of permeability, ways of measurement.** **Fluid Saturation, Capillary pressure, Clay and Shale Effect.**
3	**The first monthly exam**
4	**Electrical Properties, Resistivity, Formation Factor and Porosity, Water Saturation Estimation, Archie's law.**
5	**Borehole Environment and Mud Drilling, the resistivity changes in invaded and uninvited zones.**
6	**Fluid Drilling Mud and Invasion profiles: Water-Based Drilling Muds, Oil-Based Drilling Muds, Resistivity profile for a transition-style. Invasion of a water-bearing formation and hydrocarbon-bearing formation.**
7	**Wire-line Well-Logging Techniques: Open-hole logging, Cased-hole logging.** **The purpose (Necessity) of log measurements**
8	**Techniques: Logging-while-drilling (LWD), Measurement While Drilling (MWD).**
9	**The second monthly exam.**
10	**Definition of wire-line logging, Basic Rock Properties: Rocks type, Porosity: type of porosity, ways of measurement.**
11	**Permeability: type of permeability, ways of measurement. Fluid Saturation, Capillary pressure.**
12	**The first monthly exam**
13	**Electrical Properties, Resistivity, Formation Factor and Porosity, Water Saturation Estimation.**
14	**Borehole Environment and Mud Drilling, the resistivity changes in invaded and uninvited zones.**
15	**Fluid Drilling Mud and Invasion profiles: Water-Based Drilling Muds, Oil-Based Drilling Muds, Resistivity profile for a transition-style. Invasion of a water-bearing formation and hydrocarbon-bearing formation.**
16	**Well Logging Methods: Electrical, Nuclear, Acoustic**
17	**Components of well log, Formation Temperature**
18	**Mechanical Calipers Log, Factors influencing caliper responses, Uses of the Caliper Log.**
19	**Spontaneous Potential (SP) Log, requirements for the existence of an SP current, The Source of SP: Shale Potential and liquid junction Potential (Diffusion Potential). Factors affecting on SP value, Static Spontaneous Potential (SSP), SP deflection with different resistivity.**
20	**Gamma-Ray Logs: introduction, The Spectral Gamma-Ray Log (SGR), Important uses of (SGR), Computed Gamma-Ray log (CGR), Application of GR Log: Calculate Volume of Shale.**
21	**The third monthly exam**
22	**Porosity Logs: Introduction, Density Log: components of density tool, Principles of Measurement, Uses and Application of Density log, Effect of Shale.**
23	**Neutron Log: Introduction, Principle of Measurement, types of neutron tool, Uses and Application of Neutron log, Hydrocarbon Effect, Shale Effect. Quick-look Lithology and Porosity**
24	**Sonic Log: Introduction: Principle of Measurement, Uses and Application of Sonic log.**

25	**Cross Plotting Porosity Logs, Density-Neutron cross plot, PEF – Density cross plot , M-N lithology plot**
26	**Resistivity logs: Introduction, Resistivity Tools: Induction Tools, Latero-logs, Flushed zone resistivity.**
27	**Resistivity derived porosity. Determination of true resistivity of formation**
28	**Identification fractures zone by well logging**
29	**Coal Bed Methane : Overview, Factors of importance in CBM exploration, Gas content, Application of Geophysical Well-Logs in Coal bed Methane**
30	**Well Logging Methods: Electrical, Nuclear, Acoustic**

Week No.	Subjects
1	**Industrial Chemistry, Introduction, What is Industrial Chemistry? Characteristics of the Chemical Industry, Laboratory Chemistry vs. Industrial Chemistry, Laboratory Objectives, Industrial Scale, Industrial Objectives, Evaluation of a Reaction, (process).**
2	**Evaluation of a Reaction, Economic Feasibility, Technical feasibility, Basic Principles Of Unit Processes And Unit Operations In Organic Chemical Industries, Unit Processes And Unit Operations In Chemical Process Industries.**
3	**Alkylation and Hydro delkylation, Decomposition, Acylation, Fermentation, Ammon-oxidation Halogenation, Amination by reduction.**
4	**Hydsogenation, Amination, Hydrohenatlysis , Aromatization, Hydroformylation , Amination by ammonalysis Hydrolysis. Calcination Hydration, Carbonation.**
5	**Hydroammonalysis, Causticisation, Isomerization, Chlorination and Oxy chlorination, Neutralization , Condensation , Nitration , Biomethhanation, Methanation, Cracking; Thermal, steam cracking, catalytic, cracking , Pyrolysis , Dehydration.**
6	**Polymerization: Addition and condensation, Chain growth and step growth, Bulk, Emulsion, Suspension, solution, Radical and coordination polymerization, Dehydrogenation Reduction Ditozitation and coupling Reforming: Steam reforming, Catalytic Reforming.**
7	**Gasification of coal and biomass Sulphidation, Desulphurization and hydro desulphurization, Sulphonatiomn, Electrolysis, Sulphation, Etherification , Xanthation , Esterification and Trans Esterification.**
8	**Distillation, Membrane Processes , Membrane Processes, Gas Membrane Application Areas, Absorption , Some of the commonly used solvents are:** **Chemical Absorption, Physical Absorption.**
9	**Technological development in unit operations, Adsorption, Commercial Adsorption Processes, Pressure swing adsorption (PSA), Chromatography, Crystallization Process, Liquid –Liquid Extraction.**
10	**Soap & Detergent Manufacture, Introduction, Types of Soap & Detergent, Personal Cleaning products, Laundry Cleaning products: Household Cleaning products, Dishwashing products, Ingredients of Soaps and Detergents, (Soap Natural Source),** **(Synthetic Soap/Detergents), Surfactants, Raw Materials, Linear alkyl benzene, Detergent Builders, Types of Detergent Builders** **1) Organic builders 2) Inorganic builders** **Function of Builders**,
11	**Soap & Detergent Manufacturing Process, Soap (Natural), Industrial , Manufacturing, Batch Process, Continuous Process, Home Made, Cold Process , Hot Process, Cold Process, Limitation, Hot Process, Trace stage, Factors that Affect Trace, False Trace, Batch Process & Continuous Process,** **Saponification** **Lye separation** **Soap washing** **Lye separation**

	Neutralization **Drying**
12	**Formulation Chemistry , Characteristics of formulation chemistry, Formulation product is composed of two main parts, Surface Active Agents, hydrophobic and hydrophilic groups Surfactants, Anionic surfactants, Nonionic surfactants, Cationic surfactants, Amphoteric surfactants,**
13	**(1)A hydrocarbon chain of the surfactants, 2) Alkyl ether chain of the surfactants (Alkoxylated surfactants)** **i) Polyethylene oxides, ii) Polypropylene oxides** **Fluorinated Surfactants, Anionic surfactants, Uses of Ionic Surfactants, Nonionic surfactants , Cationic surfactants, Amphoteric surfactants**
14	**Principles of Emulsions, Importance of Emulsions, What is Emulsion?, immiscible liquids, Dispersed phase, internal or discontinuous phase, Continuous phase, external or dispersion medium , Classification (Types) of Emulsions, Oil in Water (O/W): Water in Oil (W/O):, More complex types consist of three or more phases, 1. oil-in-water (o/w)** **2. water-in-oil (w/o)** **3. water-in-oil-in-water (w/o/w)** **4. oil-in-water-in-oil (o/w/o)**
15	**Emulsion is Thermodynamically Unstable W/O & O/W ONLY.** **What we can do to prevent this unwanted physical process?, Compositions of Emulsion, Emulsifying agent, Stabilizers, Classification of Emulsifiers, Chemical Structure, Synthetic; Natural; Auxiliaire agents; disperse solids,**
16	**Mechanism of Action, Mono-molecular; Multi-molecular; Solid particle Films.** **Synthetic, Anionic; Non-Ionics; Cationic, Natural Emulsifying Agents,** **1) Carbohydrate Materials: 2) Protein Substances: 3) High Molecular Weight Alcohols:, Finely divided solids, Mechanism of action of emulsifying agents:** **Tests Used To Identify Emulsion Type: Dilution test: Conductivity Test, Dye-Solubility Test: Fluorescence test:**
17	**Theory of emulsification** **i. By reducing interfacial tension** **ii. By preventing the coalescence of droplets.** **a. By formation of rigid interfacial film** **b. By forming electrical double layer.** **Theory of emulsification –reduction of interfacial tension, Oriented-Wedge Theory:** **Theory of emulsification -Formation of electrical double layer; Interfacial films.**
18	**Methods of emulsion preparation:; English or Wet Gum Method; Bottle or Forbes Bottle Method; Auxiliary Emulsifying Agents ; Emulsion Stability:** **a) Flocculation and creaming** **b) coalescence and breaking** **c) Phase inversion** **d) Miscellaneous physical and chemical change** **physical stability Mechanism, Emulsion stability/**
19	**Emulsion polymerization, calcification of polymer, polymer structures, condensation polymers, addition polymers, polymerization mechanism, step- polymerization, chain polymerization, free radical polymerization, commercially important polymers, Advantages of emulsion polymerization, Disadvantages of emulsion polymerization, Smith-Ewart Interval 1, Smith-Ewart Interval 2, Smith-Ewart Interval 3, and Emulsion.**
20	**Mining of Ore,** **a)valuable minerals of the metal is being sought** **b) compounds of associated metals which may be of secondary value** **c) gangue minerals of minimum value.**

	Ores may be in large lumps; The ore transported to the factory. The ore is found in waterbeds. Ore dressing, series of relatively cheap processes, mainly physical rather than chemical in nature, 1. **Size Reduction** to such a size as will release or expose all valuable minerals 2- **Sorting** to separate particles of ore minerals from gangue minerals or different ores from one another 3- **Agglomeratio**
21	Size Reduction, grinding to smaller sizes by Jaw crushers, Sizing, Particles is separated into oversize and undersize. Flotation; distinguish ore mineral from gangue, and also, one ore mineral from another, ; Magnetic Separation, Ferromagnetic magnetite may be sorted out using a magnetic separator. Electrostatic Separation, Minerals have a wide range of electrical conductivity and can be distinguished by this property.
22	Sorting, The particles may be sorted by classification, flotation or magnetic methods.; separate particles according to their different rates of travel under gravity through a fluid medium such as water.; Particles of different densities, sizes and shapes have different falling velocities.
23	Dewatering and filtration, Coarse solids may be freed from most of their moisture by draining. Slurries with particles which can settle may be separated from the bulk of the liquid by settling and subsequent decantation.
24	Extractive Metallurgy Of Iron, Uses of iron; Raw materials, Removal of impurities in iron ore, Fuel, Manufacture of Pig Iron, Reactions of the blast furnace.
25	زيارة علمية
26	زيارة علمية
27	Extractive Metallurgy Of Aluminum, Chemical treatment of bauxite, Reduction of aluminum from aluminum oxide.
28	. Extractive Metallurgy Of Copper, % copper • Concentration 15-25 • Roasting 30-45 • Smelting - • Matte conversion 98 • Fire refining 99.5 • Electrolytic conversion 99.9 Concentrating, Roasting, Matte smelting, Blister copper production, Fire Refining, Electrolytic refining, Formative Evaluation, roasting, matte smelting.
29	Review
30	Final Exam

Week No.	Subjects
1	Stress and Strain
2	Stress and Strain
3	Mohr circle
4	Physical Properties-Porosity, Permeability and Density
5	Physical Properties-Porosity, Permeability and Density
6	Physical Properties- Swelling and Slaking
7	Physical Properties- Swelling and Slaking
8	Review
9	Exam
10	Mechanical Properties
11	Stress Components
12	Support of Pillars
13	RQD, Rock Quality Designation
14	Sample Description and Calculations
15	Review
16	Exam
17	Outcrop Description and Calculations
18	Outcrop Description and Calculations
19	Outcrop Description and Calculations
20	Rock Mass Rating RMR
21	Review
22	Exam
23	Geomechanical Classification
24	Rock Engineering and Structural Supporting
25	Rock Engineering and Structural Supporting
26	Wellbore Instability
27	Wellbore Instability

28	Review
29	Review
30	Exam

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اسم المقرر: ميكانيك الصخور التطبيقي نظري

عدد الوحدات: 4 / سنوي

عدد الساعات: 2   نظري + عملي

لغة المقرر: الانكليزية / الجزء النظري

مدرس المادة: د. عزالدين صالح حسن

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Week No.	Subjects
1	Rock Mechanics and Rock Engineering.
2	Failure Theories.
3	Mechanical properties of the rock.
4	Theory of Elasticity.
5	Suggested methods for rock characterization.
6	Suggested methods for rock characterization.
7	Monthly Exam.
8	Rock Slope Engineering – soil.
9	Rock Slope Engineering – rocks.
10	Factor of safety.
11	Rock Quality designation RQD.
12	Geo-mechanics classification RMR.
13	Rock Tunneling quality index Q-System.
14	Monthly Exam.
15	Geological strength index GSI.
16	Hoek and Brown Failure Criterion.
17	Mohr-Coulomb Failure Criterion.
18	Practical example – Mohr circle
19	Stresses around boreholes. Borehole failure criteria.
20	Wellbore instability - Uncontrollable factors.
21	Wellbore instability - Controllable factors.
22	Monthly Exam
23	Well problems and reservoir geo-mechanics.
24	Mechanical properties of sedimentary rocks / Failure of anisotropic rocks.
25	Mechanical properties of sedimentary rocks / Failure of fractured rocks.
26	Mechanical properties of sedimentary rocks / Stress history effects.
27	The stabilization strategy.

Week No.	Subjects
28	Monthly Exam.
29	Numerical Modeling for Inclined Wellbore.
30	Critical State Theory in Rock Mechanics.

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سم المقرر: نقل وتداول الخامات

دد الوحدات: 2 / الفصل الدراسي

دد الساعات: 2 نظري + 0 عملي

فة المقرر: انكليزي الجزء النظري

درس المادة : عمـــر هيثم غانم

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Week No.	Subjects
1	Introduction to ore transportation, definition, scope of material handling, systems concept, characteristics.
2	Classification of material, materials codes.
3	Principles of materials handling.
4	Principles of materials handling.
5	Conveyors, belts, chain, haulage and cable conveyors.
6	Bucket, roller, screw conveyors.
7	Pneumatic and hydraulic conveyors.
8	Pneumatic and hydraulic conveyors.
9	Introduction to piping, piping system, pipe size, pipe wall thickness, piping classification.
10	Piping codes and standards according to its application offshore piping.
11	Design of pipe schedule.
12	Design of pipe loop.
13	Some design examples about piping design.
14	Design of Heat exchangers.
15	Design of Heat exchangers.
16	Design example of Heat exchanger.
17	Types of pumps.
18	Design and selection of pumps.
19	Design example of pumps.
20	Coal transportation, coal properties, utilization.
21	Coal handling operation plant, precautionary measures before transporting coal, general problem faced in coal handling plant, coal storage.
22	Types of coal storage, characteristics of coal storage.
23	Liquefied gases, gas carrier codes, cargo containment systems.
24	Gas carrier types, construction of containment systems.
25	Gas carrier types, construction of containment systems.
26	Gas carrier layout.
27	ROBOTIC HANDLING, Materials Handling at the Workplace, Robots and their Classification, Robotic Handling Applications.

28	Robotic Handling Applications.
29	BULK HANDLING EQUIPMENT AND SYSTEMS, Storage of bulk solids, Bulk handling equipment.
30	Review

وزارة التعليم العالي والبحث العلمي

جامعة الموصل/كلية هندسة النفط والتعدين

مفردات منهج قسم هندسة التعدين

المرحلة الدراسية: الرابعة

Week No.	Subjects
1	The Concept of Grid Sampling System and Types Square, Rectangular, Triangular, Random Grid System. Determination of the Range of site to the Sampling (with examples solved).
3,4	Determination of Mineral Deposits.
5,6	Calculation of the Thickness of the Mineral Deposits in a mine or a single well or a group of wells. Recovery Rate Calculation.
7,8	Calculate the Concentration Degree of Ore. Calculation of Ore Concentration. Calculate the rate of Concentration of crude with the extent of the impact of the site.
9,10	Calculate the Rate of Concentration in the pulp wells to Evaluate the metal layer. Calculate the Thickness Rate in the pulp wells to evaluate the metal layer.
11,12	Evaluation (Thickness Rate and Rate of Concentration) in a cauliflower
13,14	Determination of the limits of the Mineral Deposits by Thickness of the Cut and the Cutting unit of the Concentration.
15, 16	Mineral Deposits Reserve The Concept of Mineral Reserve, Estimation of the on-site Reserve of Mineral Deposits, Density Mineral Deposits, Reserves Account.
17,18	Methods of Estimation of Mineral Deposits Reserves. Practical Issues on the metal reserve account.
19,20	Mining extraction methods. Stripping Ratio, The Angle of Repose, Calculation of Stripping Ratio
21,22	Underground Mine, Surface Mine Planning. Extraction of Mineral Deposits in Bench Mining.
23,24	Stability of Rocky Slopes. Factors Affecting the Stability of Rocky Slopes.
25,26	Mineral Extraction, Dilution Mining, Calculate the Amount of Ore extracted and the Amount of dilution with the Concentration degree.
27,28	Classification of Ore materials according to the grade of Concentration transferred to the Mineral Extraction Plant: Heag Grade, Recoverable Grade, Cut-off Grade.
29	Review
30	Exam

Week No.	Subjects
1	Basic Definitions of Mining Engineering (Mining Terminology)
2	Stages of mine cycle: (prospecting, exploration, development).
3	Stages of mine cycle: (exploitation, and reclamation).
4	Mining Methods
5	Surface Mining method (Machines and equipment method of mining and types and features and damage method).
6	Exam 1
7	Underground mining methods
8	Underground mining methods (machines and equipment of mining types: supported, unsupported, caving, characteristics and disadvantages of the method).
9	Comparison of surface and subsurface mining.
10	Unit operations of mining.
11	Exam 2
12	Drilling Technology: drilling system basics of drilling, types of drill bits.
13	Blasting Technology: basics of blast classification of explosives, properties of explosives.
14	The concept of metallurgy, classification of metallurgy
15	Physical and chemical properties of certain metals in nature
16	Principles of Mineral Processing and Extraction (Introduction, The Concept of Mineral Extraction).
17	Site of mineral processing and extraction plant design.
18	Stages of Mineral Processing and Extraction. Mineral Liberation .Mineral separation. Disposal of waste production.
19	Mineral Liberation Includes: • Breaking of rocks (Breaking Machines and Equipment).• Crushing (Crushing Machines and Equipment).•
20	Grinding (Wet and dry Grinding,: Rod Mill, Ball Mill, Tumbling Mill).• Sieving and classification (Types the Sieves and Classification).
21	Exam 3
22	Mineral Separation (Mineral Separation Concept, Basic Definitions of Mineral Separation).
23	Methods of Mineral Separation include: Post- Separation Methods include: Thickening, Filtration, and Thermal Drying Methods.
24	Physical Separation Methods Include: Method of Separation by Sizing. Manual Separation. Separation by Dense Medium. Separation by Density.
25	Magnetic Separation. Electrical Separation.
26	Chemical Separation Methods Include: Flotation Method. Leaching Method Include: In-situ Leaching.
27	Chemical Separation Methods Include: Tank Leaching. Dump Leaching.
28	Extraction metallurgy by: pyro metallurgy, Hydrometallurgy, Electrometallurgy.
29	Ore handling, mining safety, impact of mining.(potential environmental).

30	**Exam 4**	

Week No.	Subjects
1	General introduction, Environmental control of the mine atmosphere
2	Properties and behaviour of Air
3	Mine air quality control, Mine gases, Dusts and other mine aerosols
4	Mine air quality control, Mine gases, Dusts and other mine aerosols
5	Mine ventilation, Air flow through mine opening and ducts
6	Ventilation measurements and surveys
7	Ventilation measurements and surveys
8	Mine ventilation circuits and networks
9	Mine ventilation circuits and networks
10	Mine ventilation circuits and networks
11	Natural ventilation
12	Natural ventilation
13	Air moving equipment
14	Fan application to mines
15	Control of mine fires and explosions
16	Control of mine fires and explosions
17	MINE AIR CONDITIONING, Heat sources and effects in mines
18	Mine air conditioning systems
19	Mine air conditioning systems
20	Safety and health in surface mines
21	General principle, General provisions
22	Mining accidents, Hazards in the working environment
23	First aid, Personal protective equipment
24	Safety when mining, Mechanical equipment
25	Explosives in blasting, Mine closure.
26	Safety and health in underground mines
27	General principles and provisions
28	Emission of firedamp
29	Review
30	Review

Week No.	Subjects
1	Introduction to the course subjects and highlighting its important.
2	Basic of Finite Element Analysis.
3	Capabilities and utilizing of Ansys software in Mining Engineering.
4	Getting starting with Ansys and introduction to the Workbench.
5	Procedure followed using Ansys software and how to start.
6	Using the Ansys to design, draw and model simple and basic models.
7	Modelling a 3D centrifugal pump starting with meanline design.
8	Modelling using static structural analysis.
9	Evaluating students by raising some relevant problems.
10	Introduction to the course subjects and getting start with Microsoft Excel with basic operations of Excel 2013 and printing data.
11	Using functions (sum, average, entering formulas by typing, trigonometry and exponential functions and rounding functions).
12	Using functions (array formulas, matrix function, solving system of equations) and some exercises.
13	Conditional Functions (Logical Comparison Operators, if function, array formulas and conditional formatting).
14	Taking some tasks and engineering exercise i.e Data Mining (Importing TXT File, Counting and Summing with Criteria and Frequency Distribution).
15	Making an exam.
16	Charts
17	Regression Analysis
18	Taking some tasks and engineering exercises for chapters (from 6 to 8) and making an exam.
19	Introduction to Micromine software.
20	Getting start with the basic commands.
21	Getting starting with Micromine and introduction to its capabilities.
22	Design of the pit geometry, tools and the machines using the software.
23	Lunching with the Micromine company for proposed workshops.
24	Making an exam.
25	Introduction to Ventsim software.
26	Basic Operations & Import Files to Ventsim
27	Build a Basic Model of airway ducts & Regulator.
28	Underground Heat Simulation Modelling
29	Fan Ventilation Modelling& Construct Ventilation Ducts

30	Making an exam.

Week No.	Subjects
1	Transmission of power, Belt, rope, chain, gear, hydraulic and electro-hydraulic transmission.
2	Compressed Air, Comparison with other sources of power. Air compressors – types, construction, installation and maintenance, Compressed air transmission and distribution, compressed air drills, pneumatic picks, air motors and other compressed air equipment.
3	Compressed air drills, pneumatic picks, air motors and other compressed air equipment.
4	Wire Ropes, Types, construction and uses. Rope deterioration and maintenance. Capping and splicing of rope.
5	Rope haulages. Track, mine tubs and cars.
6	Safety appliances on haulage roads. Locomotive haulage. Mono rail.
7	Pumping and drainage system.
8	Pumping and drainage system.
9	Rubber tired haulage system.
10	Rubber tired haulage system.
11	Surface extraction.
12	Surface extraction.
13	Selection of dragline, shovel, bulldozer, scraper, front-end loader.
14	Review
15	Review

Week No.	Subjects
1	**General Description of Various Tunnel Types.**
2	**Types of Tunnels.**
3	**Constructions of Tunnels.**
4	**Tunnel Construction and Tunnelling Methods.**
5	**Cut and Cover Tunnels - Bottom-Up Construction.**
6	**Cut and Cover Tunnels - Top-Down Construction.**
7	**Monthly Exam.**
8	**Rock Tunnelling Methods.**
9	**Soft Ground Tunnelling.**
10	**Submerged Tunnels.**
11	**Rock Mass Classification RMC.**
12	**Rock Structure Rating RSR.**
13	**Rock Mass Rating RMR.**
14	**Monthly Exam.**
15	**Geological Strength Index GSI.**
16	**Rock Tunnelling Quality Index Q.**
17	**Tunnel lining materials.**
18	**New Austrian Tunnelling Method.**
19	**Interpretation of inclined hemisphere projections for Tunnels.**
20	**Shot Crete Technology.**
21	**Monthly Exam.**
22	**Single Hole in Plate.**
23	**Greenspan Method.**
24	**Manifestations of instability.**
25	**Information sheets for classifying tunnel faces.**
26	Tunnel Structure - Length and Depth.
27	**Effect of Bolts on Supporting the Rock Mass.**
28	**Monthly Exam.**
29	**Tunnel Construction using Drill-and-Blast Method.**
30	**Tunnelling in Weak Rocks.**

Week No.	Subjects
1	**Definitions**
2	**Explosives Engineering.**
3	**Chemical Explosives.**
4	**The Physics of Energy Release.**
5	**Explosive selection criteria.**
6	**Monthly Exam.**
7	**Blast Design Parameters.**
8	**Basic Blast Design Calculations.**
9	**Controlled Blasting Technique.**
10	**Explanation of Rock Breakage.**
11	**Explosives and Blasting Procedures.**
12	**Monthly Exam.**
13	**The Fundamentals of Blast Design.**
14	**Properties of explosives.**
15	**Environf1lental Effects of Blasting.**

اسم المقرر: ادارة المكامن واقتصاديات النفط
عدد الوحدات: 4 / سنوي
عدد الساعات: 2 نظري + 1 مناقشة
لغة المقرر: العربية والانكليزية الجزء النظري
مدرس المادة: ماهر جلال احمد

Week No.	Subjects
1	**What is reservoir management?**
2	**The base map, isopac map, net pay thickness, cross section, well correlation logs, is porosity map**
3	**Special core analysis**
4	**Screening of core data**
5	**Using correlations to estimate missing data**
6	**Calculation of initial fluids in place**
7	**Material balance**
8	**Determination of reservoir type**
9	**Building reservoir model**
10	**History matching**
11	**Optimization of surface facilities**
12	**Exam**
13	**Suggestions to increase production by plugging, Perforation, completion, etc.**
14	**Drilling new wells- well completion**
15	**Economic evaluation of the proposed strategy.**

رقم الأسبوع	عنوان المواضيع
1	التعريف باقتصاد النفط والشركات والمنظمات النفطية الدولية
2	اقتصاديات مرحلة استكشاف النفط:
3	اقتصاديات مرحلة استخ ا رج النفط أو الانتاج : محددات الإنتاج، آلية العرض والطلب،
4	القيمة الحالية والقيمة المستقبلية للبرميل النفطي، أسعار الفائدة والخصم والقيمة الحالية،
5	الاحتياطي والمسار الحرج للاستخ ا رج، كلفة المُستخدم،
6	اقتصاديات مرحلة النقل النفطي :النقل عبر خطوط الأنابيب، قضايا لها علاقة بالنقل بواسطة خطوط الأنابيب
7	التقييم الاقتصادي لخط أنابيب، ممي ا زت النقل بخطوط الأنابيب، تكلفة هيكل الأنابيب الناقلة، ،
8	النقل بالسفن : الدورة الاقتصادية لسوق الناقلات، العوامل المؤثرة في حجم الطلب على الشحن البحري، أبعاد بيئية وقوانين الحماية والتأمين
9	اقتصاديات النقل بالصهاريج عن طريق الشاحنات والسكك الحديد
10	اقتصاديات مرحلة التكرير النفطي :عمليات مصفاة التكرير النفطية الفيزيائية عمليات التحويل العمليات المساندة- - -

العوامل المؤثرة الخارجية في أداء صناعة التكرير العوامل الخارجية المؤثرة في أداء المصفاة التحديات التي تواجه صناعة تكرير النفط العالمية	**11**
اقتصاديات صناعة التكرير اقتصاديات التكرير في المنطقة العربية-	**12**
امتحان	**13**
اقتصاديات مرحلة التوزيع النفطي: علاقات اج ا رءات التوزيع التعاقدية بقطاع الاستخدام	**14**
المؤش ا رت الاقتصادية لأنظمة التوزيع الرئيسة، المؤش ا رت الاقتصادية لأنظمة التوزيع الرئيسة، مستودعات التوزيع، محطات الخدمة.	**15**