

**Department of Applied Sciences**  
**Course Description of Science OND Program**  
**(Chemistry Specialization)**



**SEMESTER 1**  
**(YEAR 1)**

**ENLS110**  
**English I**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : This writing course is for students of Science at a level. It aims at developing the student's ability to understand and write in clear and correct language the various types of concepts common to all scientific work.

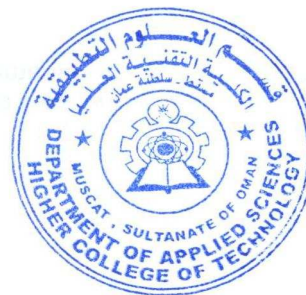
On completion of this unit, students will be able:

To obtain information from diagrams and tables; skim and scan a text for general information; transfer information from text to diagrams and tables; read the text to identify further details of context; guess the meaning of new words from the context; get the gist of a text and distinguish and identify main points from supporting details.

To display a clear style of handwriting; use conventions of style and grammar; use specialized/appropriate vocabulary accurately; write a set of clear instructions; write a description of a diagram or a table; write a simple paragraph; write an experiment; write a simple report; write a lab report and use diagrams in description.

To give information on diagrams and tables; describe an event or process; explain a procedure; give a set of instructions; explain a simple experiment; compare tables; describe how something works using diagrams and give technical specifications

To follow straight forward instructions; to identify stages of a process or event and listen for specific information





**MATS110**  
**Mathematics I**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : The course should enable the student to:

- Understand the basic Technical Mathematics like, Quadratic Equations.
- Understand and apply awareness in the field of Science like Growth and Decay
- Understand and apply oriented topics like, Differentiation and Integration in the field of Laboratory Science

**COMP 110**  
**Information Technology I**

Credit Hours: 1  
Theoretical Hours: 0  
Practical Hours: 2  
Contact Hours/Week: 2

Course Description : This course enables students to utilize the appropriate technology to effectively perform variety of tasks. It focuses on the internet, email system and the techniques of designing presentations using Microsoft PowerPoint. The students should be able to:

- Discuss the basic concepts and fundamentals of Information Technology.
- Explore to the functions of various hardware and software components of a computer.
- Distinguish system from application software/s.
- Define common networking terms from LAN and WAN technologies
- Explain the theory behind network technologies, protocols and standards.
- Discuss the software license agreement, privacy and security issues.
- Discuss internet principles and World Wide Web concepts.
- Discuss how to create and work with electronic mail.
- Demonstrate the common commands and functions of PowerPoint in a variety of applications and appreciate the benefits of technology.

**SCIG110**  
**Biology I/A**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : The aim of the unit is to provide students with basic knowledge on:

- The characteristics of living organisms
- Basic structure and function of plant cells and animal cells,
- Comparison between plant and animal cells in terms of structure and function,
- How substances get in & out of cells,
- Growth
- Structure and function of plant and animal tissues,
- Basic methods of transportation of substances across cell membranes,
- Nutrition
- Digestion in man

**SCIG 120**  
**Chemistry I/A**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : In this unit the student should be able to:

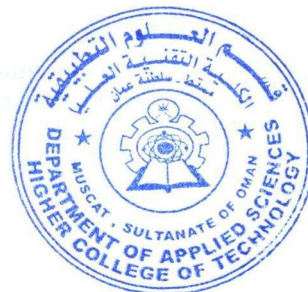
- Explain the nature of elements, compounds and mixtures and their separation,
- Use particle theory to explain changes in the states of matter,
- Describe the composition of air and some reactions of oxygen, water and hydrogen,
- Explain solubility and use the solubility curve to determine solubility of salts at different temperatures,
- Use symbols, formulae and apply mole concept to express concentrations and for chemical calculations,
- Describe and use dot/cross diagrams to sketch atomic structure,
- Describe different types of bonds and understand how to relate properties of substances to their structures.

**SCIG 130**  
**Physics I/A**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : In this unit students will:

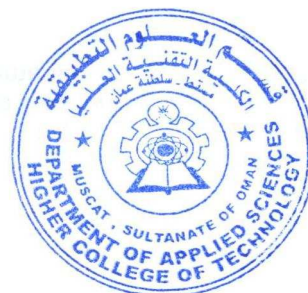
- Study distance, time, velocity and acceleration
- Study force and energy
- Study Newton's laws of motion, power
- Describe wave motion, reflection and refraction of waves
- Investigate lens equation and image formation



- Explain electric charge and its properties
- Investigate basic properties of magnetism and electromagnetism
- Investigate effects of electric current
- Explain current, potential difference and resistance

**SCIG 141**  
**Laboratory Techniques I**

Credit Hours: 2  
Theoretical Hours: 0  
Practical Hours: 6  
Contact Hours/Week: 6



Course Description :

**A. Biology**

In this unit the students will:

- Describe the use of the optical compound microscope,
- Explain the importance of the care of the slides,
- Describe simple techniques of preparing slides,
- Extend knowledge and application of microscopical techniques,
- Practice staining technique.

**B. Chemistry**

- Prepare a suspension and separate the solid by filtration processes,
- Apply centrifuge technique to separate suspensions,
- Apply crystallization and recrystallisation techniques to purify organic compounds,
- Study and apply different methods to determine the melting point of organic compounds,
- Study the basic techniques and principles of volumetric analysis and apply to acid-base titrations,
- Study and apply paper chromatography to separate colored pigments.

**C. Physics**

- Use equipment for measuring length, mass, time and temperature.
- Calculate area and volume,
- Define and perform measurements associated with density,
- Electricity, current and the use of meters to measure current and voltage.

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**SEMESTER 2**  
**(YEAR 1)**

**ENLS210**  
**English II**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : This writing course is for students of science at certificate level. It aims at developing the students' ability to understand and write in clear and correct language the various types of concepts common to scientific work.

On completion of this unit, students will be able:

To read for detailed information; get the gist of a text; distinguish and identify main points from supporting details; obtain information from diagrams and tables; skim and scan a text for general information; transfer information from text to diagrams and tables and deduce meaning of new words from context.

To write a description of a diagram or a table; write about cause and effect; write a description of a process; write a simple paragraph using specialized vocabulary accurately; write about similarities and differences; take notes and write a summary.

To give information on diagrams and tables; describe an event or a process; describe diagrams; give reasons and justifications; hold a discussion on different scientific topics; compare and contrast things; explain a procedure; give technical specifications and give an oral summary.

To listen to order information; to identify stages of a process or event; listen for specific information and listen to take notes.



**MATS210**  
**Mathematics II**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : The course should enable the student to:

- Develop the skills and knowledge to classify, record, display data
- Summarize scientific data using measures of central tendency, measures of dispersion & skewness.
- Understand the basic statistical concepts of probability
- Understand the basics of continuous probability distributions and the basics applications of the normal distribution in science.
- Have understanding of the statistical techniques, of correlation and regression analysis.

**COMS210**  
**Information Technology II**

Credit Hours: 1  
Theoretical Hours: 0  
Practical Hours: 2  
Contact Hours/Week: 2



Course Description : This course enables the students to:

- Demonstrate understanding on the importance of database in the different aspects of society;
- Explore any database tool to design and develop databases; and
- Design and develop database systems using the tool.

The students should be able to:

Discuss the basic concepts of database; Design tables using fields with correct data types; Navigate the different database operations; Create relationships between tables;. Create queries of different conditional statements using tables; Design simple forms in different ways; and Generate properly designed reports.

**SCIG 210**  
**Biology I/B**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : In this unit, the students are acquainted with:

- Photosynthesis in green plants,
- Respiration.
- Transport system in plants and animals,
- The structure and function of the circulatory systems in mammals, lymphatic system
- Excretion in mammals and the role of the kidney in the process,
- Osmo-regulation in plants and animals,
- Role of the nervous system in communication and coordination,
- The nature and role of hormones,
- Growth and cell division,
- The principles of asexual reproduction,
- Types, advantages and disadvantages of asexual reproduction,
- The principles of sexual reproduction.
- Structure of flower and fertilization

**SCIG 220**  
**Chemistry I/B**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3



Course Description : In this unit the student will:

- Study the properties and reactions of acids, bases and salts,
- Explain oxidation and reduction in terms of electron transfer,
- Study electrolysis and its simple effects and understand its role in an oxidation/reduction process,
- Describe the trends in the redox properties of metals and their compounds,
- Explain the factors that affect the rates of chemical reactions,
- Study the structure and reactions of some carbon compounds.

**SCIG 230**  
**Physics I/B**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : In this unit a student should be able to:

- Describe coplanar forces and solve problems involving forces,
- Study the principles of fluid pressure,
- Study about series and parallel circuits and describe the factors which affect resistance,
- Describe power in electrical circuits,
- Understand the concept of heat and temperature,
- Study about specific latent heat and specific heat capacity,
- Describe the properties of materials.

**SCIG 241**  
**Laboratory Techniques II**

Credit Hours: 2  
Theoretical Hours: 0  
Practical Hours: 6  
Contact Hours/Week: 6



Course Description :

**A. Biology**

In this unit the students will employ qualitative and quantitative methods to analyze food contents,

Describe and explain the principles involved in the isolation and culturing of microorganisms.

**B. Chemistry**

Study the general principles of potentiometry and apply these to potentiometric titrations of acids and bases,

Apply redox titrations to different chemical analysis,

Study the basic principles and uses of some distillation techniques,

Study the principles of chromatographic techniques and apply these for qualitative separations.

**C. Physics**

A student should be able to:

- Understand resistance codes and measure resistance using multi-meters,
- Use potentiometer and bridge circuits,
- Use the cathode ray oscilloscope,
- Describe the principles of high and low pressure techniques,
- Understand the properties and construction of capacitors,
- Understand radioactivity,
- Use low and high resistance meters.



Department of Applied Sciences  
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SEMESTER 3  
(YEAR 2)

**ENLS310**  
**English III**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : On completion of this unit, students will be able:

To read for detailed information; get the gist of a text; distinguish and identify main points from supporting details; obtain information from diagrams and tables; skim and scan a text for general information; transfer information from text to diagrams and tables; deduce meaning of new words from context.

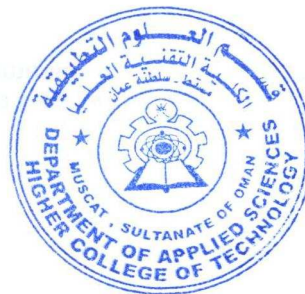
To write a description of a diagram or a table; write about cause and effect; write a description of a process; write a simple paragraph using specialized vocabulary accurately; write about similarities and differences; take notes and write a summary.

To give information on diagrams and tables; describe an event or a process; describe diagrams; give reasons and justifications; hold a discussion on different scientific topics; compare and contrast things; explain a procedure; give technical specifications and give an oral summary.

To Listen to order information; to identify stages of a process or event; listen for specific information and listen to take notes.

**SCIC 310**  
**Chemistry II**

Credit Hours: 4  
Theoretical Hours: 3  
Practical Hours: 2  
Contact Hours/Week: 5



Course Description : In this unit, the students should be able:

- Study the concept of standard enthalpy change, enthalpy diagram and their determination;
- Study the structure and bonding of different molecules;
- Study chemical equilibria and their application to industrial processes;

- Describe some basic electrochemical concepts, e.g. pH, pOH, buffer solutions, acid dissociation constants ( $K_a$ );
- Study the periodic table, different types of elements in the periodic tables (s-, p- and d-block elements) and their properties;
- Study carbon compounds like hydrocarbons, alcohols, carbonyl compounds, carboxylic acids and their reactions.

**SCIC 320**  
**Material Technology**

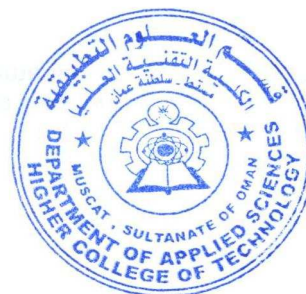
Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : In this unit, the students will be able to:

- Explain the classification of solid materials;
- Compare the physical and mechanical properties of materials;
- Study the basic concepts relating to crystalline structure;
- Analyze the binary thermal equilibrium diagrams related to alloy structures;
- Describe the iron-carbon system;
- Heat treatment processes of plain carbon steels;
- Study the effects of some common alloying elements on plain carbon steels;
- Explain the structure and properties of common cast irons;
- Analyze the common types of non-ferrous alloys;
- Describe the common types of polymeric materials and relate them to their use;
- Describe the common testing methods to establish the mechanical properties;
- Study the preparation of specimens and examination of microstructure of metals;
- Study the principles and practice of non-destructive testing.

**SCIB 330**  
**Instrumentation**

Credit Hours: 3  
Theoretical Hours: 2  
Practical Hours: 2  
Contact Hours/Week: 4



Course Description : A student should be able to:

- Describe potential hazards associated with electrical equipment,
- Appreciate the effects of environmental factors on particular equipment and take measures to maintain it in good condition,
- Test individual electronic components to see if they are working,
- Perform soldering techniques safely and competently,
- Understand the different types of measuring systems,
- Understand the function transducers,

- Ensure that students can undertake routine maintenance strategies,
- Undertake fault diagnosis,
- Ensure the maintenance of different laboratory equipment,
- Describe different types of electrochemical cells and compile a maintenance programme for all electrodes,
- Use different measurement systems.
- The function of transducers;
- Number of measurement systems;
- Routine maintenance.

### **SCIB 341** **Analytical Techniques**

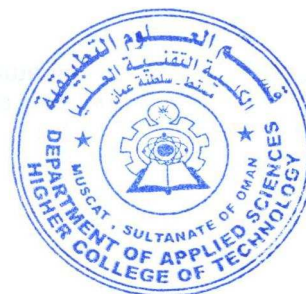
Credit Hours: 3  
Theoretical Hours: 1  
Practical Hours: 4  
Contact Hours/Week: 5

Course Description : In this unit, students will study the principles and use of:

- Ion-exchange resins;
- Electrophoresis;
- Column chromatography;
- Gas/liquid chromatography;
- Visible/UV and IR absorption spectrophotometry;
- Flame photometry;
- Colorimetry;
- Polarimetry;
- Atomic absorption spectrophotometry.

### **SCIC 351** **Chemistry Techniques III**

Credit Hours: 2  
Theoretical Hours: 1  
Practical Hours: 2  
Contact Hours/Week: 3



Course Description : In this unit, students will acquire practical skills in:

- Basic principles of precipitation titrations and apply to different chemical analysis;
- Basic principles of conductometric titrations and apply to different chemical analysis;
- Complexometric titrations and apply to chemical analysis;
- Basic principles of solvent extraction and apply the technique in chemical analysis;
- Steam distillation technique to isolate products from reaction mixture.

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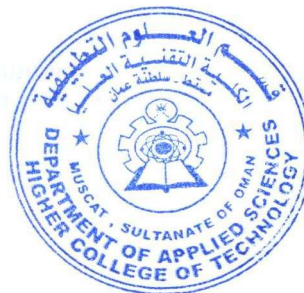
**SEMESTER 4**  
**(YEAR 2)**

**ENLS 410**  
**English IV**

Credit Hours: 3  
Theoretical Hours: 3  
Practical Hours: 0  
Contact Hours/Week: 3

Course Description : By the end of Semester four the students will be able to:

- read for a specific purpose/information – Scan
- read for detailed information
- read for general information – skim
- guess meaning from context
- make inferences
- give justifications
- sequence information
- guess words in context
- distinguish facts from opinion
- make predictions
- comprehend physical, chemical and functional description



**SCIG 410**  
**Safety, Laboratory Organization and Management**

Credit Hours: 2  
Theoretical Hours: 1  
Practical Hours: 0  
Contact Hours/Week: 2

Course Description : In this unit the students will:

- Study the general safety rules associated with science laboratories,
- Explain the basic precautions to prevent fire and action to be taken in the event of fire,
- Study the hazards associated with electrical equipment and radiation materials,
- Study the hazards during handling chemicals and glassware,
- Study the hazards associated with handling biological materials,
- Analyze the role of the technician in laboratory lay-out and design,
- Compare the systems of purchasing and financial control,
- Explain the organization and management of the laboratory stores,
- Describe the basic principles of laboratory administration,
- Study the principles of maintenance of laboratories and equipment.

**SCIC 420**  
**Chemistry III**

Credit Hours: 4  
Theoretical Hours: 3  
Practical Hours: 2  
Contact Hours/Week: 5

Course Description : In this unit, students should be able to:

- Apply the knowledge of equilibrium to extend the acid-base system understanding;
- Perform calculation related to  $[H^+ (aq)]$ , pH,  $K_a$  or  $pK_a$ ;
- Explain the mode of action of a buffer solution;
- Understanding the factors that governs the rate of a reaction and the relationship between energy distribution and the reaction system;
- Classify and recognize the nature of colligative properties and their use on the determination of molar mass;
- Understand the general properties associated with the s-block, p-block and d-block elements of the periodic table;
- Describe and apply further reactions of the benzenoid rings, nitro-compounds, amines, carboxylic acids and their derivatives;
- Understand some aspects of stereoisomers (optical and geometrical);
- Understand some aspects of organic reaction mechanisms;
- Use the knowledge of this unit to further study in chemistry and technological areas.

**SCIC 430**  
**Industrial Chemistry**

Credit Hours: 4  
Theoretical Hours: 3  
Practical Hours: 2  
Contact Hours/Week: 5

Course Description : In this unit, students will be able to:

- Explore industries in Oman of chemical industries;
- Analyze the water and water pollution;
- Analyze the air pollution;
- Describe the natural gas, crude oil and petrochemical industries;
- Describe the fat and oil industries;
- Study the soap and detergent industries;
- Describe the paints, varnishes and lacquers industries;
- Study the fertilizer industries;
- Study the photographic industries;
- Describe the food industries: beverage, baking, chocolate and dairy industries;
- Explain the copper and gold industries;
- Explain the cement industries;
- Analyze the corrosion of metals and its prevention;
- Study the polymer industries.



**SCIC 441**  
**Chemistry Technique IV**

Credit Hours: 2  
Theoretical Hours: 1  
Practical Hours: 2  
Contact Hours/Week: 3



Course Description : Students should be able to:

- Work safely in the laboratory;
- Assemble and confidently use the scientific apparatus;
- Understand and apply the general principles of gravimetric analysis;
- Describe and perform simple qualitative analysis for inorganic and organic substances;
- Draw honest and meaningful conclusions from results;
- Understand the limitations inherent in measurements and possible sources of errors.

**SCIC 451**  
**Project**

Credit Hours: 3  
Theoretical Hours: 0  
Practical Hours: 6  
Contact Hours/Week: 6

Course Description : In this unit, the students should be able to:

- Conceive a practical-based project topic for investigation and take full responsibility from initiation to completion;
- Plan and organize the project;
- Define the aims and objectives of the project;
- Search through materials related to the project;
- Formulate a scheme of investigation;
- Observe safe practice during investigation;
- Create an environment which will enable them to build upon practical skills acquired in other units;
- Develop interrelationship between the more formal disciplines in other units in the course;
- Design, modify or improve experiments relevant to the investigation;
- Interpret and relate the observations to the objectives of the project;
- Discuss the validity and significance of results and observations;
- Broaden experience and develop sense of responsibility and self-assurance;
- Apply mathematical concepts;
- Use application of IT in presenting project; develop the command of language and present a project effectively;
- Evaluate their project work;
- Communicate effectively with other people orally;
- Defend their project.