Department of Biochemistry

Description of Biochemistry Department

Courses

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<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>No. of Units</th>
<th>Pre-requisites</th>
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</thead>
<tbody>
<tr>
<td>Bioc 200</td>
<td>General Laboratory Safety</td>
<td>1</td>
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</tbody>
</table>

- **Course Objectives:**
- **Course Description:**

Main text books:
CRC Handbook of Laboratory Safety. Fifth Edition. .1
Editor. A. keith Furr

الأسس الأولية لإجراء التجارب الحيوية المعملية. الطبعة الأولى. أ.د. طه بن عبدالله قمصاني

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<th>1</th>
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<tbody>
<tr>
<td></td>
<td>Bioc 201</td>
<td>General Biochemistry</td>
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</tbody>
</table>
Objectives of the course
Study the structure, properties and functions of biomolecules.

Course Description:
Introduction to acids, bases and buffers-Amino acids and proteins: classification and characteristics - Carbohydrates: classification, derivatives and reactions - Lipids: classification and properties- Introduction to biological membranes and lipoproteins-Nucleic acids: chemical structures of nitrogenous bases, nucleosides and nucleotides- Chemical and 3-D structures of DNA-Introduction to enzymes, hormones and vitamins.

Main text books:

Subsidiary books:

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<tbody>
<tr>
<td></td>
<td>Bioc 211</td>
<td>General Metabolism (1)</td>
<td>Th. 3 Pr. 3 Credit 4</td>
<td>Bioc 201</td>
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</table>

Objectives of the course:
Study of carbohydrates and lipids metabolism.

Course Description:
Carbohydrates and lipids digestion-Different pathways for synthesis and degradation of carbohydrates (metabolism of glucose, fructose, galactose, disaccharides, starch, glycogen) - Synthesis and degradation of neutral
lipids and fatty acids - Biosynthesis of cholesterol - Biosynthesis and functions of leukotrienes and prostaglandins - Phospholipids and their functions - Lipoproteins: classes, functions and clinical disorders - Bile acids and pigments - Porphyries - Diseases associated with carbohydrates and lipids metabolism disorders.

Main text books:

Subsidiary books:

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<tbody>
<tr>
<td>Bioc 231</td>
<td>Enzymes</td>
<td>Th. 2 Pr. 3 Credit 3</td>
<td>Bioc 201</td>
</tr>
</tbody>
</table>

Objectives of the course:
Study of enzymes and their role in the biochemical reactions.

Course Description:
Definition and assays of enzymes - Properties of enzymes - Enzyme classification and nomenclature - Isolation and purification of enzymes from different sources - Characteristics and structures of enzymes - Mechanism of enzyme action - Coenzymes - Isoenzymes - Enzyme kinetics - Inhibitors and activators of enzymes.

Main text books:

Subsidiary books:
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<tr>
<td>Bioc 301</td>
<td>Inorganic Biochemistry</td>
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<td>Bioc 231</td>
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</tbody>
</table>

**Objectives of the course:**
To apply core inorganic concepts to understanding of the role of inorganic elements in biological systems.

**Course Description:**
Occurrence and availability of inorganic elements in organisms – Biological function of inorganic elements – Properties and Functions of some important metallic enzymes – Absorption and transport of the essential, inorganic elements- Toxic elements – Chemotherapy using compounds of inorganic elements

**Main text books :**

**Subsidiary texts :**

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<tr>
<td>Bioc 312</td>
<td>General Metabolism (2)</td>
<td>2</td>
<td>Bioc 211</td>
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</table>

**Objectives of the course:**
Study of Amino acids and nucleotides metabolism.

**Course Description:**
Proteins and Nucleic acid digestion - Metabolism of amino acids (anabolism and catabolism of individual amino acids) - Urea cycle - Physiologically active amines (serotonin and histamine) - Nucleotide metabolism (synthesis and degradation of purines and pyrimidines) -
Diseases associated with their metabolism disorders.

**Main text books:**

**Subsidiary books:**
- Metabolism at a glance by J. Salway (1999), Blackwell Science (UK).

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<td>6</td>
<td>Bioc 313</td>
<td>Hormones</td>
<td>Th. 2, Pr. -</td>
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</table>

**Objectives of the course:**
Study of hormones and their functions.

**Course Description:**
Hormones classification, their effects on the molecular and cellular levels - Endocrine hormones (thyroid, parathyroid, pituitary, hypothalamus, pancreas, renal and gonads) - Diseases related to hormonal disturbances.

**Main text books:**

**Subsidiary books:**

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<tr>
<td>7</td>
<td>Bioc 314</td>
<td>Biochemistry of Nutrition</td>
<td>Th. 2, Pr. 3</td>
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</table>

**Objectives of the course:**
Study of the nutrients.
Course Description:

Main text books:

Subsidiary books:

| 8 |
|---|---|---|---|---|
| Bioc 315 | Metabolic Regulation | 2 | - | 2 | Bioc 312 |

Objectives of the course:
Study the various mechanisms of metabolic regulation in living organisms.

Course Description:
Introduction to metabolic regulation - Allosteric enzymes (allosteric behaviour, identification of rate limiting enzymes, crossover point, cooperative binding and its different models) - Regulation of carbohydrate metabolism in muscle, liver and intestine - Regulation of glycogen metabolism - Regulation of metabolism in adipose tissue - Role of starvation, diabetes, hypothyroidism in metabolic regulation.

Main text books:
- Regulation in Metabolism by E. Newsholme and C. Start (1973), J. Wiley (UK).

Subsidiary books:
Hormones and Metabolic Control by White and Baxter (1995), Arnold (UK).

Objectives of the course:
The study of mechanisms of energy transduction in biological systems.

Course Description:
Types of energy, its conversion and transfer in biosystems. Energy transducers and transduction mechanisms by specific biomolecules. Laws governing energy transfer and utilization. Anatomy of the mitochondrion and chloroplast. Location of enzymes, redox carriers and the oxidative phosphorylation machinery. Inhibitors and uncouplers of energy-linked functions. Utilization of the proton gradient to drive the formation of high energy bonds. The molecular structure of F1 ATP-ase synthase. Mitochondrial disfunction and disease.

Main text Books:

Objectives of the course
Study of physical phenomena in the biological systems.

Course Description:
Thermodynamics (equilibrium, electrochemical potential, membrane equilibrium) - Intermolecular forces - Chemical kinetics of some biological reactions - Pharmacokinetics - Diffusion and transport across biological membranes.
**Main text books:**

**Subsidiary books:**
- Principles of Physical Biochemistry by K.E. van Holde and others (1998), Prentice Hall (USA).

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<tr>
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<td>Bioc 342</td>
<td>Natural Products</td>
<td>3 3 4</td>
<td>Bioc 312</td>
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**Objectives of the course**
Study of photosynthesis and the different aspect of natural products.

**Course Description:**
Photosynthesis - Biosynthesis of carbohydrates from CO₂ in C₃ and C₄ plants – Secondary metabolites (natural products) in plants – Methods of separation and identification of natural products – Biosynthesis of natural products (Alkaloids, Phenolic, Terpenoids) in plants. The commercial and medical important of natural products.

**Main text books:**

**Subsidiary books:**

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<tr>
<td></td>
<td>Bioc 343</td>
<td>Analytical Biochemistry</td>
<td>3 3 4</td>
<td>Bioc 231</td>
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</table>

**Objectives of the course**
The use of chemical and physical methods in separation, determination and identification of various biomolecules.

**Course Description:**
Preparative and analytical methods - Chromatography (adsorption and partition) and its biochemical applications (ion-exchange, affinity and gel filtration) - Separation by salts, organic solvents and centrifugation - Electrophoresis - Dialysis - Micro filtration - Photometry and its application in biochemistry (UV, VIS, IR, fluorescence, atomic emission and absorption ,NMR) - Isotopes - Immunological separation methods - Genetic engineering.

**Main text books:**

**Subsidiary books:**

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<td>Bioc 370</td>
<td>Biochemistry for medical engineering</td>
<td>3</td>
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**Objectives of the course:**
Study of the qualitative and quantitative structure of living matter and their transformation on the molecular level.

**Course Description:**
Structure and functions of biomolecules: carbohydrates, lipids, amino acids, proteins and nucleic acids-Enzymes and coenzymes-Metabolism and energy – Respiration – body fluid – Role of biochemistry in some medical areas.

**Main text Books:**

Subsidiary books:

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<tr>
<td></td>
<td>Bioc 371</td>
<td>Biochemistry for non-Biochemist</td>
<td>3 3 4</td>
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</tbody>
</table>

Objective of the Course:
Study the structure, properties and function of biomolecules and their transformation in the cells.

Course Description:

Main text books:
أسس الكيمياء الحيوية. د. عبدالمنعم الأعسر, المكتبة الأكاديمية (1996), القاهرة.

Subsidiary books:

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<th>15</th>
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<tr>
<td></td>
<td>Bioc 390</td>
<td>Summer Training (1)</td>
<td>- 6 2</td>
<td>Department Approval</td>
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Objectives of the course:
To provide the student with practical training in biochemistry related
areas such as hospitals, factories, research centers, and quality control centers.

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<tr>
<td>Bioc 391</td>
<td>Biochemical terminology &amp; literature</td>
<td>Th. 3</td>
<td>Pr. 3</td>
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Objectives of the course:
To provide information's about the important sources of literature concerning with the biochemical publication. Discussion on some publication models. Study of the roots of biochemical terminology.

Main Text Books:

Subsidiary Books:

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<td>Bioc 392</td>
<td>Computer applications in Biochemistry</td>
<td>Th. 2</td>
<td>Pr. 3</td>
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Objectives of the course:
To use of computer for simulation and solving biochemical problems such as enzyme kinetics, nucleotide and peptide sequences.

Main Text Books:

**Subsidiary Books:**

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<tr>
<td>Bioc 401</td>
<td>Special Topics in Biochemistry</td>
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**Objectives of the course:**
Selected up to date different topics in the field of biochemistry will be presented every semester.

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<tr>
<td>Bioc 416</td>
<td>Clinical Biochemistry</td>
<td>3</td>
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<tr>
<td>Bioc 315</td>
<td>Bioc 401</td>
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**Objectives of the course:**
To provide some informations about clinical biochemistry.

**Course Description:**
Biochemical tests in clinical medicine - Water, Sodium and Potassium - Hydrogen ion homoeostasis and blood gases - Diabetes mellitus - Clinical analyses (blood, urine, stool, amniotic fluid, cerebrospinal fluid and synovial fluid) - Clinical enzymology - Hyperuricaemia and gout - Clinical nutrition - Liver diseases and gall stones - Inherited metabolic diseases - Plasma proteins - Kidney function.

**Main text books:**

**Subsidiary books:**
- Clinical Biochemistry for Medical Students by M.F. Laker (1996), Saunders (UK).

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<tr>
<td>Bioc 417</td>
<td>Biochemistry of Diseases</td>
<td>2</td>
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</table>

**Objectives of the course:**
Study of the biochemical basis of some Human Diseases.

**Course Description:**
Introduction to human anatomy and physiology with emphasizing on cellular and chemical aspects of physiology. A brief in various organ systems including digestive, cardiovascular, and respiratory systems and some of their diseases – introduction to cancer cells and some type of cancers – Sexual transmitted diseases.

**Main text books:**

**Subsidiary books:**

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<tr>
<td>Bioc 418</td>
<td>The Biochemistry of Cancer Cells</td>
<td>2</td>
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**Objectives of the course:**
Study of types and treatment of cancer.

**Course Description:**

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<td></td>
<td>Th.</td>
<td>Pr.</td>
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<tr>
<td>Bioc 422</td>
<td>Microbial Toxins</td>
<td>2</td>
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**Objectives of the course:**
Study of a group of microbial toxins and their actions.

**Course Description:**

**Main text books:**

**Subsidiary texts:**

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<td>Th.</td>
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<tr>
<td>Bioc 432</td>
<td>Molecular Biochemistry</td>
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<td>3</td>
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</table>
Objectives of the course:
Study of the macromolecules involved in genetics.

Course Description:
The relationship between chemical structures and functions of proteins - Relationship between chemical structure and function of nucleic acids in relation to storage, coding and transfer of information across subsequent generations - Various techniques used to study this experimental discipline (x-ray diffraction, centrifugation, electron microscopy, isotopes, amino acid and nucleotide sequencing) - Genetic engineering and its applications in medicine, agriculture and industry.

Main text books:

Subsidiary books:

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<tr>
<td>Bioc 444</td>
<td>Drug Metabolism</td>
<td>2</td>
<td>Bioc 312</td>
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</table>

Objectives of the course:
Biotransformations reactions and fate of drugs in the body.

Course Description:
Pharmacokinetics of drugs; absorption, distribution, metabolism, storage and excretion. Phase I and phase II reactions. The role of mixed function oxidase (MFO) and cytochrome P 450 (CYP) in drug metabolism. Induction, inhibition and regulation of CYP's. Xenobiotic chemical pollutants, polymorphism and other factors affecting drug metabolism.

Main text books:

Subsidiary books:

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<tbody>
<tr>
<td>25 Bioc 445</td>
<td>Applied Biochemistry</td>
<td>3 3 4</td>
<td>Bioc 231</td>
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</tbody>
</table>

**Objectives of the course:**
Study of the different application fields which biochemistry can share in industry.

**Course Description:**
Some aspects of microbial biochemistry - Aerobic and anaerobic fermentation - Biotechnology – Genetic engineering and biotechnology – Biotechnology and the production of chemicals, antibiotics, Vaccines, inter Fers and enzymes – Application of enzymes in food industry and medicin – Biomass and the production of biological fuels – single cell proteins – Bioremediation.

**Main text books:**

**Subsidiary books:**

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<tr>
<td>26 Bioc 446</td>
<td>Immunochemistry</td>
<td>2 3 3</td>
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</tbody>
</table>

**Objectives of the course:**
Study of the molecular immune system.

**Course Description:**
Organs, cells and molecules of the immune system - Natural and acquired

Main text books:
- Immunology by J. Kuby (1994), Freeman (USA).

Subsidiary books:
- Laboratory Immunology and Serology by N.J. Bryant (1986), W.B. Saunders, (USA).

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<tbody>
<tr>
<td>Bioc 490</td>
<td>Summer Training (2)</td>
<td>Th. 6 Pr. 2</td>
<td>Department Approval</td>
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Objectives of the course:
To provide the student with practical training in biochemistry related areas such as hospital, factories, research centers, and quality control centres.

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<tr>
<td>Bioc 491</td>
<td>Research Projects in Biochemistry</td>
<td>Th. 9 Pr. 3</td>
<td>-</td>
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</tbody>
</table>

Objectives of the course:
The course tends to train the student in conducting research work and provide him an opportunity for the acquisition of skills by practical work.

Course Description:
Original experimental research in one of the fields of biochemistry carried out under the supervision of a department member. A type written report and an oral presentation is required.
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<tr>
<td>Bioc 492</td>
<td>Career skills &amp; technical writing</td>
<td>2</td>
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**Objectives of the course:**
To develop skills on how to write technical reports.

**Course Description:**
Hands-on writing scientific reports in biochemistry. How to retrieve information, resources and sites. How to quote and cite information from paper and electronic resources. How to write references and maintain a high standard of ethics. Skills for effective presentation.

**Main Text Books:**
2. شلبي أحمد ( 1968 ) , كيف تكتب بحثا أو رسالة – مكتبة النهضة المصرية – القاهرة.