

Department of Applied Sciences
Course Description of Science OND Program
(Laboratory Schools)



SEMESTER 1
(YEAR 1)

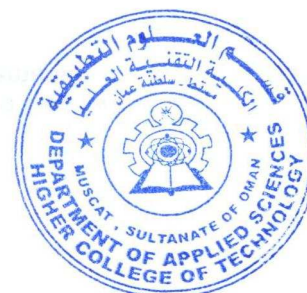
ENLS110
English I

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.

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

COMS110
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: 2
Practical Hours: 2
Contact Hours/Week: 4



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: 2
Practical Hours: 2
Contact Hours/Week: 4

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: 2
Practical Hours: 2
Contact Hours/Week: 4

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

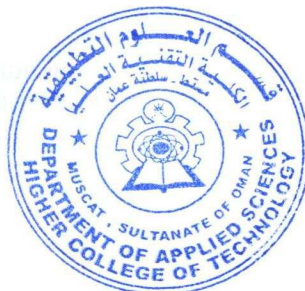
Course Description :

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)

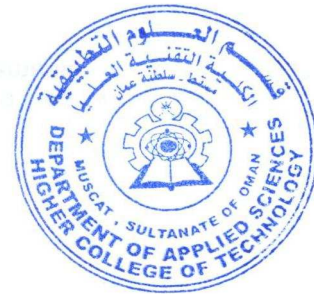
ENLS210
English II

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.

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:

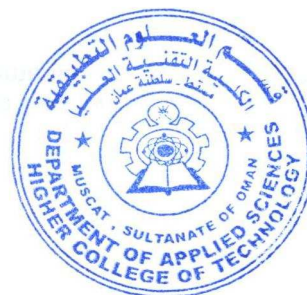
- Demonstrate understanding on the importance of database in the different aspects of society;
- Explore any database tool to design and develop databases; and
- Design and develop database systems using the tool.

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.

SCIG210 **Biology I/B**

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



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: 2

Practical Hours: 2
Contact Hours/Week: 4

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: 2
Practical Hours: 2
Contact Hours/Week: 4



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.



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SEMESTER 3
(YEAR 2)

SCIS 310
Biology

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

Course Description : In this unit the students are expected to study:

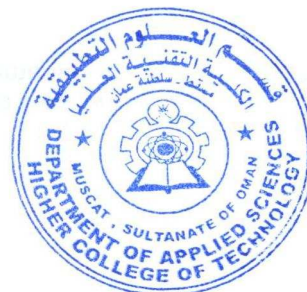
- The nucleus in division and interphase
- DNA structure
- Life cycle and cell division
- Mendelian genetics and its significance,
- Test cross, incomplete dominance, multiple alleles,
- Chromosomal inheritance,
- Sex linked conditions in humans,
- Variations in populations
- Evolution,
- Growth, development and reproduction in flowering plants and animals
- The principles of taxonomy and classification

SCIS 320
Chemistry

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

Course Description : In this unit the students will:

- Study the enthalpy changes occurring during chemical reactions,
- Explain the forces acting between molecules,
- Study the basic crystal structure,
- Analyze the relationship between the electronic configuration of atom and its position in the periodic table,
- Compare the trends in the properties in terms of their electronic configuration,
- Study the general properties of the s-block elements and their compounds,
- Study the structure and reactions of benzene,
- Describe the nature of colligative properties and their use in the determination.



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.

SCIS 340
Physics

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

Course Description : A student should be able to:

- Understand the behavior of gases and ideal gas laws,
- Know the concept of molar mass, molar volume and relative molecular mass,
- Understand types of energy and the principle of energy conservation,
- Describe waves, polarization and diffraction,
- Describe types of spectra,
- Describe the properties of materials,
- Study the laws of radioactive decay,
- Understand the term “activity”, “half-life” of a radioactive source.



SCIS 351
Laboratory Techniques III

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



Course Description :

A. Biology

In this practical unit the students should be able to :

- Take care of animals in the laboratory
- Handling and sexing lab animals
- Cleaning, feeding and breeding lab animals
- Ethical, legal requirements and safety for laboratory animals
- Human killing of animals
- Aquarium management
- Construction of aquarium
- Handling of drosophila
- Care and propagation and collection of materials
- Preservation of plants and animal specimens.

B. Chemistry

Study the basic principles of precipitation titrations,
Apply precipitation titrations to different chemical analysis; e.g. Analysis of bleach,
Determination of RMM of some compounds, etc.,
Study the basic principles of gravimetric analysis,
Apply gravimetric technique to different chemical analysis; e.g. Determination of water crystallization, analysis of commercial table salt, analysis of limestone, estimation of Iron(II) in an iron salt, etc.

C. Physics

Set up a loaded beam and verify the principle of moments,
Verify Newton's laws of motion using a linear air track,
Set up a pulley system and determine efficiency,
Study Boyle's law and use pressure instruments,
Verify Hooke's law,
Use a ripple tank to demonstrate reflection, refraction, diffraction and interference,
Use a cathode ray oscilloscope to demonstrate sound waves, study the rate of cooling of a heated body,
Use electrostatic generators, Van-de-Graff generator,
Set up an electrical circuit to measure resistance.

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SEMESTER 4
(YEAR 2)

SCIG 410
Safety, Laboratory Organization and Management

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

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.

SCIS 420
Biology 4

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

Course Description : In this unit the student will study:

- Organisms and their environment,
- Ecology ,biosphere and major world biomes
- Adaptation of organisms to environment,
- Physical and biotic factors which operate in the environment
- Nutritional interrelationship between different organisms in the ecosystem,
- Heterotrophic relationship between different organisms,
- Significance of the cycling of matter and energy in the ecosystem,
- Types of nutritional associations between organisms,
- Human and the environment
- Factors that control number of organisms in the communities,
- Concept of homeostasis.



- Skin and temperature control
- Human kidney
- The mammalian eye
- The mammalian ear
- Support and movement in organisms
- Flowering plants
- Plant tissue
- Soil
- Response in plants
- Photoperiodism and its significance to flowering plants

SCIS 430
Chemistry

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

Course Description : In this unit a student will:

- Study the basic principles of equilibria and its applications,
- Use the concept of equilibria to acids and bases,
- Study acids and bases and their conjugate pairs,
- Describe buffer solutions and their mechanism of action,
- Study carboxylic acids, strength of the acids and their reactions,
- Study carboxylic acid derivatives and their reactions,
- Study amines and their reactions,
- Study the chemistry of p-block elements (Group IV and Group VII elements).

SCIS 440
Physics

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

Course Description : A student should be able to:

- Describe basic angular quantities and describe circular motion,
- Apply the principle of conservation of linear momentum,
- Understand and apply the laws of electromagnetic induction,
- Explain how a magnetic field is detected and measured,
- Describe simple harmonic motion,
- Explain the effects of damping and resonance,
- Understand the effects of uniform electric fields and thermoionic effects,
- Use the cathode ray oscilloscope.



SCIS 451
Laboratory Techniques IV

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



Course Description :

A. Biology

In this practical unit, the students will learn:

- Techniques of dissection,
- Classification techniques of some flowers,
- Perform various micro techniques,
- Preparation of some experimental set-ups,
- Preparation of cultures.

B. Chemistry

Be able to work safely in a chemical laboratory,
Be conversant with qualitative inorganic and organic analysis,
Be able to draw honest and meaningful conclusions from results,
Be able to report results lucidly and draw precise conclusions,
Be familiar and confident in the assembly of apparatus used in the generation of commonly used gases.

C. Physics

Use Attwood machine and determine the acceleration due to gravity,
Explain Archimedes' principle and determine relative density of solids and liquids,
Use a linear air track to verify conservation of energy and momentum,
Use the free fall apparatus to determine the acceleration due to gravity,
Determine the size of a molecule using an oil film,
Record temperature, pressure and humidity,
Use an optical bench to determine the focal length of a converging lens,
Use a resonance tube to determine the speed of sound,
Determine specific heat capacity of a liquid using a Joule's calorimeter,
Use a G-M tube and meters to detect radioactivity.

SCIS 461
Project

Credit Hours: 1
Theoretical Hours: 0
Practical Hours: 3
Contact Hours/Week: 3

Course Description : In this unit students will acquire manipulative skills in different

areas which they will need to work as Laboratory Technicians in schools. And these are:

- Glasswork,
- Woodwork,
- Electronic/Electrical Work,
- Plastic Work,
- Model Making,
- AVA & Charts,
- Photography.

