Course Contents

محتوي المقررات:

مقرر ثقافي (ع101) **المستوى الأول**

- Introduction to the philosophy of science.
- History and philosophy of Mathematics.
- The most famous scientists in Mathematics.
- History and philosophy of physics.
- The most famous scientists in physics.
- History and philosophy of Chemistry.
- The most famous scientists in Chemistry.
- History and philosophy of Biology.
- The most famous scientists in Biology.

حقوق انسان (ع102) **المستوى الأول**

- Identification of human rights and its international importance.
- Types of human rights.
- Human rights in Islam religion and comparative legislation.
- Mechanisms of human rights protection.

تفاضل وتكامل (ر101) **المستوى الأول**

- Real numbers, inequalities, intervals and absolute value.
- Reviewing of some basic concepts of functions.
- Limits and continuity.
- Derivatives.
- Integration.
- Inverse functions: Exponential, Logarithmic and Inverse Trigonometric functions.
- Techniques of Integrations.

فيزياء 1(ف101) **المستوى الأول**

Part 1:Thermal physics:

- Temperature and thermometers.
- Heat estimation.
- Thermal expansion.
- Change of phase.
- Heat transfer.
- Kinetic theory of gases.

Part 2: Properties of matter:

- Units and Dimensions (Dimension theory and itsapplications.Scaler and vectors).
- Linear motion.
- Planer motion .
- Newton`s second law.
- Simple harmonic motion.

• Monent of inertia for some bodies, pendulums.
• Hook`s law-Elasticity modulus Relation between elasticity modulus-Stress-Straincurves.
• Pressure and Pascal`s rule.
• Archimede`s rule.
• Bernoulli's equation.
• Surfacetension.
• Viscosity and Poiseuill`s formula.
• Stoke's law.

كيمياء عامة 1 (101 ك) **المستوى الأول**

Part I: Physical Chemistry
• Introduction to physical chemistry.
• Gaseous state.
• Thermochemistry.
• Chemical equilibrium.
• Solution (1).
• Ionic equilibrium
• Problems in physical Chemistry.

Part II: Inorganic Chemistry
• Chemical calculations.
• Atomic spectra and atomic structure.
• Electronic configuration of atoms.
• Determination of hydrate Stoichiometric determination.

عملي كيمياء عامة 1 (102 ك) **المستوى الأول**

Practical Chemistry

• Introduction and safety in laboratories.
• Determination of density of liquids.
• Determination of viscosity of liquids.
• Determination of surface tension of liquids.
• Determination of empirical formula of an oxide.
• Determination of hydrate.
• Stoichiometric determination.
• Determination of the molecular weight of volatile liquid.
• Determination of the heat of formation of MgO.
• Determination of heat of neutralization (strong acid and strong base).
• Determination of heat of neutralization (strong acid and weak base).
• Determination of heat of neutralization (weak acid and weak base).

أساسيات علم النبات 1 (101ن) المستوى الأول

Part 1:

- Introduction ,general characters of higher plants and germination of monocot and dicot seeds.
- Types of seeds and germination.
- Different shapes of plant organs and their modifications.
- Adaptation of some plants to different habitats.

Part 2:

- Plant Growth –cell wall.
- Plant cell components (living and non-living)- Epidermal tissues and complex tissues- Secondary structures in plant, Periderm, Tylosis ,Lenticels.
- Simple tissues (Meristematic and permanent)- Plant organs (monocot&dicot), stem, root and leaves.

علم الحيوان 1 (101 ح) المستوى الأول

- Introduction to zoology (physiology, cytology and histology).
- Bases of anatomy and essential physiological processes of human digestive, cardiovascular, respiratory, reproductive and renal systems.
- Essential processes of human neurophysiology.
- General and Functional cytology.
- General and descriptive animal histology.
- Introduction to zoology (physiology, cytology and histology.
- Bases of anatomy and essential physiological processes of human digestive system.
- Human digestive system.
- Human reproductive and urinary system.
- Human Cardiovascular system.
- Human lymphatic and immune system.
- Human central nervous system.
- Human peripheral and autonomic nervous system.
- Human skeletal system.
- Human respiratory systems.
- Human endocrine systems.

مصطلحات علمية بالغة الانجليزية (103ع) المستوى الأول

- Introduction to biology.
- Branches of biology.
- Latin and Greek word parts (Prefixes, root words, suffixes).
- Basic terms of zoology, definitions, and Zoology Vocabulary Words.
- Readings in the topics of life sciences.

مدخل فى الحاسب الالى (ع104) المستوى الأول

- Hardware concepts, Input/output ports.
- Computer performance , memory and storage, number systems.
- Input/output devices, Software concepts.
- Networks concepts, Information and communication technology in everyday life.
- Security, Legal issues, Internet terminology and concepts , Web browsers concepts.
- Searching the web, Feeds and security issues.
- Outlook terminology and concepts.
- Sending receiving, reading replying messages, Manipulating text files and contacts.
- Organizing email and customizing settings.
- Introduction to excel, manipulating rows and columns, cells, cell contents.
- Worksheets, formatting , freezing row and column titles.
- Formulas, functions, Charts, customizing excel and printing issues.

كيمياء عامة 2 (103 ك) المستوى الأول

- **Part I: Physical Chemistry**
- Introducton to Physical chemistry.
- The Phenomena of electrolysis, Faraday's laws + solution 2.
- Electrical conductance, EMF.
- Electrode Potential, Chemical and electrical energy.
- **Part II: Inorganic Chemistry**
- Periodic table and general properties.
- Types of chemical bonds.
- Lewis structure and formal charge.
- Valence bond and VSPER theory.
- Molecular orbital theory.

عملى كيمياء عامة 2 (104 ك) المستوى الأول

Practical Chemistry

- Introduction to acidic radicals.
- Detection of dilute HCl group.
- Detection of H_2SO_4 group.
- Detection of miscellaneous groups.
- Scheme of general investigation of acidic radicals.
- Introduction of basic radicals.
- Detection of groups I, II-A, and II-B.
- Detection of groups III and IV.
- Detection of groups V and VI.
- Scheme of general investigation of basic radicals.
- Detection of acidic and basic radicals of unknown salts.
- Analysis of cationic radicals in a mixture.

أساسيات علم النبات 2 (102ن) المستوى الأول

- Colloids.
- Plant cell.
- Diffusion, Osmosis and Permeability.
- Plant water relationships.
- Enzymes.
- Photosynthesis.
- Respiration.
- Plant Growth.
- Studying the organisms' diversity.
- Classification the organisms in Plant kingdom according to their specific characters.
- Studying the general characters for each group in the classification using an example for each one.

علم الحيوان 2 (102ح) المستوى الأول

Part 1: Histology

- Introduction to cytology and histology.
- The cell morphology. Cell membrane Cytoplasm and cytosol.
- Cell organelles. General organelles- structural, ultrastructural and functional characteristics.
- Mitochondria, Endoplasmic reticulum, Golgi complex and Lysosomes.
- Cytoskeleton, Specialized cell organelles and Cell inclusions.
- Nucleus.
- Epithelia tissues, characters and classification.
- Epithelia tissues, glands structure and classifications.
- Connective tissues, proper and specialized.
- Muscular tissues.
- Nervous tissues.

Part 2: Taxonomy

- Bases of taxonomy and Five kingdoms theory.
- General characters and taxonomy of Protozoa.

- General characters and taxonomy of Porifera.
- General characters and taxonomy of Coelentrates.
- General characters and taxonomy of Hydrozoa and Scyphozoa.
- General characters and taxonomy of Anthozoa.
- General characters and taxonomy of Acoelomata.
- General characters and taxonomy of Platyhelminths.
- General characters and taxonomy of Turbellarians.
- General characters and taxonomy of Cestoda.
- General characters and taxonomy of Pseudocoelomates.
- General characters and taxonomy of Nematoda.

ميكروبيولوجى1 (101م) المستوى الأول

- Introduction and Historical review on microbiology.
- Descriptions of prokaryotic, eukaryotic forms.
- Natural ecology, growth and nutrition of microbes.
- Taxonomy and Classification of microorganisms.
- Viruses; Animal, Plant, Bacteriophages- Prions.
- Bacteria, Rickettsia, cyanobacteria, Archaeobacteria.
- Slime molds, Heterokontophyta, Chromista.
- Fungi, Zygomycota.
- Ascomycota, Basidiomycota, Deuteromycota.

علم الحشرات (101ش) المستوى الأول

- Introduction to insects (Systematic position, Characteristics, differences with other Arthropods).
- Insect success (Attributes of survival and dominance).
- The economic importance of insects.
- General insect morphology (body parts, segmentation, Appendages).
- Comparative morphology (types of antennae).
- Followed comparative morphology (types of mouthparts).
- Followed comparative morphology (types of legs).
- Followed comparative morphology (types of wings).
- Followed comparative morphology (types of abdominal appendages).
- General insect anatomy (Digestive, Circulatory, Respiratory system).
- Followed General insect anatomy (Excretory, Nervous, Reproductive system).
- Metamorphosis in insects.

مصطلحات علمية بلغة انجليزية (2) (201 ع) المستوى الثاني

• Vocabulary Skills.
• Words in context.
• Roots.
• Words for size.
• Idioms, confusing Expressions and word pairs.
• Writing Skills.
• Structure and cohesion.
• Description: Process and procedure.
• Definitions.
• Exemplification.
• Classification.
• Reading comprehension.
• Doing Science.

مقدمة في علم اللافقاريات (221 ح) المستوى الثاني

• Introduction to coelomic invertebrates.
• Phylum Annelida.
• Phylum Arthropoda.
• Phylum Mollusca.
• Phylum Echinodermata.
• Importance of coelomic invertebrates.

مقدمة في علم الوراثة (222 ح) المستوى الثاني

• Introduction to the course and the study of genetics.
• Mitosis division.
• Meiosis division.
• The Chromosomal Basis of Heredity.
• Structure and types of Chromosomes.
• Mendelian Genetics: Monohybrid crosses.
• Mendelian Genetics: Dihybrid crosses.
• DNA - the Genetic Code.
• Structure of DNA Replication, and Manipulation of DNA Chromosomal Mutations.
• DNA Mutations Molecular Genetics: PCR and DNA cloning.

فسيولوجيا الخلية (211ح) المستوى الثاني

• Biological membrane, Molecular organization.
• The fluid mosaic model, The lipid bilayer.
• Arrangement of membrane proteins, Membrane fluidity.
• Functions of cell surface, Movements across membrane.
• Simple diffusion, Facilitated diffusion, Active transport.
• Excitable membranes: Action potential, Molecular structure of Na – channel, Patch clamp technique.
• Membrane signalling: Membrane receptors, Signal transduction.
• The second messenger hypothesis: G-protein coupled receptors, Beta-adrenergic receptors.
• Action of cAMP, Activation of adenylate cyclase,Inositol triphosphate.

• Intracellular calcium, Ca-binding protein.
• Catalytic receptors.

مفاهيم احصائية (213 ص) المستوى الثاني

• Descriptive statistics: frequency tables - measures of central tendency.
• Measures of dispersion.
• Standards sprains and kurtosis.
• Regression and correlation.
• Introduction to probability theory.
• The definition of probability.
• Probability axioms.
• Fundamental principles of harmonic analysis.
• The conditional probability and independence.
• The law of total probability and Bayes.

مقدمة في الفيزياء الحيوية (219 ف) المستوى الثاني

• Biomechanics.
• Thermodynamics.
• Light theory and its applications.
• Bioelectricity.
• Bioelectronics.
• Radiation dosimetry units.
• Biological effects of ionizing radiation.

مقدمة في علم الجيولوجيا (201 ج) المستوى الثاني

• مقدمة فى علم الجيولوجيا
• نشأة الكون
• التركيب الداخلى للأرض
• التراكيب الاولية و الثانوية فى الصخور الرسوبية
• علم المعادن
• علم الصخور
• التجوية الفيزيقية و الميكانيكية و الكيميائية
• العوامل الهدمية و البنائية للرياح والكثبان الرملية واشكالها
• البحار و المحيطات
• المياة الجوفية
• الزلازل والبراكين ونظرية الألواح التكتونية

كيمياء عضوية (اليفاتية احادية وعديدة) (214 ك) المستوى الثاني

• Aliphatic Hydrocarbons.
• Alkyl Halides.
• Alcohols, and Ethers.
• Aldehydes and Ketones.
• Di carbonyl.
• Carboxylic acids and Their Derivatives.

• Amines.

كيمياء غير عضوية (نظريات + عناصر s,p) (215 ك) المستوى الثاني

• General information about main group elements and some common properties.
• Periodic Table: General trend in table (electronegativity, ionization energy, electron affinity, effective nuclear charge, atomic radius) and periodic anomalies.
• Chemistry of Hydrogen: Physical and chemical properties, dihydrogen, hydride compounds, hydrogen bond.
• Alkali metals (Li, Na, K, Rb, Cs, Fr): Physical and chemical properties and their compounds.
• Alkaline Earth Metals (Be, Mg, Ca, Sr, Ba, Ra): Physical and chemical properties and their compounds.
• Group IIIA Elements (B, Al, Ga, In, Tl): Physical and chemical properties and their compounds.
• Group IVA Elements (C, Si, Ge,Sn, Pb):Physical and chemical properties and their compounds.
• Group VA Elements (N, P, As, Sb, Bi): Physical and chemical properties and their compounds.
• Group VIA Elements (O, S, Se, Te, Po): Physical and chemical properties and their compounds.
• Group VIIA Elements (F, CI, Br, I, At): Physical and chemical properties and their compounds.
• Noble Gas Chemistry.
• The importance of Main Group Elements in biological activities.

أساسيات الكيمياء التحليلية (216 ك) المستوى الثاني

• Introduction.
• Titration Principles.
• Preparation techniques.
• Standards Solutions.
• Reactions Used in Volumetric Analysis.
• Types of Volumetric Analysis.
• Endpoint Determination.
• Back Titrations.
• Advantages and Disadvantages of Titrimetric Analysis.
• Types of titrations.

مقدمة في حبليات وتطور عضوي (223ح) المستوى الثاني

• Basis of chordates taxonomy, Cephalochordata.
• General Characters and taxonomy of Agnatha.
• Characters and taxonomy of Chondrichthyes.
• Characters and taxonomy of Osteichthyes.
• Characters and taxonomy of Amphibia.
• Characters and taxonomy of Reptilia.
• Characters and taxonomy of Aves.
• Characters and taxonomy of Mammalia.
• Evolution and Relationships of the chordate subphylums.

كيمياء الانسجة والتقنية المجهرية (216ح) المستوى الثاني

• Introduction to mirotechnique.
• Tissue preparation.
• fixation and Classification of fixatives.

- Post-fixation treatment.
- Dehydration and clearin.
- Types of embedding media, Infilteration and Wax impregnation.
- Microtomy, various types of microtomes and microtome knives.
- Foults in section cutting and their remedy.
- Staining theory and methods of staining
- Classification and structure of dyes.
- **Part 2:** Historical aspects and principle components.
- Introduction and classification of carbohydrates, histochemical identification and methods of demonstration of carbohydrates.
- Introduction to protein, demonstration and classification of protein.
- Introduction to lipid and histochemical demonstration of lipids.
- Classification and methods of demonstration of nucleic acids.
- Enzyme histochemistry.
- Immunohistochemistry.

لافقاريات طبية (218ح) المستوى الثاني

- Introduction.
- Porifera (Sponges).
- Coelenterates.
- Terellarian.
- Nematodes.
- Annelids.
- Custaceans.
- Spiders.
- Gastropods.
- Cephalopods.
- Echinodermats.

ميكروبيولوجيا طبية (280 م) المستوى الثاني

- Introduction: Historical Background & classification of microorganisms.
- Introduction to Viruses Structure and morphology of viruses Classification / Replication / Pathogenicity
- Introduction to Fungi Structure and morphology of fungi Classification / Fungal diseases.
- Introduction to Bacteria Classification / Morphology Bacterial Structures / Bacterial replication.
- Bacterial growth / Growth curve Factors affecting growth.
- Antimicrobial agents.
- Microbial control / Principles Physical and chemical methods.
- Microbial control – Chemical agents Hospital acquired infections.
- Introduction to Parasites Classification /General characteristics of protozoa Medically important protozoa General characteristics of helminths/Medically important helminths.
- Pathogenicity of infectious diseases.
- Upper respiratory tract infections.

• Lower respiratory tract infections.
• Wound and skin infections.
• Sexually transmitted diseases.
• Food borne diseases, Water borne disease.

الجغرافيا الحيوية (219 ح) المستوى الثاني

• Origins and history of biogeography.
• Species distributions.
• Communities and Biomes.
• Traditional Ecological Knowledge.
• Changing continents and climates.
• Dispersal, colonization, and invasion.
• Geographic variation, speciation, and extinction.
• Species diversity The ecological niche.
• Disturbance and succession.
• Island biogeography theory.
• Quaternary vegetation history.
• Island Biogeography Theory .
• Climate change and forests.
• Impacts of Human Activities.
• Biogeography and Sustainable Development. Strategies of Conservation Biogeography.

كيمياء عضوية (اروماتية احادية وعديدة) (217 ك) المستوى الثاني

Part 1: Aromatic compounds

• Nomenclature of aromatic compounds.
• Methods for preparation of benzene and its derivatives.
• Reaction of benzene ring.
• Aromatic alcohols,Aromatic aldehydes and ketones.
• Aromatic carboxylic acids.
• Aromatic amines.

Part 2: Bi-functional compounds

• Each chemical class includes: preparation some physical properties chemical propertied& some applications, dienes.
• alfa-hydroxy aliphatic carboxylic acids.
• Alfa - amino aliphatic carboxylic acids.
• Alfa - cyano aliphatic carboxylic acids.
• Alfa, bets - unsaturated carbonyl compound, Michael reaction: examples.
• Diels - Alder reaction: examples.

كيمياء فيزيائية (كيمياء الديناميكا الحرارية + كيمياء كهربية1) (218 ك) المستوى الثاني

• **Part 1: Thermodynamics**

• Introduction of thermodynamics.
• First law of thermodynamics.
• Second law of thermodynamics.
• Third law of thermodynamics.
• Chemical equilibrium in solids.
• Entropy relations.
• Carnot cycle.

• **Part 2: Electrochemistry**

• Review of Redox Chemistry.
• Galvanic Cells.
• Electrode and Cell Potentials.
• Potential, Free Energy, and Equilibrium.
• References electrodes.
• Calculations of Ph.
• Batteries and Fuel Cells.
• Corrosion.
• Electrolysis.

كيمياء فيزيائية (كيمياء حركية) (219 ك) المستوى الثاني

• Rate of reactions-Molecularity and order of reaction.
• The determination of the reaction order (Zero, first, second and third order).
• Kinetics of simultaneous reactions.
• Energy of activation, Arrhenius equation.
• A theoretical approach of chemical kinetics.

كيمياء عضوية (بترول+بيئة 220 ك) المستوى الثاني

• Definition of Petroleum and it origin formation and traps.
• Methods of exploration and Petroleum, Classification, Chemical Composition of Petroleum.
• Field separation of crude oil (Desalting, water treatment, gas treatment).
• Refining operations and Fractional Distillation of crude oil.
• Crude oil Distillation products: light distillates (natural Gas, gasoline and naphtha).
• Mild distillates (kerosene, heating oil and jet fuel and diesel fuel).
• Heavy distillates (lubricates oil and waxes, asphalt and coke oil).
• Chemical conversion processes of crude oil: Cracker processes (Thermal cracking and catalytic cracking and hydrocracking).
• Combining processes (polymerization and alkylation).

كيمياء فيزيائية (النظرية الحركية للغازات + الخواص الفيزيائية والتركيب الجزيئي) (221 ك) المستوى الثاني

Part I: Chemical kinetics

• Rate of reactions-Molecularity and order of reaction.
• The determination of the reaction order(Zero, first, second and third order).
• Kinetics of simultaneous reactions.
• Energy of activation, Arrhenius equation.
• A theoretical approach of chemical kinetics.

Part II: Kinetic theory of gases

• Kinetic theory of gases, ideal and non-ideal gas model.
• Liquifaction of gases – critical parameters.
• Boyl's temperature and Joule Thomson effect.
• Virial coefficient and law of correspondence.
• Mean free path ,collision frequencies and barometric formula.

كيمياء عضوية (ستروريدات) 222 ك المستوى الثاني

• Introduction to Natural Products.
• Classifications of Steroids and Cholesterol,ergosterol stigmasterol.
• Steroid Hormones.

الخطأ في التحليل الكيميائي 223 ك المستوى الثاني

• Sources of chemical analysis errors.
• How to reduce chemical analysis errors.
• Standard curve.
• Sampling errors.
• Concentration calculation methods.

خلية وبيولوجيا جزيئية (301ح) المستوى الثالث

• Chemical composition and types of membrane lipids.
• Types of membrane proteins and interaction to maintain the cell shape.
• Experiments that showed that DNA is the genetic material.
• Contributions of researchers towards solving the structure of DNA molecule.
• Trials of Watson and Crick to solve DNA helix).
• Chemical composition of DNA molecule and its features. Relation between DNA and chromosomes
• Overview of DNA replication. The different models proposed for DNA replication.
• Mechanism of DNA replication. Differences between replication in pro-and Eukaryotes
• Overview about DNA transcription in different organisms.
• The detailed mechanism of gene transcription in eukaryotes.
• Types of modifications of RNA transcripts. How RNA is spliced?
• Overview of Translation and Structure of tRNA, Ribosomes and their interaction.
• Mechanics of translation. Proteins control the characteristics of living cells and the organisms' traits.

بيئة حيوانية (302ح) المستوى الثالث

• Introdution of Ecology, abiotic and biotic environment.
• Community ecology
• The complexity of the Environments and habitats.
• Populations, dynamics and ecosystem.
• Breeding Ecology.
• Feeding habits, metabolic rate and trophic ecology.
• Feeding habits, metabolic rate and autotrophy.
• Foraging habits and food chain.
• Biodiversity: value, concept and measurements.
• Food webs and pyramids.
• Conservation of species and Ecosystem.

بيولوجيا الحماية (314 ح) المستوى الثالث
• Funa, Egypt and Damietta habitat. • Amphibian fauna. • Reptilian Fauna (Lizards & snakes). • Reptilian Fauna (Turtles & crocodiles). • Avian fauna (common birds & birds). • Avian fauna (water birds). • Avian fauna (Raptors). • Avian fauna (migratory birds). • Mammalian fauna. • Egypt protect rates.
السرطان الوراثي (315 ح) المستوى الثالث
• The genetic mechanisms of cancer. • Phenotypic and Genotypic Diagnosis of Malignancies. • The heritability of cancer. • Inherited cancer genes. • Childhood cancer & leukaemia. • Melanoma & pancreatic cancer. • Hereditary gastric cancer. • Renal Cancer. • Prostate cancer. • Ovarian Cancer. • Breast Cancer.
احصاء حيوي وبيولوجيا حسابية (317 ص) المستوى الثالث
• Common sampling techniques. • Sampling and basic statistics. • Mean, median, mode, standard deviation, variance. • Significant figures. • Sampling designs. • Distributions, Terminology, Histograms and Value in sampling. • Normality and Tests for normality. • What do you do if your data are not normal? Transformations-What are transformations? • Effects of outliers on analyses - What do you do with them when detected? • Catch-per-unit-of-effort (CPUE) sampling Number of samples. • Size of samples(r). • Comparing distributions. • Size distributions. • Age structure. • Chi-square analysis. • Statistical methods (SPSS examples will be used for different cases of study).

- T-test - Paired t-test.
- Analysis of variance (1-way, 2-way, interaction, etc.).
- Analysis of covariance.
- Correlation analysis.
- Regression analysis.
- Why do we transform data?
- Outliers, What are they? Methods to see if you have them (Detection).
- Variable selection techniques (forward-backward-stepwise).

كيمياءعضوية فراغية وسكريات (316 ك) المستوى الثالث

Part I: Stereochemistry (1h/ w)

- Introduction of stereochemistry of organic compounds.
- Chirality's resolution and analysis of enantiomers and diastereomers.
- Conformational isomerism and geometrical isomerism.
- Introduction to stereo selective synthesis and drug design.
- Stereo selectivity in nature and spectroscopic determination of relative and absolute chirality's.

Part II: Carbohydrate (1h/w)

- Classification, nomenclature of carbohydrates and biomedical importance.
- Monosaccharides (classification, configuration and conformation).
- Anomeric effect.
- Mutarotation.
- Reducing and non reducing sugar.

كيمياءغيرعضوية (تناسقية +عناصر f, d) (317 ك) المستوى الثالث

- General properties of transition metal (d-block elements).
- Chemistry of scandium, titanium, vanadium, chromium, magnanese, iron, cobalt, nickel, copper and zinc groups in term of their electronic configuration, different oxidation states.
- Physical and chemical properties of the elements and their compounds structure of some important compounds – isolation of elements – uses and applications.
- f-block elements (electronic configuration, oxidation states, physical and chemical properties).

كيمياء فيزيائية (كيمياء السطوح 1 + كيمياء الحفز +الخواص الفيزيائية للبلمرات) (318 ك) المستوى الثالث

- Definition and types of surface tension.
- Solutions.
- Determination of contact angle.
- Chemical and physical adsorption.
- Colloids Introduction.
- Colloids Types.
- Preparation of Colloids.

كيمياء فيزيائية (كيمياء كهربية 2) (319 ك) المستوى الثالث

- Definition of over voltage.

• Causes and benefits of over voltage.
• Determination of over voltage.
• Kinetics of potential electrode.
• Electrode Types.
• Corrosion.
• Sources of Corrosion.

كيمياء عضوية (احماض امينية + انثوسيانين) (320 ك) المستوى الثالث

• 1-Introduction to aminoacids and anthocyanins.
• Aminoacids and proteins.
• Purines and nucleic acids.
• Anthocyanins.

كيمياء غير عضوية تطبيقية (321 ك) المستوى الثالث

• Acids of industrial importance (sulfuric, nitric acids, their compounds as well as their economic importance and impact on the environment).
• Bases of industrial importance (Caustic soda and the chloro-alkali industry and industrial production of soda (Solvay process).
• Silicon compounds and related products:
  - The Cement industry (Cement manufacturing process. Cement Degradation by atmospheric factors).
• Nitrogenous compounds:
  - Ammonia - nitrogen – fixation of atmospheric nitrogen - liquid nitrogen and its uses.
  - Industrial production of ammonia (Bosch-Haber process).
  - Chemistry of fertilizers: Nitrogen, phosphorus and potassium compounds in agriculture.
• Glass industry. Properties of glasses. Types of glasses, Colored glasses.
• Iron industries: basic raw materials - interactions in blast furnace - the different types of iron and their properties, Iron corrosion and its resistance.
• Sulfur compounds and paper industry:
  - Industrial production of paper (Kraft process) and Comparison with the "sulfite" process.
• Ceramic industry: basic raw materials - chemical transformations in the ceramic industry.
• Water treatment:
  - Water hardness.
  - Treatments for demineralization and softening of waters for industrial uses.
• Energy production with fuel cells.
  - Production of hydrogen and hydrogen fuel cells.
  - Comparison among the different types of fuel cells.

الكيمياء الخضراء (322 ك) المستوى الثالث

• Definition of green chemistry, how green chemistry differs from cleaning up pollution.
• Green chemistry, principle, examples of impact of green chemistry.
• The use of green solvent, development of specialized synthetic technique.

• Goals of green chemistry.
• synthesis of various compound by environmentally friendly green chemistry.

فسيولوجى 1 (316ح) المستوى الثالث

• Membrane physiology.
• Membrane potential.
• Synaptic transmission.
• Physiological Anatomy of Muscles.
• Mechanisms of Muscle Contraction.
• Respiratory Mechanisms.
• Gas transport and Exchange.
• Buccal and Gastric Digestion.
• Intestinal Digestion& Absorption.
• Metabolic Pathways of Carbohydrates.
• Metabolic Pathways of Fats.

لافقاريات متقدم وطفيليات (317ح) المستوى الثالث

• Introduction to Parasitology.
• Protozoan parasites.
• Platyhelminth Parasites.
• Nematode Parasites.
• Arthropod Parasites.
• Feeding & digestion in polychaetes.
• Feeding & digestion in molluscs.
• Feeding & digestion in crustacea.
• Respiration & respiratory pigments.
• Respiration in polychaeres mollusca & crustacean.

حيوان اقتصادي (310ح) المستوى الثالث

- An introduction to Economic Zoology.
- Aquaculture.
- The economic importance of fish.
- coral reef (habitat – reproduction).
- coral reef (importance – threats).
- Apiculture.
- Honey (Chemical Composition).
- Honey (benefits).
- propolis (constituents – benefits).
- Royal Jelly (constituents – benefits).
- bee venom(constituents – uses).
- bee wax (constituents – uses).

مقدمة في التكنولوجيا الحيوية (308 ح ك) المستوى الثالث

- Introduction, History and scope of biotechnology.
- Review of DNA replication, transcription, and translation, Natural and artificial mechanisms of DNA transfer.
- Introduction to vectors, Selectable markers, Cloning.
- Vectors, Expression vectors, Shuttle vectors, Creation of recombinant DNA molecules, Creation of genomic and cDNA libraries.
- Library screening, Ligation, Restriction endonuclease.
- Digestion and mapping, Gel electrophoresis, Northern blotting, Southern blotting.
- Polymerase Chain Reaction (PCR).
- DNA sequencing and sequence analysis.
- Reverse transcriptase PCR, Real time PCR.
- Production of monoclonal antibodies, Immunoblotting.
- DNA microarrays, Protein microarrays.
- Introduction to bioinformatics.
- Applications of biotechnology: Genetically engineered foods, Bioremediation.

كيمياء عضوية (صبغات +طيف) (323 ك) المستوى الثالث

Part I: Dyes (1h/w)

- Relation between color and chemical constitution.
- Synthesis and application of azo dye.
- Synthesis and application of Disperse dye.
- Synthesis and application of Diphenyl methane dye.
- Synthesis and application of Triphenyl methane dye.
- Synthesis and application of vat dye.

Part II: Spectroscopy of Organic compounds (1h/w)

Infrared spectroscopy and mass spectrometry:

- Introduction
- The Electromagnetic Spectrum
- The Infrared Region

• Molecular Vibrations
• Measurement of the IR Spectrum
• Introduction to Mass Spectrometry
• Determination of the Molecular Formula by Mass Spectrometry.
• Fragmentation Patterns in Mass Spectrometry.

Nuclear magnetic resonance spectroscopy:

• Introduction.
• Theory of Nuclear Magnetic Resonance.
• Magnetic Shielding by Electrons.
• The NMR Spectrometer.
• The Chemical Shift.
• The Number of Signals.
• Areas of the Peaks.
• Spin-Spin Splitting.
• Complex Sitting.

تحليل بالاجهزة (324 ك) المستوى الثالث

• **Chapter 1:** Analytical Methodologies.
• **Chapter 2:** Introduction of spectroscopy.
• **Chapter 3:** Ultraviolet and Visible Spectrophotometers.
• **Chapter 4:** Flame photometer.
• **Chapter 5:** Atomic Absorption.
• **Chapter 6:** Experimental Part.

كيمياء عضوية (فيتامين +علاجية) (325 ك) المستوى الثالث

• **Part I: Vitamins**

• Introduction.
• Structures and functions of the lipid soluble vitamins (vitamins A, D, E, K).
• Biomedical importance of lipid soluble vitamins.
• Structures and functions of the water soluble vitamins (thiamin ,riboflavin, niacin, pantothenic acid, vitamin B6, biotin ,vitamin B 12 , folic acid , vitamin C).
• Biomedical importance of water soluble vitamins.

• **Part II: Chemotherapy**

• Introduction and classification.
• Enzymes.
• Antibacterial agents.
• Antiviral agents.
• Antineoplastic drugs.
• Antimalarial drugs

كيمياء غير عضوية (فلز-عضوية) (326 ك) المستوى الثالث

• Introduction to organometallic chemistry.
• 18-electron rule and structure of organometallic compounds.
• Preparation of organometallic compounds: direct reactions between metals and alkyl halides.

• Basic classes of organometallic compounds: σ- bonded alkyl and aryl complexes, π-bonded systems (alkenes, alkynes, cyclopentadienyl, and other aromatic systems). • Metal Alkyls and Metal Hydrides • Metal Carbonyls, Cyanides, Nitrosyls, Phosphine Complexes and Substitution, Metal Olefin Complexes, • Application in homogeneous catalytic reactions.
كيمياء فيزيائية حيوية (327 ك) المستوى الثالث
• Proteins and amino acids. • Structure of proteins. • Reactions of amino acids. • Diseases related to protein deficiency. • Carbohydrates. • Structure of carbohydrates. • Types of carbohydrates. • Applied topic on carbohydrates. • Lipids. • Vitamins.
أساسيات علم البيئة المائية (422 ح) المستوى الرابع

• Introduction to course.
• Physical and chemical properties of Aquatic Ecosystems.
• Plankton biology.
• Plankton and primary production.
• Plankton and food webs.
• Oceanic nekton.
• Oceanic nekton.
• Deep sea biology.
• Tropical communities.
• Human impacts: fisheries.
• Human impacts: pollution.

فسيولوجي 2 (423ح) المستوى الرابع

• Introduction.
• Cardiovascular system: Components of cardiovascular system and physiological properties of the heart.
• Electrical events of the heart (Normal and abnormalities of ECG).
• Comparative functional morphology of vertebrate hearts.
• Cardio dynamics (cardiac cycle, cardiac contractive force, pressure volume loops).
• Excretion: Structure and function of excretory system, Acid base balance (ABB).
• Endocrinology: Introduction to hormone chemical nature and mechanisms of action, the pituitary hormones.
• Thyroid and adrenal gland hormones.
• Insulin and parathyroid hormones.
• Sex hormones.
• Respiration: Structure of the respiratory system.
• External respiration (Inhalation, Explanation and diffusion in the alveoli and internal respiration).

بحث ومقال (435 ح) المستوى الرابع

• Writing an essay in Zoology.
• Reviewing the literature and internet sites in Zoology.
• Collecting and summarizing the main conclusions about the one subject.
• Discussions and recommendations.

بيولوجيا اشعاعية (310 ح) المستوى الرابع

• Introduction to bioradiation.
• Source of radiation.
• X-ray.
• Gama ray.
• Alpha ray.
• Beta ray.
• Solar energy.
• Phone ray.
• Effect of radiation .

• Handling radiation.
• Avoiding radiation.
• Radiation and environment.

بيولوجيا الاورام (408 ح) المستوى الرابع

• Natural history: the life of a cancer.
• Pathology: defining a neoplasm.
• Epidemiology: identifying causes for human cancers.
• Oncogenes, tumour suppressor genes and viruses.
• Mutations, DNA repair and genetic instability.
• Familial cancers.
• Growth: a balance of cell proliferation, death and differentiation.
• Invasion and metastasis.
• Principles of cancer treatment.
• Clinical evidence that links DNA repair and carcinogenesis.
• Repair mechanisms.
• Approaches to cancer prevention.

سموم وتلوث بيئي (409 ح) المستوى الرابع

• Introduction to Environmental toxicology.
• Environmental pollution.
• Air pollution in Egypt.
• Soil pollution.
• Natural Pollution of Soil.
• Anthropogenic Soil Pollution.
• Categories of Wetlands, Protecting Wetlands.
• Sources of Water Pollution.
• Wastewater treatment in constructed Wetlands.
• The Negative Effects of Water Pollution on animals.
• Heavy metal pollution in soil, water and fish tissue.
• PLASTIC Pollution: Plastic's Impact on Wildlife is alarming.
• Dangerous Effects of Burning Plastic.
• Action plan and creative solution.

الجينيوم والبروتيوم (424 ح) المستوى الرابع

• Shape and structure of proteins (amino acid structure, folding into a distinctive conformation).
• Different structural levels of protein and overall folding.
• Depicting the conformation of proteins, structural motifs and domains.
• Promotion of protein folding by chaperones, proline isomerases, abnormal folding and disease.
• Enzymes: highly efficient and specific catalysts.
• Enzyme's active site and binding substrates.

- Regulated synthesis and degradation of proteins (proteasome and ubiquitin roles).
- Allosteric regulation of proteins, allosteric switches to control protein activity.
- Phosphorylation, dephosphorylation and proteolytic cleavage regulate protein activity.
- Protein purification and separation by electrophoresis, liquid chromatography.
- Detecting individual proteins by enzyme and antibody assays.
- Characterizing proteins and determining the mass and sequence of proteins (mass spectrometry).

كيمياء عضوية (ميكانيكية تفاعلات +تربينات) (419 ك) المستوى الرابع

Part 1: Physical organic chemistry

- Orbital symmetry theory.
- Concerted and stepwise reactions.
- Molecular orbital theory of organic compounds.
- General rules for pericyclic reactions.
- Woodward and selection rules Frontier orbital approach (HOMO & LOMO concepts).
- The aromatic transition state concept (aromaticity and aromatic character of three, four, five, six, seven, eight and larger carboxylic rings systems, heterocyclic ring systems, non-benzenoid aromatics).
- Electrocyclic reactions.
- Cycloaddition reactions.
- Sigmatropic and chelotropic rearrangement.
- **Part II: Terpenoids Chemistry**
- The biogenesis of the isoprene unit, Exceptions of the Special Isoprene Rule.
- Isolation of Mono- and Sesequiterpenes, Classification of terpenes.
- General methods for structure determination of terpenoids.
- Structure-elucidation and Synthesis of selected terpenoids.
- The precursors of different terpenoids.
- Formation of cyclic monoterpenoids.
- Formation of cyclic sesquiterpenoids.
- Formation of cyclic diterpenoids.
- Formation of cyclic triterpenoids.

كيمياء غير عضوية (طيفية + حيوية) (420 ك) المستوى الرابع

- Introduction.
- Examples of inorganic elements in human body.
- Metals in medicine and related applications as well as Nanotechnology & Nanoparticles and their applications in medicine.

(كيمياء فيزيائيه) ديناميكا حرارية للمحاليل (421 ك) المستوى الرابع

- Free energy function.
- Change of state and Clausius Clapeyron equation.
- Some useful equations.
- Van't hoff isotherm.
- Gibbs free energy.
- Helmholtz equation.
- Le chatelier’s principle.

- Reaction in solutions.
- Ideal and non-ideal solution.
- Partial molal quantity.
- Heterogeneous equilibrium and the phase rule.

كيمياء عضوية (بيروين + نيوكلويدات) (422 ك) المستوى الرابع

- Nucleosides, nucleotides, and nucleic acids.
- Adenosine triphosphate (ATP), chemical energy carriers.
- Mechanisms of phosphoryl transfer reaction.
- High-energy property of the phosphounhydride linkage, kinetic stability of ATP in the cell.
- Chemotherapeutic design.
- Some important nucleotides, nucleic acids, helical structure and biosynthesis of DNA Disaccharides and polysaccharides; fatty acids.
- Transcription and biosynthesis of RNA, Protein biosynthesis.
- Determination of arrangement and sequence of nucleic acids in DNA.
- Structure of nucleosides, nucleosides and nucleic acids.

كيمياء حيوية تحليلية (423 ك) المستوى الرابع

- **Part 1: Chromatographic Analysis**
- Chapter 1: Analytical Methodologies.
- Chapter 2: Introduction of chromatography.
- Chapter 3: Electrophoreses.
- Chapter 4: Gas Chromatography (GC).
- Chapter 5: High Performance Liquid Chromatography (HPLC).
- Chapter 6: Planer Chromatography.
- **Part II: Electroanalytical Chemistry**
- Components of a Potentiometric Cell.
- Indicator Electrodes.
- Ion-selective Electrodes.
- Glass Membrane Electrodes.
- Liquid membrane electrodes.
- Crystalline membrane electrodes.
- Gas-sensing electrodes.
- Potentiometric Titrations.

كيمياء فيزيائية (كيمياء الاسمنت1 + قاعدة الصنف) (424 ك) المستوى الرابع

- Set up the context of sustainability in the research about cementitious materials.
- Introduction to cement chemistry and hydration mechanism.
- How to use SEM-EDX to characterize cement. Learn the best practices and LMC tips.
- Go deeper in cement hydration and kinetics of the reaction.
- The gibbs free energy and the equilibrium constant.
- Theory of solutions, Rault;s law and Henry’s law.
- Electrochemical systems.

• The Helmholtz and the Gibbs free energy.

علم الانسجه (425 ح) المستوى الرابع

• Introduction to histology -Integumentary system- Male reproductive system.
• Female reproductive system.
• Respiratory system.
• Muscles.
• Nerves.
• Urinary system.
• Circulatory system.
• Hair and glands.
• Nails.

أساسيات علم بيولوجيا التكوين (426 ح) المستوى الرابع

• Introduction; life cycles and evolution of developmental patterns.
• Developmental genetics, cell-cell communication.
• Oogenesis and spermatogenesis.
• Fertilization, prevention of polyspermy and parthenogenesis.
• Cleavage: mechanisms, patterns and consequences.
• Morphogenic processes in gastrulation and neurulation.
• Axis formation: setting up the body axis.
• Sex determination.
• Early development of teleost fish. (zebra-fish.)
• Early development of amphibian.
• Early development of birds.
• Early development of mammals.
• Medical aspects of developmental biology.
• Environmental regulation of development.

اسم المقرر : سلوك الحيوان (416 ح) المستوى الرابع

• Introduction (Ethology, definitions, impact).
• Development of behavior.
• Behavior genetics.
• Behavior genetics.
• Instinctive activities in animals.
• Physiology of instinct.
• Motivating factors to a behavior.
• Releasing stimuli of a behavior
• Expressive behavior in animals.
• Learning: learning vs instinct, types of learning.
• Language and mental representation: non-verbal communications.
• Verbal communication in animals: language and teaching animals to converse.
• An overview on biological relationships.

مقدمة في علم الأوليات (427 ح) المستوى الرابع

- Introduction.
- General Classification of Protozoa.
- The New 'Kingdom Protozoa.
- Phylum: Amoebozoa, Morphology, and practical importance.
- Phylum: Amoebozoa, Taxonomy, Life Histories and Ecology.
- Phylum: Ciliophora, introduction, Habitats and Ecology.
- Phylum: Ciliophora, Ecology, Taxonomy, and Some Life Cycles.
- Phylum: Ciliophora, Detail of Cell Structure.
- Phylum: Ciliophora, Tintinnids, parasitic ciliates.
- Phylum: Apicomplexa, introduction to Intestinal coccidian, and Blood and tissue coccidian. The study of *Cryptosporidium parvum.*
- Phylum: Apicomplexa, the study of plasmodium and Trypanosoma.

الحساسية وأمراض المناعة الذاتية (428 ح) المستوى الرابع

- Defining and history of autoimmunity
- Role of antigens as a driver of autoimmunity.
- Autoimmunity triggers and immune system activation.
- Immune cells and immune responses in autoimmunity.
- Cytokines: Their receptors and signals.
- Intimation of autoimmunity.
- Mechanisms of autoimmunity.
- Genetics and autoimmunity.
- General features of autoimmune diseases.
- Multisystem autoimmune diseases.
- Diagnosis, prevention and therapy of autoimmune diseases.
- Similarities and differences between autoimmunity and allergy.

هندسة وراثية (418ح)	المستوى الرابع

- An introduction to Genetic Engineering.
- Overview of DNA extraction and visualization.
- Overview of Polymerase Chain Reaction.
- Definition of gene cloning, Plasmids and restriction enzymes.
- The general strategy of gene cloning.
- First historical experiment in gene cloning.
- cDNA production and restriction mapping.
- DNA libraries and colony hybridization.
- Detection of gene products, proteins bound to DNA.
- Analysis of DNA sequences and site-directed mutagenesis.
- Production of hormone by recombinant bacteria, cloning of Dolley.
- Production of recombinant animals.

توجهات حديثة في التصنيف (420 ح)	المستوى الرابع

- Introduction.
- Taxonomists as Synthesisers.
- Taxonomy, Systematics and Biosystematics.
- Stages in Taxonomic Procedures.
- Stages in Taxonomic Procedures.
- Alpha Taxonomy, Beta Taxonomy, Gamma Taxonomy
- Neotaxonomy.
- Electron Microscopy in Taxonomy.
- Embryological Approach in Taxonomy.
- Ecological Approach in Taxonomy.
- Ethological Approach in Taxonomy.
- Cytological Approach in Taxonomy: DNA Hybridisation, Karyological.
- Biochemical Approach in Taxonomy: Chromatography, Electrophoresis.
- Immunological Technique or Immunotaxonomy.
- Numerical Taxonomy.

أساسيات التشريح المقارن (429 ح)	المستوى الرابع

- The integumentary system of vertebrates.
- The skeletal system of vertebrates.
- The digestive system of vertebrates.
- The respiratory system of vertebrates.
- The circulatory system of vertebrates.
- The urogenital system of vertebrates.

علم الاوبئة الطفيلية ومكافحتها (419 ح)	المستوى الرابع

- Introduction to Epidemiology.
- Definition and Purpose of Epidemiology.
- Development of Epidemiology.
- Concepts and Methodological Approaches in Epidemiology.

- Principles of Data Analysis.
- Applications of Epidemiological Methods and research Areas in Epidemiology.
- Control of Human Parasitic Diseases.
- The Health Policy Environment.
- Parasitic Diseases: New and Old Challenges.
- Components of transmission cycles.
- Modes of transmission and the vector.
- Implementation of human Schistosomiasis Control: Challenges and Prospects.

كيمياء عضوية (غير متجانسة وقلويدات) (425 ك) المستوى الرابع

- Introduction to heterocycles.
- Five membered heterocycles with one or more heteroatom(s).
- Six membered heterocycles with one or more heteroatom(s).
- Benzofused heterocycles with five membered rings with one or more heteroatom(s) like indole, benzofuran and quinoline.

كيمياء فيزيائية (كيمياء ضوئية) (426 ك) المستوى الرابع

- Laws of photochemistry.
- Quatum yield (experimental and theoritical).
- Faactors affecting quantum yield.
- Kinetics of photochemistry.
- Process of photochemistry.
- Latent image.
- Photoelectric effect.
- Photosynthesis.

كيمياء غير عضوية (سلاسل +المتركبات العنقودية) (427 ك) المستوى الرابع

- Structures of polysilances.
- Configurations and Stereochemistry.
- Ordering in copolymers.
- Copolymers with other monomers.
- Miscellaneous Inorganic Polymers.
- Silicon Containing Polymers.
- Boron Containing Polymers.
- Chemical Modification of Polysilanes.

بحث ومقال (428 ك) المستوى الرابع

- Importance of scientific research, scientific ethics.
- How to do scientific research, types of publications.
- How to do literature survey on a certain topic.
- How to manage writing of the essay and the reference list.
- Component of the essay :- Title page, Acknowledgement, Abstract, introduction, aim of the essay, conclusion and future work and References.

كيمياء عضوية (ضوئية+ ليبيدات) (429 ك) المستوى الرابع

Part 1: (Photochemistry):

- Energy units, inter-conversions, Boltzmann distribution law, Beer-Lambert law and different regions of electromagnetic spectrum., transition dipole moment originate, laws of photochemistry, spin multiplicity, different types of electronic transitions in different compounds.
- Electronic states and Jablonski diagram.
- Energy gap law & Deduction of rate constant expressions for quantum yields, Franck-Condon Principle.
- Fluorescence and Mirror image phenomenon & Energy estimation of S1, S2 and T1 & Influence of molecular structure.
- Stern-Volmer equation & Delayed fluorescence, Excimer and Exciplex, PHOTOCHEMISTRY OF KETONES, a-Cleavage (Norrish Type I), H-Atom abstraction.
- Intermolecular, Intramolecular (Norrish Type II), Structure-reactivity and structure-efficiency relationships in Type II reactions, Applications of photochemistry.

Part 2: (lipids):

- Chemical structure of lipids.
- Types of lipids.
- Chemical reactions of lipids.
- Cholesterol.
- Phosphoprotein.
- Glycolipids.
- Diseases related to lipid deficiency.

كيمياء فيزيائية (كيمياء السطوح2 + كيمياء الحفز التطبيقية) (430 ك) المستوى الرابع

Part 1: Surface chemistry (1h/w):

Brief history.
Surface and interfaces.
Structure of surfaces.
Surface energy and composition.
Elementary process of gas-surface interaction.

Part 2: Chemistry of applied catalysis (1h/w):

Brief history.
Catalytic action.
Catalyst, preparation, deactivation.
Classification of solid catalyst.
Catalyst characterization.

كيمياء تحليلة تطبيقية (431 ك) المستوى الرابع

- **Chapter 1:** Soil Analysis.
- **Chapter 2:** Water Analysis.
- **Chapter 3:** Cement Analysis.
- **Chapter 4:** Biomass Analysis.
- **Chapter 5:** Gold Extraction Process.