

## Course Overview

### General Chemistry II

<b>Course code :</b>	GMS204
<b>Course title:</b>	General Chemistry II
<b>Level/semester:</b>	Second Semester
<b>PRECEDING COURSES</b>	.First year Courses
<b>Credit hours: 4</b>	Theoretical: 3
	Practical: 2

Course Title: Techniques in Clinical Chemistry- MLT 205

#### THEOREY -1

Unit	CONTENTS	HOURS
1	<b><u>Basic Laboratory Principlpes:</u></b> <ul style="list-style-type: none"> <li>❖ Units of Measure .</li> <li>❖ Water and aqueous solutions (the terms hydrophilic, hydrophobic, amphipathic and hydrotropic substances)</li> <li>❖ Surface tension, diffusion and osmosis .</li> <li>❖ Basic separation techniques (centrifugation, filtration, dialysis)</li> <li>❖ Calculations in clinical chemistry (dilution, weights and, concentrations [%- molar and normal], preparation of acids, pH, Buffers)</li> </ul>	6
2	<b>Laboratory Safety:</b> <ul style="list-style-type: none"> <li>❖ Safety awareness of persons and safety equipments.</li> <li>❖ Chemical safety</li> <li>❖ Biological safety</li> <li>❖ fire safety and control of other hazards</li> <li>❖ Disposal of hazardous materials</li> </ul>	4
3	<b>Specimen Collection and Handling:</b> <ul style="list-style-type: none"> <li>❖ Specimen collection (urine, blood, faeces, cerebrospinal fluid and other body fluids)</li> <li>❖ Specimen Handling (maintenance of identification, preservation, separation, storage and transport of specimens)</li> </ul>	2
4	<b>Quality Management:</b> <ul style="list-style-type: none"> <li>❖ Fundamentals of total quality management .</li> </ul>	3

	<ul style="list-style-type: none"> <li>❖ The total testing process .</li> <li>❖ Control of preanalytical variables .</li> <li>❖ Control of analytical variables .</li> <li>❖ External quality assessment.</li> </ul>	
5	<p><b>Analytical Techniques and Instrumentation:</b></p> <p><b>-1Spectrophotometric and photometric techniques:</b></p> <p>i- Basic concepts (Nature of light- Beer's law)</p> <p>ii- Spectrophotometry (Types- Components- Performance parameters)</p> <p>iii- Flame photometry (Principle- Components- Operation)</p> <p>iv- Atomic absorption spectrophotometry (Principle- Components- Operation)</p> <p>v-Fluorometry, Chemiluminescence (Basic concepts and definitions- Measurement of fluorescence)</p> <p><b>-2Electrophoresis :</b></p> <p>i- Basic concepts and definitions.</p> <p>ii- Theory of electrophoresis.</p> <p>iii- Factors affecting electrophoresis (sample, supporting media, buffer, electric field and generated heat).</p> <p>iv- Description of the electrophoresis technique .</p> <p>v- Types of electrophoresis (zone, isoelectric focusing, two-dimensional, blotting techniques)</p> <p><b>-3Electrochemistry :</b></p> <p>i- Galvanic, electrolytic and half cells.</p> <p>ii- Ion selective and pH electrodes.</p> <p>iii- Gas- sensing and enzyme electrodes.</p> <p><b>-4Chromatography</b></p> <p>i- Basic concepts and definitions.</p> <p>ii- Separation mechanisms (adsorption, affinity, ion-exchange)</p> <p>iii- Types of chromatography (paper, thin-layer, gas, high-performance)</p> <p><b>-5Immunochemical techniques</b></p> <p>i- Basic concepts and definitions.</p> <p>ii- Qualitative methods (passive gel diffusion-immunoelectrophoresis- western blotting)</p> <p>iii- Quantitative methods (radial immunodiffusion- labeled immunochemical assays)</p> <p><b>-6Automation</b></p> <p>i- Basic concepts and definitions.</p> <p>ii- Steps in automated analysis (a- specimen preparation, identification, measurement and delivery, b- reagent systems and delivery, c- chemical reaction and measurement phases, d- signal processing and data handling)</p>	15

## PRACTICAL

<b>ITEM</b>	<b>CONTENTS</b>	<b>HOURS</b>
Practice 1	General Instructions and Laboratory Rules	1
Practice 2	General Laboratory Supplies: Glass and Plastic wares	3
Practice 3	Pipeting (glass and automatic)	4
Practice 4	Weighing	4
Practice 5	Types of solutions (crystalloid, colloid and suspensoid)	4
Practice 6	Hydrotropic factor (the effect of a hydrotropic factor on forming emulsion between two solutions)	4
Practice 7	Preparation of different percent, molar and normal concentrations of common acids, bases and salts	4
Practice 8	Surface tension, diffusion, dialysis and osmosis	4
Practice 9	pH determination by indicator and pH meter	4
Practice 10	Preparation of buffer solution	4
Practice 11	Acid- base titration (preparation and standardization of 0.1 N HCL with a standard sodium carbonate solution)	4
Practice 12	Redox titration (potassium permanganate titration)	4
Practice 13	Spectrophotometry: a- Spectrophotometer: Components- Use of different colored solutions and show the relation between wavelength, color and maximum absorption of light.	4
Practice 14	Spectrophotometry: b- Flame photometer: Components Demonstration of method of use.	4
Practice 15	Electrophoresis: a- Protein electrophoresis.	4
Practice 16	Electrophoresis: b- Hemoglobin electrophoresis	4