



# COLLEGE OF SCIENCE, TECHNOLOGY AND APPLIED ARTS OF TRINIDAD AND TOBAGO

## School of Nursing, Health and Environmental Sciences DEPARTMENT OF NATURAL & LIFE SCIENCES

**“Transforming Lives, Transforming Communities, Transforming the Nation... One Student at a Time  
CHEM 111- CHEMISTRY I**

### PHILOSOPHY:

### VISION:

*To be a student-centered, dynamic and innovative, world-class and multi-campus college, promoting excellence in teaching and learning, serving diverse communities and producing lifelong learners who can compete globally.*

### MISSION:

*To be the premier educational institution in: providing high quality, affordable and accessible education programmes serving the needs of business, industry and the diverse campus communities and facilitation the personal and professional development of its students, faculty and staff.*

The Institution’s motto “Transforming Lives, Transforming Communities, Transforming the Nation... One Student at a Time.” is embodied in our Core Curriculum as well as Programme Curriculum through ten competencies which students will understand, practice and demonstrate upon successful completion of their programmes of study at the College. These competencies are as follows:

Programme Curriculum Competencies
<b>KNOWLEDGE</b>
A clear understanding of the principles and concepts of related theories and models of the particular discipline and the relationship to other disciplines through study, education and experience.
<b>EFFECTIVE COMMUNICATION</b>
The ability to accurately transfer thoughts and meaning through interpersonal skills using appropriate registers.
<b>ANALYTICAL ABILITY</b>
The ability to systematically gather relevant data and make appropriate deductions, inferences and connections with a view to judiciously solve problems.
<b>TECHNOLOGICAL EXPERTISE</b>
Utilization of current tools and techniques with the view to achieving efficiency and improving functionality.
<b>COLLABORATION</b>
Proficiency in working cohesively with other stakeholders with the view to achieving common goals.
<b>CREATIVITY</b>
The ability to explore issues and generate solutions from an innovative perspective.
<b>PROFESSIONALISM</b>
A life-long engagement in reflective, moral, ethical and best practices in all spheres.
<b>DIVERSITY</b>
The ability to recognize and respect uniqueness, worth and dignity of others whilst developing one’s own belief system.
<b>SOCIAL AND GLOBAL RESPONSIBILITY</b>
A conscientious approach that reflects social and global accountability, commitment, caring and integrity.
<b>ENTREPRENEURSHIP</b>
The ability to recognize and take advantage of legitimate opportunities for innovation and social improvement, whilst accepting the related risks.

Course Code:	CHEM 111
Course Title:	Chemistry 1
Number of Credits:	3
Semester:	
Track:	
Co-requisites:	
Prerequisite:	CHEM 090 & CHEM 092 or CXC Grade 3
Prerequisite for:	
Number of Contact Hours:	60
Delivery:	Learning is accomplished through practical experiences with an emphasis on group work, planning and design, manipulation and scientific reporting skills
Instructor:	
Office:	
Office Hours:	
Telephone:	
Email:	

### COURSE DESCRIPTION AND GOAL:

This course seeks to introduce students to the fundamental principles of Chemistry at the College Level. It will also help students to understand and appreciate the use of science, especially chemistry, in everyday life.

The competencies addressed in this course are **Knowledge** at Immersion, Intermediate and Advanced levels, **Analytical Ability** at the Intermediate level, **Technological Expertise** at Intermediate and Advanced levels and **Collaboration** at a the Immersion and Intermediate levels. The specific objectives for this course are listed by Competency:

#### Specific Objectives for CHEM111-Chemistry 1

##### KNOWLEDGE

*Immersion level: Demonstrates comprehension of the relevant and significant ideas across disciplines and can make comparisons and draw conclusions about them.*

Student should be able to:

1. Define chemistry, matter and energy.
2. Describe and explain diffusion and osmosis.
3. Discuss Dalton's atomic theory.
4. Describe the structure of the atom and the properties of the sub-atomic particles.
5. Discuss the arrangement of elements within the Periodic Table.
6. Identify the first twenty (20) elements of the Periodic Table.
7. Describe the arrangement of the elements into Groups and Periods in the Periodic Table.
8. Define chemical formulas and stoichiometry.
9. Write chemical formulas of compounds.
10. Define the mole.
11. List the SI base units.
12. Describe reactions in aqueous solutions
13. Name and write formulas for common binary and ternary inorganic compounds.
14. Write balanced chemical equations to describe chemical reactions.
15. Use the terminology of solutions, solute, solvent, concentration.

16. Use the terminology of electrochemistry.
17. Write half-reactions and overall cell reactions for electrolytic processes.
18. Describe the refining and plating of metals by electrolytic methods.
19. Define organic chemistry.
20. Define functional groups.
21. Name organic compounds.
22. Describe the polymerization of organic compounds.
23. Define environment and pollution.
24. Identify common sources of pollution.

*Intermediate level: Makes connections between disciplinary and professional expectations.*

Student should be able to:

25. Differentiate atoms based on sub-atomic particles & define and discuss isotopes.
26. Use the IUPAC system of naming compounds.
27. Discuss the Law of Constant Composition.
28. Recognize and describe non-electrolytes, strong electrolytes and weak electrolytes.
29. Recognize and classify acids, bases and salts.
30. Recognize and describe classes of reactions.
31. Identify organic compounds.
32. Identify functional groups.
33. Draw structural formulas of organic compounds.

## **ANALYTICAL ABILITY**

*Immersion Level: Student analyses structures and organizations and perceives and makes relationships.*

Student should be able to:

34. Explain the differences between states of matter in terms of energy and particle arrangement.
35. Differentiate between chemical and physical properties and changes.
36. Classify matter by its properties & composition.
37. Explain how and why atoms form bonds.
38. Explain the physical and chemical properties of element in Groups I to VII and 0.
39. Combine base units to form derived units.
40. Calculate the molar mass of any element or compound given its formula.
41. Interconvert mass, moles and number of atoms or molecules.
42. Calculate percent composition of an element in a compound.
43. Determine the empirical formula of a compound from mass or mass percentage data.
44. Determine molecular formula from empirical formula and molar mass.
45. Determine percentage purity of a sample.
46. Assign oxidation numbers to elements when they are free, in compounds, or in ions.
47. Recognize oxidation-reduction reactions and identify which species are oxidized, reduced, oxidizing agents, and reducing agents.
48. Recognize and describe classes of reactions.
49. Use balanced chemical equations to calculate the moles and masses of reactants and products.
50. Determine which reactant is the limiting reactant in reactions.
51. Use the limiting reactant concept in calculations involving chemical equations.
52. Calculate the concentrations of solutions when they are diluted.
53. Recognize oxidation and reduction half-reactions.
54. Use Faraday's Law of Electrolysis in calculations on electrolysis.

- 55. Discuss and predict the physical and chemical characteristics of given homologous series.
- 56. Identify structural isomers of organic compounds.
- 57. Explain the basic concepts of pollution prevention and conversion.

*Intermediate level: Articulates problem solving processes and practices using disciplinary problem solving processes to approach problems.*

Student should be able to:

- 58. Carry out calculations related to the use of solutions in chemical reactions.
- 59. Explain the importance of water in the environment.

### **TECHNOLOGICAL EXPERTISE**

*Intermediate level: Student displays positive attitudes towards technology uses and independently selects appropriate tools that support productivity, collaboration, learning and personal pursuits.*

Student should be able to:

- 60. Perform and design simple experiments.
- 61. Show an ability to construct and interpret tables and graphs showing the results of chemistry experiments.

*Advanced level: Student demonstrates practical applications of simulated and virtual technological devices and instruments.*

Student should be able to:

- 62. Utilize lab equipment and computer simulations to plan, design and conduct chemistry experiments and project possible applications for the methodologies learnt.

### **COLLABORATION**

*Immersion Level: Student initiates cooperative learning activities by seeking out others for assistance and for building projects together and acts as an active facilitator.*

Student should be able to:

- 63. Work in a group to discuss problems created by man-made chemicals on the environment .

*Intermediate level: Student values and incorporates others' ideas and other points of view and recognizes there is power in combining ideas.*

Student should be able to:

- 64. Work in group to research and compile a project in chemistry.

## **TEACHING OBJECTIVES:**

### **UNIT 1 – THE NATURE OF MATTER**

#### ***Content:***

- Definitions: chemistry; matter and energy
- Chemical and physical properties and changes
- Classification of matter
- The law of constant composition
- States of matter
- Movement of particles in different states.
- Diffusion and Osmosis.
- Changes of state of matter freezing, melting, boiling, sublimation.

#### ***Objectives:***

Students should be able to:

1. Define chemistry, matter and energy
2. Explain the particulate nature of matter.
3. Explain the differences between states of matter in terms of particle arrangement and energy.
4. Describe and explain diffusion and osmosis.
5. Identify the properties of matter as intensive and extensive
6. Differentiate between chemical and physical properties and changes

7. Classify matter by its properties & composition and recognize the various

forms of matter.

## UNIT 2 – ATOMS, MOLECULES AND BONDING

### *Content:*

- Definitions and appropriate examples of atoms, molecules and compounds.
- Dalton's atomic theory: including contributions by Rutherford, Mosely, Thompson & Chadwick
- The properties of protons, neutrons & electrons
- The concept of isotopes & their relative abundance with reference to chlorine, carbon, oxygen.
- The differences of atoms of elements: examples including transition elements.
- The Octet rule

- Ionic and covalent bonding

### *Objectives:*

Students should be able to:

1. Define and differentiate the following terms: atoms, molecules and compounds.
2. Discuss Dalton's atomic theory
3. Describe the structure of the atom and the properties of the three fundamental sub-atomic particles
4. Differentiate atoms based on sub-atomic particles & define and discuss isotopes
5. Explain how and why atoms form bonds.

## UNIT 3 – THE PERIODIC TABLE

### *Content:*

- The history of development of the periodic table
  - Law of Triads: Johann Dobereiner
  - Law of Octaves: John Newlands
  - Lothar Meyer & Dmitri Mendeleev Periodic Table
- Arrangement of elements in the Periodic Table into Groups & Periods.
- Symbols and representation of elements from atomic numbers 1-20.
- Structure of elements from atomic numbers 1-20.
  - Only shell concept: octet rule
  - Nucleus content
- Trends of Groups I, II, III, IV, V, VI, VII & 0.
- Atomic radii
- Variation of electronegativity
- Variation of ease of formation of ions
- Variations in boiling point, melting point, density, atomic radius

- Relationship of elemental position in Periodic Table and Oxidation state

### *Objectives:*

Students should be able to:

1. Discuss the arrangement of elements within the Periodic Table.
2. Identify the first (20) twenty elements of the Periodic Table.
3. Describe the arrangements of elements into Groups and Periods in the Periodic Table.
4. Explain the physical and chemical properties of elements in groups; I, II, III, IV, V, VI, VII & 0 of the Periodic Table.

## UNIT 4 – CHEMICAL FORMULAS AND COMPOSITION STOICHIOMETRY

### *Content:*

- Definitions: chemical formulas, allotropes & stoichiometry.
- The law of constant composition
- Chemical formulas
- Relative molecular mass ( $M_r$ ) and relative atomic mass ( $A_r$ ).
- The mole as an amount of particles: atoms, molecules, ions, formula units etc in a substance
- Significant figures
- Formula mass, molar mass and moles
- The value of Avogadro's constant ( $L$ ),  $6.02 \times 10^{23}$  particles  $\text{mol}^{-1}$ .
- Interconversion of mass, moles and number of atoms or molecules
- Percent composition and formulas of compounds
- Derivation of formulas from elemental composition
- Determination of purity

### *Objectives:*

Students should be able to:

1. Define chemical formulas, allotropes & stoichiometry
2. Discuss the law of constant composition (Law of definite proportion)
3. Write chemical formulas of compounds
4. Use the IUPAC system of naming compounds.
5. Define absolute atomic mass, relative atomic mass and relative molecular mass
6. Define the mole
7. List the SI base units
8. Combine base units to form derived units
9. Express the results of calculations to the correct number of significant figures
10. Apply the appropriate units to describe the results of measurement
11. Use the unit factor method to carry out conversion among units.
12. Calculate the molar mass of any element or compound given its formula
13. Interconvert mass, moles and number of atoms or molecules
14. Calculate percent composition of element in a compound given the chemical formula
15. Calculate the mass of each element present in a sample from combustion data
16. Determine empirical formula of a compound from mass or mass percentage data
17. Determine molecular formula from the empirical formula and the molar mass
18. Determine percentage purity of sample

## UNIT 5 – SOME TYPES OF CHEMICAL REACTIONS

### *Content:*

- Aqueous Solutions
- Electrolytes and Extent of Ionization
- Strong and Weak Acids
- Reversible Reactions
- Strong bases, Insoluble bases, and Weak bases
- Solubility Guidelines for Compounds in Aqueous solution
- Reactions in Aqueous Solutions
- Oxidation Numbers
- Naming Binary Compounds
- Naming Ternary Acids and their salts
- Oxidation-Reduction Reactions
- Combination Reactions
- Decomposition Reactions
- Displacement Reactions
- Metathesis Reactions
- Gas-Formation Reactions
- Summary of Reaction Types

### *Objectives:*

Students should be able to:

1. Recognize and describe non-electrolytes, strong electrolytes, and weak electrolytes
2. Recognize and classify acids (strong, weak), bases (strong, weak, insoluble), and salts (soluble, insoluble); using the solubility guidelines
3. Describe reactions in aqueous solutions by writing formula unit equations, total ionic equations, and net ionic equations
4. Assign oxidation numbers to elements when they are free, in compounds, or in ions
5. Name and write formulas for common binary and ternary inorganic compounds
6. Recognize oxidation-reduction reactions and identify which species are oxidized, reduced, oxidizing agents, and reducing agents
7. Recognize and describe classes of reactions: decomposition reactions, displacement reactions, various types of metathesis reactions, and gas-formation reactions

## UNIT 6 – CHEMICAL EQUATIONS AND REACTION STOICHIOMETRY

### *Content:*

- Chemical equations
- Calculations based on chemical equations
- The limiting reactant concept
- Percent yields from chemical reactions
- Sequential reactions
- Concentrations of solutions
- Dilution of solutions
- Using solutions in chemical reactions
- Definitions of solutions, solute, solvent and concentration of a solution with appropriate examples

### *Objectives:*

Students should be able to:

1. Write balanced chemical equations to describe chemical reactions
2. Use balanced chemical equations to calculate the moles and masses of reactants and products involved in each of the reactions
3. Determine which reactant is the limiting reactant in reactions
4. Use the limiting reactant concept in calculations involving chemical equations
5. Compare the amount of substance actually formed in a reaction (actual yield) with the predicted amount (theoretical yield), and use to determine the percent yield
6. Work with sequential reactions
7. Use the terminology of solutions – solute, solvent, concentration
8. Calculate concentrations of solutions when they are diluted
9. Carry out calculations related to the use of solutions in chemical reactions



## UNIT 7 – ELECTROLYSIS

### *Content:*

- Electrical Conduction
- Electrodes
- The electrolysis of molten sodium chloride (The Downs cell)
- The electrolysis of aqueous sodium chloride
- The electrolysis of aqueous sodium sulfate
- Counting electrons: Coulometry and Faraday's Law of electrolysis
- Commercial applications of electrolytic cells

### *Objectives:*

Students should be able to:

1. Use the terminology of electrochemistry (terms such as “cell”, “electrode”, “cathode”, “anode”)
2. Recognize oxidation and reduction half-reactions, and know at which electrode each occurs for electrolytic cells and for voltaic cells
3. Write half-reactions and overall cell reactions for electrolytic processes
4. Use Faraday's Law of Electrolysis to calculate amounts of products formed, amounts of current passed, time elapsed, and oxidation state
5. Describe the refining and plating of metals by electrolytic methods

## UNIT 8 – ORGANIC CHEMISTRY

### *Content:*

- Definition of organic chemistry & organic compounds.
- Homologous series: General Formula
- Structural formula & isomerism
- Functional Group(s) in organic compounds
- Nomenclature of organic compounds

#### Alkanes, Alkenes & Alkynes:

- Distinguish between these compounds
- Hydrogenation of alkenes
- Hydration of alkenes
- Production of alkanes & alkenes from crude oil

#### Alcohols:

- Nomenclature
- Preparation
- Reactions of alcohols: metals, oxidation, dehydration, combustion, esterification, breath analyzer

- Effects on the body

#### Organic acids & Esters:

- General formula
- Preparation of ethanoic acid
- Reactions with metals, metal oxides, hydroxides.
- Preparation and properties of esters
- Naming esters
- Hydrolysis of esters
- Soaps, detergents and hard water

#### Polymers & plastics:

- Addition polymerization eg. PVC
- Condensation polymerization eg. polyesters

### *Objectives:*

Students should be able to:

1. Define organic chemistry & identify organic compounds

2. Explain the existence of numerous organic compounds
3. Recognize the importance of organic compounds
4. Define and identify functional groups
5. Name organic compounds: alkanes, alkenes, alkynes, alcohols & carboxylic acids up to 10 carbon atoms.
6. Draw structural formula of organic compounds
7. Identify structural isomers of organic compounds
8. Discuss and predict the physical and chemical characteristics of given homologous series.
9. Describe the polymerization of organic compounds.

## UNIT 9 – CHEMISTRY IN THE ENVIRONMENT

### *Content:*

- Integrated concepts of environment, definition of pollution
- Pollutants and sources
- Biodegradable materials, non-biodegradable materials, recycling of materials.
- Water and living systems, leaching.
- Water contamination and treatment.

### *Objectives:*

Students should be able to:

1. Define environment and pollution.
2. Identify common sources of pollution.
3. Explain the basic concepts of pollution prevention and conversion.
4. Explain the importance of water in the environment.

SCHEME OF WORK

WK/ Date	Class	ACTIVITY/TOPICS TO BE COVERED
1	<b>UNIT 1 - THE NATURE OF MATTER</b>	
	1	<p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Definitions: chemistry; matter and energy</li> <li>• Chemical and physical properties and changes</li> <li>• Classification of matter</li> <li>• The law of constant composition</li> <li>• States of matter</li> <li>• Movement of particles in different states.</li> <li>• Diffusion and Osmosis.</li> <li>• Changes of state of matter freezing, melting, boiling sublimation</li> </ul> <p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• Group Exercise: Students are asked to look around the classroom and identify all the examples of matter and then classify them</li> </ul>
		<p><b>Practical exercise 1: Diffusion and osmosis</b>  <b>DUE DATE:</b></p>
2	<b>UNIT 2 - ATOMS, MOLECULES AND BONDING</b>	
	2	<p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Definitions and appropriate examples of atoms, molecules and compounds.</li> <li>• Dalton's atomic theory: including contributions by Rutherford, Mosely, Thompson &amp; Chadwick</li> <li>• The properties of protons, neutrons &amp; electrons</li> <li>• The concept of isotopes &amp; their relative abundance with reference to chlorine, carbon, oxygen.</li> <li>• The differences of atoms of elements: examples including transition elements.</li> <li>• The Octet rule</li> <li>• Ionic and covalent bonding</li> </ul> <p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• Drawing atomic diagrams of some other isotopes other than carbon, chlorine and oxygen</li> <li>• Drawing dot and cross diagrams to show ionic and covalent bonding</li> <li>• Calculating number of neutrons and/or protons of an isotope given appropriate data</li> </ul>
3	<b>UNIT 3 - THE PERIODIC TABLE</b>	
	3	<p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• The history of development of the periodic table <ul style="list-style-type: none"> <li>▪ Law of Triads: Johann Dobereiner</li> <li>▪ Law of Octaves: John Newlands</li> <li>▪ Lothar Meyer &amp; Dmitri Mendeleev Periodic Table</li> </ul> </li> </ul> <p>Arrangement of elements in the Periodic Table into groups &amp; periods.</p> <ul style="list-style-type: none"> <li>• Symbols and representation of elements from atomic numbers 1-20.</li> </ul>

4		<ul style="list-style-type: none"> <li>Structure of elements from atomic numbers 1-20. <ul style="list-style-type: none"> <li>Only shell concept: octet rule</li> <li>Nucleus content</li> </ul> </li> <li>Trends of Groups I, II, III, IV, V, VI, VII &amp; 0.</li> <li>Atomic radii</li> <li>Variation of electronegativity</li> <li>Variation of ease of formation of ions</li> <li>Variations in boiling point, melting point, density, atomic radius</li> <li>Relationship of elemental position in Periodic Table and Oxidation state</li> </ul>
	4	<p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>Exercises involving the identification of the Period and/or Group of the Periodic Table to which an element belongs given an electronic configuration for the element.</li> </ul>
<b>TEST 1 - Topics: Units 1, 2 and 3</b>		
<b>ASSIGNMENT OF GROUP PROJECTS</b>		
<b>DUE DATE: 14<sup>th</sup> Week</b>		
5 & 6	<b>UNIT 4 - CHEMICAL FORMULAS AND COMPOSITION STOICHIOMETRY</b>	
5 & 6	<p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Definitions: chemical formulas, allotropes &amp; stoichiometry.</li> <li>The law of constant composition</li> <li>Chemical formulas</li> <li>Relative molecular mass (Mr) and relative atomic mass (Ar).</li> <li>The mole as an amount of particles: atoms, molecules, ions, formula units etc in a substance</li> <li>Significant figures</li> <li>Formula mass, molar mass and moles</li> <li>The value of Avogadro's constant (L), <math>6.02 \times 10^{23}</math> particles mol<sup>-1</sup>.</li> <li>Interconversion of mass, moles and number of atoms or molecules</li> <li>Percent composition and formulas of compounds</li> <li>Derivation of formulas from elemental composition</li> <li>Determination of purity</li> </ul>	
	<p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>Exercises on calculating empirical and molecular formula</li> <li>Calculations involving interconversion of mass, moles and number of atoms or molecules</li> <li>Calculations involving percentage composition of elements present in compounds given the formula of the compound</li> </ul>	
	<b>Practical Exercise 2: Determination of the Purity of a Salt</b>	
	<b>DUE DATE:</b>	
7 & 8	<b>UNIT 5 - SOME TYPES OF CHEMICAL REACTIONS</b>	
7 & 8	<p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Aqueous Solutions</li> <li>Electrolytes and Extent of Ionization</li> <li>Strong and Weak Acids</li> </ul>	

		<ul style="list-style-type: none"> <li>• Reversible Reactions</li> <li>• Strong bases, Insoluble bases, and Weak bases</li> <li>• Solubility Guidelines for Compounds in Aqueous solution</li> <li>• Reactions in Aqueous Solutions</li> <li>• Oxidation Numbers</li> <li>• Naming Binary Compounds</li> <li>• Naming Ternary Acids and their salts</li> <li>• Oxidation-Reduction Reactions</li> <li>• Combination Reactions</li> <li>• Decomposition Reactions</li> <li>• Displacement Reactions</li> <li>• Metathesis Reactions</li> <li>• Gas-Formation Reactions</li> <li>• Summary of Reaction Types</li> </ul>
		<p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• Students are given the equations for various chemical reactions and asked to identify the type of reaction represented by each equation</li> <li>• Calculation of the oxidation number of elements in neutral compounds and polyatomic ions</li> <li>• Exercises involving use of oxidation numbers to identify redox reactions</li> </ul>
		<p><b>Practical exercise 3: Investigating Chemical Reactions</b>  <b>DUE DATE:</b></p>
9	<b>UNIT 6 – CHEMICAL EQUATIONS AND REACTION STOICHIOMETRY</b>	
	9	<p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Chemical equations</li> <li>• Calculations based on chemical equations</li> <li>• The limiting reactant concept</li> <li>• Percent yields from chemical reactions</li> <li>• Sequential reactions</li> <li>• Concentrations of solutions</li> <li>• Dilution of solutions</li> <li>• Using solutions in chemical reactions</li> <li>• Definitions with appropriate examples.</li> </ul>
		<p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• Calculations based on equations using the limiting reactant concept.</li> <li>• Calculation of percent yields in chemical reactions.</li> <li>• Calculation of concentration of solutions given relevant data</li> <li>• Calculation of the concentration of solutions on dilution from neat (stock) solutions given appropriate data.</li> </ul>
10	10	<b>TEST 2 – Topics: Units 4, 5 and 6</b>

UNIT 7 – ELECTROLYSIS	
11	<p><b>11</b></p> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Electrical Conduction</li> <li>• Electrodes</li> <li>• The electrolysis of molten sodium chloride (The Downs cell)</li> <li>• The electrolysis of aqueous sodium chloride</li> <li>• The electrolysis of aqueous sodium sulfate</li> <li>• Counting electrons: Coulometry and Faraday’s Law of electrolysis</li> <li>• Commercial applications of electrolytic cells</li> </ul>
	<p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• Questions involving the prediction of the products of electrolysis from the nature of the electrolyte and electrodes used in the electrolysis.</li> <li>• Calculation of the amount of substance formed in electrolysis based on the quantity of electricity passed through the electrolyte.</li> </ul>
	<p><b>Practical exercise 4: Electrolysis</b>  <b>DUE DATE:</b></p>
UNIT 8 – ORGANIC CHEMISTRY	
12 & 13	<p><b>12 &amp; 13</b></p> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Definition of organic chemistry &amp; organic compounds.</li> <li>• Homologous series: General Formula</li> <li>• Structural formula &amp; isomerism</li> <li>• Functional Group(s) in organic compounds</li> <li>• Nomenclature of organic compounds</li> </ul> <p>Alkanes, Alkenes &amp; alkynes:</p> <ul style="list-style-type: none"> <li>• Distinguish between these compounds</li> <li>• Hydrogenation of alkenes</li> <li>• Hydration of alkenes</li> <li>• Production of alkanes &amp; alkenes from crude oil</li> </ul> <p>Alcohols:</p> <ul style="list-style-type: none"> <li>• Nomenclature</li> <li>• Preparation</li> <li>• Reactions of alcohols: metals, oxidation, dehydration, combustion, esterification, breath analyzer</li> <li>• Effects on the body</li> </ul> <p>Organic acids &amp; Esters:</p> <ul style="list-style-type: none"> <li>• General formula</li> <li>• Preparation of ethanoic acid</li> <li>• Reactions with metals, metal oxides, hydroxides.</li> <li>• Preparation and properties of esters</li> <li>• Naming esters</li> <li>• Hydrolysis of esters</li> <li>• Soaps, detergents and hard water</li> </ul>

		<p>Polymers &amp; plastics:</p> <ul style="list-style-type: none"> <li>• Addition polymerization eg.PVC</li> <li>• Condensation polymerization e.g. polyesters</li> </ul>
		<p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• Students use molecular models to show chemical structures and isomerism in alkanes.</li> <li>• Molecular models used to show functional groups</li> <li>• Students given the structures of various compounds to name using IUPAC nomenclature.</li> <li>• Students given the structures of various alcohols and carboxylic acids and asked to draw and name the esters formed by combination of any chosen acid and alcohol.</li> </ul>
		<p><b>Practical exercise 5: Formation of Soap</b>  <b>DUE DATE:</b></p>
14	<b>UNIT 9 - CHEMISTRY IN THE ENVIRONMENT</b>	
	14	<p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Integrated concepts of environment, definition of pollution</li> <li>• Pollutants and sources</li> <li>• Biodegradable materials, non-biodegradable materials, recycling of materials.</li> <li>• Water and living systems, leaching.</li> <li>• Water contamination and treatment.</li> </ul>
		<p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• Group exercise: Identifying some common sources of pollution in local environments.</li> <li>• Discussion: Non-Biodegradable materials as an environmental problem</li> </ul>
15	15	<b>Final Project Presentation</b>
16	16	<b>FINAL EXAM</b>

For this course, the following grading scheme will be used:

<b>Grading system used for CHEM 111- Chemistry 1</b>			
<b>Mark Range</b>	<b>Definitions</b>	<b>Grade</b>	<b>GPA</b>
90 - 100	Excellent	A	4.0
85 - 89	Very good	B+	3.5
80 - 84	Good	B	3.0
75 - 79	Satisfactory	C+	2.5
70 - 74	Average	C	2.0
65 - 69	Below average	D+	1.5
60 - 64	Minimum passing grade	D	1.0
0 - 59	Fail	F	0.0

The mark allocation for this course will be broken down as follows:

<b>Mark Allocation system used for CHEM 111- Chemistry 1</b>	
2 In-course exams at 15% each	30 %
These two examinations will consist of multiple choice and/ or structured short- answer questions. You will be informed by your lecturer about the topics to be covered in each test before the exam	
Project	10 %
The project mark will be a composite of the following:	
<ul style="list-style-type: none"> <li>• Written Report based on the depth of investigation, organizational skills and the effectiveness and accuracy of expression. <i>Please note that projects typewritten using x12 font; double spaced; and printed on standard A4 or 8.5x 11 paper. The pages should be numbered and included in the table of contents. Marks will be deducted for inappropriate bibliography. Reports that have been heavily plagiarized will not be marked.</i></li> <li>• Oral Presentation based on <ul style="list-style-type: none"> <li>• Organisation: (Establishment of importance of topic; Development of theme ; Relevance of research to the topic; Adherence to time limit)</li> <li>• Presentation: (Sensitivity to audience; Personal composure and style; Verbal and non-verbal expression; Use of humor)</li> </ul> </li> <li>• Effectiveness: (Use of visuals; Use of handouts; Discussion skills)</li> </ul>	
Laboratory performance and Reporting	20 %
An 80% attendance of Labs is expected for all Science courses. Labs will be assessed based on Manipulation skills, Analytical Skills, Observation skills, Reporting and Calculations. Students are expected to adhere to safety precautions outlined in the Laboratory manual, with special attention to appropriate lab wear (Lab coats and covered shoes.) Students are further expected to be cognizant of the mark penalty for late submission of lab reports and exercises, where two (2) marks per day will be deducted for late assignments. Students are required to submit an explanatory letter and a medical certificate should illness prevent timely completion of an assignment.	
Final Examination	40 %
A 3 hour examination of the entirety of the course in the following sections: Section A - Multiple Choice - 30 questions Section B - Structured type - 5 questions Section C - Essay type - 1 question.	

*Please note: Any late assignments that are not delivered directly to the lecturer must be deposited with the Programme Assistant and signed for in the register. Assignments that are not submitted in the format designated by the lecturer will not be graded.*

#### **STATEMENT ON ACADEMIC DISHONESTY**

“Academic dishonesty is unacceptable and will not be tolerated. Cheating, forgery, plagiarism and collusion in dishonest acts undermine the College’s educational mission and the student’s personal and intellectual growth. COSTATT students are expected to bear individual responsibility for their work and to uphold the ideal of academic Integrity. Any Student who attempts to compromise the academic process will be sanctioned.”

- COSTAATT Academic, Integrity and Honesty Policies and Procedures Handbook.



## A QUICK NOTE ON CITATION

**Plagiarism** is the representation of someone else's ideas or words as one's own. It is a serious academic offence that includes:

- Presenting another person's paper or ideas as original, submitting borrowed, purchased, ghost-written papers and documents downloaded from internet sites.
- Extensive paraphrasing
- Flagrant failure to properly cite sources. This includes uncited ideas, quotations and/or words.

Students are expected to implement the methods taught in COMM117, COMM118 and LIBS130 and should be cognizant of the fact that credit will not be given for work found to be plagiarized. Repeated incidents of plagiarism will result in a failing grade and/or academic sanction.

COSTAATT requires students to adhere to the APA (American Psychology Association) citation standards that require in text citation and a reference list. Details of these requirements are as follows:

- In text citation (Quotes/Paraphrasing)
  - Direct quotation
    - Use quotation marks and include page numbers (when quoting books, journals and periodicals) or paragraph number (para. when quoting online sources).
    - A quotation of 40 or more words should be formatted as a freestanding, indented block of text without quotation marks.
  - Indirect quotation/paraphrasing
  - Citations from a secondary source
- References list

### THE TEACHING TEAM FOR THIS COURSE:

In addition to the lecturer, several people are responsible for the smooth and efficient running of this course. From time to time, a student will interact with one of the following people:

- **The Programme Assistant: Miss Nichelle Rudolfo**

- At the end of an assignment, the full bibliographic information for each source cited in text should be provided. *Do not use footnotes*
- References must be listed in alphabetical order by author and should use the hanging indent format.
- Books / Reports / DVDs
  - Each reference should include four elements:
    - Author/Editor/Producer
    - Date
    - Title
    - Publication Information
- Periodicals -Serials or periodicals are resources published on a regular basis, such as journals, magazines and newspapers. The elements to be included are:
  - Author(s)
  - Date
  - Title of article
  - Title of Periodical
  - Volume, Issue and Page numbers
- Web pages (unpublished and informally published work) Reference to web page should include the following elements :
  - Author
  - Date
  - Title
  - Retrieval statement (URL)

Students may leave messages for their lecturer with the Programme Assistant, including late lab submissions. The Programme Assistant also sets up appointments should a student wish to see the Department Chair.

- **Lab Lecturer**

In some courses, team teaching is performed where one lecturer is in charge of the theory component of the course and another, highly qualified lecturer teaches the laboratory component. This lecturer is additionally responsible for collecting and grading lab reports.

- **Lab Technicians: Miss Leann Dogan and Mr Rupesh Mahabir**

The Lab Technicians are highly capable individuals who are responsible for setting up labs, assisting with handling samples and equipment during labs and responsible for lab safety procedures and protocols. In case of an emergency, the Lab Technician and Lab Lecturer are responsible for your safety in the lab.

### **ESSENTIAL SUPPLIES**

- Text books – students should walk with their text books to class and to labs.
- Lab manual – to be provided at the start of the lab component of each course.
- Appropriate Lab wear – slippers, flip-flops and open toed footwear are strictly prohibited in the Labs. Students are also expected to wear protective clothing in labs, for example a lab coat. For the safety of all concerned, the Lab Technician has the responsibility to deny a student access to the lab if they are improperly attired.
- Appropriate Field equipment – Students should keep a separate, hardbound notebook for making field notes in potentially uncomfortable circumstances e.g. pouring rain. Depending on the nature of the field trip, students are expected to dress for safety and comfort by wearing sneakers or hiking boots and walking with a change of clothing.

### **TEXTBOOKS:**

Recommended Text:

**Basic Chemistry – 3<sup>rd</sup> Edition** by Karen C Timberlake and Williams Timberlake-Publisher, Pearson.  
ISBN-321663101

### **AUDIO-VISUAL RESOURCES:**

Multimedia Projector, Laptop with Microsoft Office Word, PowerPoint, Excel, Multimedia Player DVD drive, USB ports and Speakers, Biological Models, Specimens and Charts.

### **COURSE COORDINATOR:**

Ms. Delamae Wilson

Chair: Natural & Life Sciences Department

COSTAATT

Email: [DWilson@costaatt.edu.tt](mailto:DWilson@costaatt.edu.tt)