MCAST

MCAST PROGRAMMES - PUBLIC INFORMATION TEMPLATE (FULL TIME)

Institute	Institute of Applied Sciences
Department	-

Programme Title	Advanced Diploma in Applied Science				
Course Code *To be filled in by Admissions Dept.*	AS4-A02-23		**If the programme includes a WBL element, How is it accredited?**	Apprenticeship	
MQF/ EQF Level	Level 4	**Type** *(refer to Appendix 1 for Parameters)*	Qualification	**Awarding Body**	MCAST – Malta College of Arts, Science and Technology
Accreditation Status	Accredited via MCAST's Self Accreditation Process (MCAST holds Self-Accrediting Status as per 1st schedule of Legal Notice 296/2012)				
Mode of Delivery	Face to Face	**Duration** *(Academic Years or Semesters)*	2 Years	**Mode of Attendance**	Full-Time
Total Number of Credits	120 credits	**Total Learning Hours** *(25 Total Learning Hours for each ECTS)*	3000 hours		
Target Audience	Ages 16 - 65	**Target Group** *(the type of learners that the educational institution anticipates joining this programme)*	Students exiting compulsory education		
Programme Fees	There are no fees applicable to Maltese and other EU Nationals (as will be evidenced by their Identity Document) Fees apply for other International Applicants… for fee information and any related updates it is best to communicate with MG2i International through applyinternational@mcast.edu.mt One may consider checking about possible eligibility or otherwise for any exemption from fees by contacting the relevant section within MEYR (Floriana) – or visit the servizz.gov.mt website here				
Date of Next Student Intake	For further information regarding upcoming student intake and applications time windows for same kindly click here				
Language of Instruction	The official language of instruction at MCAST is English. All notes and textbooks are in English (except for language courses, which will be in the respective language being instructed). International candidates will be requested to meet English language certification requirements for access to the course.				
Application Method	Applications to full-time courses are received online via the College Management Information System. Applicants can log-in using Maltese Electronic ID (eID) in order to access the MCAST Admissions Portal directly and create one's own student account with the identity being verified electronically via this secure service. Non-EID applicants need to request account creation though an online form after that they confirm that their local Identification Document does not come with an EID entitlement. . Once the identity is verified and the account is created on behalf of the				

	applicant, one may proceed with the online application according to the same instructions applicable to all other applicants. For more information about how to apply online for a course at MCAST, please visit: https://mcast.edu.mt/how-to-apply-online-2/
Information for Non-EU Citizens	Non-EU candidates require a study visa in order to travel to Malta and join the course applied for (on a Full Time delivery mode). For further information re study-visa please access https://www.identitymalta.com/unit/central-visa-unit/. Further information International / TCN applicants should take note of before requesting to being considered for a programme of studies at MCAST, can be obtained through the respective FAQ found on https://mcast.edu.mt/important-information/
IMPORTANT note to Non-EU Nationals / TCNs	In instances where a TCN is applying for an MCAST programme of studies which includes Apprenticeship / Placement / Internship, it is the applicant's responsibility to check with the relevant Maltese Authority whether one would be eligible to have the necessary permits to be able to carry out the accredited Apprenticeship / Placement / Internship, success from which is expected in order to be able to successfully complete the selected programme of studies. Further information can also be obtained through the respective FAQ found on: https://mcast.edu.mt/important-information/
Address where the Programme will be Delivered	*MCAST has four campuses as follows:* **MCAST Main Campus** Triq Kordin, Paola, Malta *All courses except for courses delivered by the Institute for the Creative Arts, the Centre of Agriculture, Aquatics and Animal Sciences and the Gozo Campus are offered at the Main Campus address (above).* *Courses delivered by the Institute for the Creative Arts, the Centre of Agriculture, Aquatics and Animal Sciences, or the Gozo Campus, are offered in one of the following addresses as applicable:* **Institute for the Creative Arts** Mosta Campus Misraħ Għonoq Tarġa Gap, Mosta **Institute of Applied Sciences** Centre of Agriculture, Aquatics and Animal Sciences, Luqa Road, Qormi **Gozo Campus** J.F. De Chambray Street MCAST, Għajnsielem Gozo *In the case of courses delivered via Online Learning, students will be following the programme from their preferred location/address.* *Programmes delivered via Blended Learning, and which therefore contain both an online and a face to face component shall be delivered as follows:*

	○ Face to Face components – as per above address instructions ○ Online components – from the student's preferred address.
Course Description *(Refer to Programme Specification)*	This programme of study is aimed at learners who wish to embark on a scientific career in a range of industries such as petrochemical, life sciences, health, pharmaceutics and the environment. The programme of study contains a wide range of science and technology study units that reflect aspects of employment within relevant industries. The learners will appreciate how the fundamental principles of science relate to the technological operations of the workplace. They will develop the necessary skills to work in a laboratory environment within the manufacturing industry, and to apply basic principles within the workplace.
Deskrizzjoni tal-Kors *(Refer to Programme Specification)*	Dan il-programm ta' studju huwa mmirat lejn studenti li jixtiequ jibdew karriera xjentifika f'firxa ta' industriji bħal dawk relatati mal-petrokimika, ix-xjenzi tal-ħajja, is-saħħa, il-farmaċewtika u l-ambjent. Il-programm ta' studju jinkludi firxa wiesgħa ta' unitajiet ta' studju fix-xjenza u t-teknoloġija li jirriflettu aspetti tal-impjiegi f'industriji rilevanti. L-istudenti jirrikonoxxu kif il-prinċipji fundamentali tax-xjenza jirrelataw mal-operat teknoloġiku tal-post tax-xogħol. Huma jiżviluppaw il-ħiliet neċessarji biex jaħdmu f'ambjent ta' laboratorju fl-industrija tal-manifattura, u biex japplikaw il-prinċipji bażiċi fil-post tax-xogħol.
Career Opportunities:	Laboratory Analyst, Laboratory Technologist, Laboratory Technician, Quality Control/Quality Assurance Technician, Research Assistant/Research Support Officer
Entry Requirements *(Refer to Prospectus / Course Page on MCAST website)*	**Internal Progression Route….** MCAST Diploma in Applied Science or Any MCAST MQF Level 3 Diploma, whilst being in possession of the compulsory subjects as indicated hereunder OR 4 SEC / SSC&P or equivalent with a Pass Grade / Level 3 from the following subjects: English Language, Mathematics, Physics, Chemistry, Biology, Design and Technology ,
Other Notes related to this Programme, and which are to be taken note of	-
Programme Learning Outcomes *(Refer to Programme Specification)*	At the end of the programme the learner will be able to: 1. Follow and communicate procedures in the scientific workplace. 2. Use scientific techniques to understand technological processes within an organization. 3. Understand how science-based organizations develop products and deliver services. 4. Understand the requirements of science technicians in an organization
Teaching, Learning and Assessment Procedures	The programmes offered are vocational in nature and entail both theoretical lectures delivered in classes as well as practical elements that are delivered in laboratories, workshops, salons, simulators as the module requirements dictate. Each module or unit entails a number of in person and/or online contact learning hours that are delivered by the lecturer or tutor directly (See also section 'Total Learning Hours).

	Access to all resources is provided to all registered students. These include study resources in paper or electronic format through the Library and Resource Centre as well as tools, software, equipment and machinery that are provided by the respective institutes depending on the requirements of the course or module. Students may however be required to provide consumable material for use during practical sessions and projects unless these are explicitly provided by the College. All Units of study are assessed throughout the academic year through continuous assessment using a variety of assessment tools. Coursework tasks are exclusively based on the Learning Outcomes and Grading Criteria as prescribed in the course specification. The Learning Outcomes and Grading Criteria are communicated to the Student via the coursework documentation. The method of assessment shall reflect the Level, credit points (ECTS) and the schedule of time-tabled/non-timetabled hours of learning of each study unit. A variety of assessment instruments, not solely Time Constrained Assignments/Exams, are used to gather and interpret evidence of Student competence toward pre-established grading criteria that are aligned to the learning outcomes of each unit of the programme of study. Grading criteria are assessed through a number of tasks, each task being assigned a number of marks. The number of grading criteria is included in the respective Programme Specification. The distribution of marks and assessment mode depends on the nature and objectives of the unit in question. Coursework shall normally be completed during the semester in which the Unit is delivered. Time-constrained assignments may be held between 8 am and 8 pm during the delivery period of a Unit, or at the end of the semester in which the Unit is completed. The dates are notified and published on the Institute notice boards or through other means of communication. Certain circumstances (such as but not limited to the COVID-19 pandemic) may lead Institutes and Centres to hold teaching and assessment remotely (online) as per MCAST QA Policy and Standard for Online Teaching, Learning and Assessment (Doc 020) available via link https://www.mcast.edu.mt/college-documents/ The Programme Regulations pertaining to this Programme's MQF/EQF level available at: link https://www.mcast.edu.mt/college-documents/, apply.
Grading System	All MCAST programmes adopt a Learner-centred approach through the focus on Learning Outcomes. The assessment of MCAST programmes is criterion-referenced and thus assessors are required to assess learners' evidence against a pre-determined set of Learning Outcomes and Assessment Criteria. For a student to be deemed to have successfully passed a unit, a minimum of 50% (grade D) must be achieved. All full time units are individually graded as follows: A* (90-100) A (80-89) B (70-79) C (60-69) D (50-59)

	Unsatisfactory work is graded as 'U'. Work-based learning units (where applicable) are graded on a Pass/Fail basis only. Some units which follow industry standards and regulations may also be graded on a Pass/Fail basis as per programme regulations referred below. Detailed information regarding the grading system may be found in the Programme Regulations pertaining to this programme's MQF/EQF Level available at: https://www.mcast.edu.mt/college-documents/ (Refer to DOC 003, 004 and 005)
Exit Point (where and as applicable)	Where a student will not make it to the Final Certification achievable from this Programme of Studies (as per Programme Regulations), one might wish to look into Exit Point possibilities as may be applicable to this programme for studies. Further information, is available at https://www.mcast.edu.mt/college-documents/, kindly refer to *DOC 077 Procedure for the processing of Claims for Certificates at Interim Exit Points.*
Contact details for Further Learning Opportunities	The MCAST Career Guidance Team, offers the service of qualified and experienced Career Advisers who will be very willing to discuss with potential applicants the course which best achieves one's career ambitions, as well as exploring one's education route, or similar. **MCAST Career Guidance** Tel: 2398 7135/6 Email: career.guidance@mcast.edu.mt
Regulatory Body/ Competent Authority Contact Details *(where applicable - in the case of a programme leading to Regulated Profession)*	Not Applicable

Programme Structure	Unit Code	Unit Title	ECTS	Year	Semester
	ASAPS-406-1501	Fundamentals of Science	6	1	Year
	ASAPS-406-1502	Working in the Science Industry	6	1	Year
	ASAPS-406-1503	Scientific Investigations	6	1	Year
	ASAPS-406-1504	Perceptions of Science	6	1	Year
	ASAPS-406-1505	Microbiological Practical Techniques	6	1	Year
	ASAPS-406-1507	Science for Environmental Technicians	6	1	Year
	ASLAB-403-2000	Chemical Laboratory Techniques 1	3	1	Year
	ASAPS-406-1508	Resource Based Training	6	1	Year
	ASWBL-403-2000	Work Based Module 1	3	1	Year

	CDKSK-406-2319	English	6	1	Year
	CDKSK-406-2320	Mathematics	6	1	Year
	ASCHM-406-2106	Practical Chemical Analysis	6	2	Year
	ASLAB-409-2000	Chemical Laboratory Techniques 2	9	2	Year
	ASCHM-406-1501	Industrial Chemical Reactions	6	2	Year
	ASCHM-406-1502	Industrial Applications of Organic Chemistry	6	2	Year
	ASWBL-409-2000	Work Based Module 2	9	2	Year
	ASAPS-406-1509	Energy Changes, Sources and Applications	6	2	Year
	ASELE-406-1517	Electrical Circuits and their Applications	6	2	Year
	CDKSK-404-2325	Entrepreneurship Essentials	4	2	A
	CDKSK-402-2324	Community Social Responsibility	2	2	A
	Information Technology	Information Technology	6	2	Year

Allocation of Total Learning Hours (per Unit)

The total learning hours required for each unit or module are determined as follows:

Credits (ECTS)	**Indicative contact hours[1]**	**Self-Learning and Assessment Hours[3]**	**Total Student workload (hrs)[2]**
1	5 – 10 hrs	20 - 15 hrs*	25 hrs
2	10 – 20 hrs	40 - 30 hrs*	50 hrs
3	15 – 30 hrs	60 - 45 hrs*	75 hrs
4	20 – 40 hrs	80 - 60 hrs*	100 hrs
6	30 – 60 hrs	120 - 90 hrs*	150 Hrs
9	45 – 90 hrs	180 - 135 hrs*	225 hrs
12	60 – 120 hrs	240 - 180 hrs*	300 hrs

Note: The 'Self-Learning and Assessment Hours[3]' amount to the difference between the 'Indicative Contact Hours'[1] and the 'Total Student Workload'[2]

APPENDIX 1

MINIMUM CREDITS FOR QUALIFICATIONS AT DIFFERENT LEVELS

MQF Level	Minimum ECTS Required for a Qualification*
8	
7	30
6	180
5	30
4	30
3	60
2	60
1	40

* Programmes assigned fewer ECTS than indicated will be classified as Awards.

Reference: Fig.1: p48, Malta Further and Higher Education Authority (MFHEA) (October 2024). Referencing Report, 5th Revised Edition.

APPENDIX 2

EXAMPLES OF QUALIFICATION TYPES AT A SPECIFIC MQF LEVEL

MQF Level	Examples of qualification types at a specific MQF level (The list in this column is not exhaustive)	Number of ECTS *
8	Doctoral Programmes:	
	PhD	N/A
	Professional Doctorate	180
7	Master's Degree	90
	Postgraduate Diploma	60
	Postgraduate Certificate	30
6	Bachelor's Degree	180
	Bachelor's Honours	240
5	Undergraduate Higher Diploma	90
	Undergraduate Diploma	60
	Undergraduate Certificate	30
	VET Level 5	60
4	Advanced Diploma	120
	Pre-Tertiary Certificate	30 - 60
	MATSEC Matriculation Certificate (Advanced and Intermediate)	N/A
	VET Level 4	120
3	Certificate	60
	MATSEC Secondary Education Certificate	N/A
	VET Level 3	60
2	Foundation Certificate	60
	MATSEC Secondary Education Certificate	N/A
	VET Level 2	60
1	Introductory Certificate	40
	VET Level 1	40

* Programmes assigned fewer ECTS than indicated will be classified as Awards.

Reference: Fig.2: p48, Malta Further and Higher Education Authority (MFHEA) (October 2024). Referencing Report, 5th Revised Edition.

ASAPS-406-1501: Fundamentals of Science

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

The aim of this unit is to enable learners to gain a broad theoretical and practical knowledge of chemistry, biology and physics. The science technicians in industries require a working knowledge and skills to use science.

The focus of this unit is on linking scientific principles with practical applications in engineering, medical and other scientific fields. Learners will know the structure of atom and ionic bonding to form molecules. They will understand the chemical reactions and ionic bonding of atoms. Learners will know the structure and function of cell membrane, cell wall, nucleus and nucleolus. They will understand the nature of tissues and their functions.

Students will study different forms of energy and differentiate between potential energy and kinetic energy. They will learn how energy changes from one form to another and understand the nature of heat and transfer of heat. Learners will know the nature of electric charge, electric current and electric circuits. They will know the electromagnetic spectrum, nature of light, sound, ultrasound and uses of X-rays.

Learners will perform experiments in chemistry, biology and physics. They will do titration, use microscope to identify cells and communicate results in their own work place as well as in other organizations to share the knowledge by means of reports and scientific papers.

Learning Outcomes

On completion of this unit learners will be able to

1. *Use chemicals in scientific and industrial work.*
2. *Use the knowledge of structure and functions of cells and tissues in biological and Medical fields.*
3. *Use different types of energy efficiently.*
4. *Communicate to share the scientific information.*

ASAPS-406-1502: Working in the Science Industry

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This is a skills based unit that will allow learners to demonstrate they have the necessary skills to be able to work effectively, efficiently and safely in a scientific environment. Students will be able to identify and carry out standard procedures in the scientific workplace safely in well-designed and operated work spaces and to communicate all aspects of the day-to-day running and data handling requirements of a variety of scientific workplaces. Students will also familiarize themselves with the regulatory and legislative requirements placed upon the scientific community to protect individuals and the environment.

The Unit is relevant to learners wishing to develop their knowledge of working in the science industry. On completion of the unit learners will understand how to design and operate a scientific laboratory within given specifications and regulations. They will be able to monitor and maintain a variety of instruments, stocks and datasets, using ICT where appropriate. This unit will provide the Learner with the ability to a use a variety of standard instruments and apparatus found in a range of scientific laboratories, to assess risks and store records and data associated with these activities and to clearly communicate organisational and scientific information to relevant parties.

Learners will carry out research and analysis tasks to further their understanding of working successfully within the science industry.

Finally, learners should have the underpinning knowledge and understanding to recognise and establish good laboratory practice in a variety of scientific disciplines within the science industry.

Learning Outcomes

On completion of this unit learners will be able to:

1. *Explain how procedures are followed and communicated in the scientific workplace.*
2. *Design a scientific laboratory to meet given specifications.*
3. *Describe the use of laboratory information management systems in the workplace.*
4. *Demonstrate safe working practices in the scientific workplace.*

ASAPS-406-1503: Scientific Investigations

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This is a skills based unit that will allow learners to demonstrate they have the necessary skills to be able to work effectively, efficiently and safely in a scientific environment. Students will be able to identify and carry out a scientific investigation using standard, and perhaps some more specialised, procedures in the laboratory safely. They will be able to communicate their results and evaluation of their investigation using recognised protocols and appropriate language. Students will also undertake risk assessments of their experimental work and familiarize themselves with the regulatory and legislative requirements of their chosen field of investigation.

The Unit is relevant to learners wishing to develop their knowledge of working in a scientific research environment. On completion of the unit, learners will understand how to design and carry out a scientific investigation safely and effectively. They will be able to construct hypotheses, design and carry out experimental procedures, collect, analyse and present data, using ICT where appropriate. This unit will provide the Learner with the ability to a use a variety of standard instruments and apparatus found in scientific laboratories in their chosen field, to assess risks and store records and data associated with these activities and to clearly communicate scientific information.

Learners will carry out research in preparation of their investigations to ascertain the extent previous work and to construct a bibliography to assist their investigation.

Finally, learners should have the underpinning knowledge and understanding to recognise and follow good laboratory practice in a scientific discipline of their choice.

Learning Outcomes

On completion of this unit learners will be able to

1. *Consider a specific area of study and plan a scientific investigation relating to the specified study area.*
2. *Use relevant scientific principles, and carry out the planned investigation.*
3. *Collect results from the investigation, then collate and assess them.*
4. *Interpret the results gained and consider conclusions.*

ASAPS-406-1504: Perceptions of Science

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This is a theoretical unit that will allow learners to demonstrate an understanding of how science is perceived by the wider public. Students will understand the process of scientific research and development. They will be able to evaluate sources of information for a range of target audiences based on use of language, writing styles, detail and accuracy of science reporting. They will develop an awareness of the moral issues, ethical issues, benefits and drawbacks of scientific advances. Finally, learners will develop an appreciation of the way science is funded and the benefits and pressures this brings to scientists and society from a variety of official, pressure and interest groups.

Learners wishing to develop their understanding of the role and perception of science in society will find this unit of relevance. On completion of the unit learners will understand how science can be reported and the effects of this on various target groups. They will be able to make informed decisions about current scientific advances and ongoing research and have an awareness of how science has developed historically and continues to develop currently. They will understand how financial, commercial and political influences affect current and future scientific developments and be able to state examples where this has occurred.

Learners will carry out research; undertake reading and surveys to allow them to become conversant with current popular science research, debate and attitudes towards this in the wider public. This will allow them to develop an overview of the way that science is perceived in society, develop their own opinions on scientific research and the associated ethical and moral considerations and improve their ability to recognise factual use and reporting of science in the wider context.

Finally, learners should have the underpinning knowledge and understanding to confidently address the perceptions and value of current and future scientific developments.

Learning Outcomes

On completion of this unit learners will be able to:

1. *Explain how scientists develop scientific ideas.*
2. *Describe the ways in which the media influence the way that members of the public perceive science.*
3. *Investigate some scientific advances and the moral and ethical issues raised by them.*
4. *Explain the relationships that exist between politics, commerce and science.*

ASAPS-406-1505: Microbiological Practical Techniques

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

This is a skills based unit and will allow learners to demonstrate they have the necessary skills to be able to understand the processes involved in the culture and growth of a range of micro-organisms. Students will be able to identify micro-organisms, their structures and functions, growth requirements and culture under aseptic conditions. They should understand that micro-organisms are ubiquitous and hence food and beverage, pharmaceutical, environmental and medical industries need to ensure sterility. However, certain food and beverage and pharmaceutical industries need microorganisms to create their products. They will develop a familiarity with microscopes and other equipment routinely used in the microbiology laboratory and how micro-organisms are contained and safely disposed of.

The Unit is relevant to learners wishing to further develop their knowledge of micro-organisms, their culture and use in biotechnology and biomedical industries. On completion of the unit, learners will understand how to identify, count, contain and culture a range of micro-organisms, as well as developing the understanding, knowledge and skills required to use microbiological techniques and equipment.

Learners will carry out laboratory procedures in order to prepare, count and identify a range of micro-organisms, providing a broad understanding of the operation of a microbiology laboratory.

Learning Outcomes

On completion of this unit learners will be able to

1. *Identify the characteristic features and functions of prokaryotic and eukaryotic cells.*
2. *Culture a range of micro-organisms using aseptic techniques.*
3. *Determine and state factors which influence micro-organisms growth.*
4. *Recognize the range of pathogenic and useful microorganisms and their roles in various biotechnology industries.*

ASAPS-406-1506: Practical Chemical Analysis

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

From food labelling to drug analysis, analytical chemistry plays a key role in identifying chemical substances in a mixture and detecting trace elements. There are many applications of analytical chemistry particularly in monitoring the quality of food and drug products during manufacturing processes and monitoring water quality and pollution in the environment. Analytical work used in industry must follow the processes and procedures to comply with Health and Safety legislation.

Determination of unknown quantities of a substance requires mathematical and practical skills that ensure accuracy. This often requires standards that can be used as reference points so that comparisons can be made with the unknown substance to determine its identity or quantify its value. For example, determination of the unknown concentration of a solution requires standard solutions with known concentration. Preparations of primary and secondary standard solutions require calculating the amount of solids needed for making up the stock solution. This stock solution can also be diluted to make a series of solutions with different concentrations. In this unit, the learners will discover the importance of standard solutions and the methods used to accurately determine the unknown concentration of substances.

Since the discovery of the properties of electromagnetic waves and their uses in spectroscopy, the spectroscopic techniques have become a powerful tool in detecting and identifying trace compounds in a sample. This detection of compounds will depend on the type of electromagnetic waves used, which will determine the amount of energy exerted onto the atoms and sub-atoms of compounds or the way they excite the electrons in a sample. For example, the functional groups of organic compounds are detected by the vibration of bonds within molecules by the infrared radiation whereas the detection of molecules by UV-visible spectroscopy is by the excitation of molecular electrons to a higher energy orbital. In this Unit, the learners will be given an opportunity to explore a range of spectroscopic techniques and analyse the data from these techniques to evaluate the properties of the unknown compound in question.

When you have a compound of interest in a mixture, it is often necessary to separate it from the mixture before identification. Chromatography is a selective procedure used to isolate the compounds according to their physical properties which can then be collected, identified and possibly quantified.

On completion of this unit, learners will gain a deep understanding of sample detection and identification using traditional and modern techniques.

Learning Outcomes

On completion of this unit learners will be able to:

1. *Prepare standard solutions and perform serial dilutions.*
2. *Use spectroscopic techniques to identify and quantify substances.*
3. *Use chromatographic techniques to separate, identify and quantify substances.*

ASAPS-406-1507: Science for Environmental Technicians

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

The aim of this unit is to enable learners to gain a broad theoretical and practical knowledge of the Earth science and Energy resources. The environmental technicians require a working knowledge and skills to use science.

The focus of this unit is on linking scientific principles with practical applications in environmental studies. Learners will study the movement of Earth, composition of atmosphere, ozone layer in stratosphere, climate change and global warming due to pollution. They will know the processes associated with the formation of soil and rocks, structure of the interior Earth, weathering and erosion. Learners will know the demand of water, its availability in Malta and vegetation. They will understand the importance of efficient system of water storage, water harvesting, water pollution and its treatment and supply.

They will understand the availability of non-renewable and renewable Energy resources. They will learn the method of using non-renewable energy to generate electricity. Learners will understand the importance of sustainability, extraction of materials, materials management, energy resources and its efficient use. They will know the impact of energy use on environment. Learners will know the techniques of waste management and re-cycling of waste materials.

Learning Outcomes

On completion of this unit learners will be able to:

1. Explain solar system and the climate of Earth.
2. Identify processes associated with soil and rock formation.
3. Explain water cycle and water management.
4. Explain management of materials and Energy resources.

ASLAB-403-2000: Chemical Laboratory Techniques 1

Unit Level (MQF/EQF): 4
Credits: 3
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 75

Unit description

This unit is designed to develop learners in a range of laboratory skills that form the basis of good laboratory writing skills identification of organic and inorganic substances. A wide range of practical work will allow learners to demonstrate their ability to identify substances through separation and analysis.

Whatever the purpose of scientists, they must understand the importance of Health and Safety legislation. Through practical work, learners will gain autonomy to work safely in a science laboratory by wearing appropriate personal protective equipment (PPE) and following instructions when carrying out reactions and operating equipment. Learners will also master record keeping skills where observations and measurements are recorded using a suitable format. Identify risk hazards associated with the chemicals used, read and understand a MSDS and take the necessary precautions associated with the chemicals used.

Because of the complexity of chemical reactions, it is necessary for the learners to begin their journey using simple reactions with simple equipment to understand the key principles.

As learners become more experienced, improvements to the procedures can be considered. This may follow onto more complex techniques that are capable of producing increased accuracy, reliability, purity and yield. Calculation of atom economy of reactions should link to green chemistry which must be considered when choosing alternative methods.

On completion of the unit learners will gain competence in many aspects of wet chemistry and experience what it is like to work in a science laboratory.

Learning Outcomes

On completion of this unit learners will be able to

1. *Compile a practical report to understand MSDS.*
2. *Examine quantification of analytical substances including yield and purity, as well as accuracy and precision of techniques.*
3. *Identify organic and inorganic compounds using qualitative analysis.*
4. *Apply simple separation techniques followed by quantitative and qualitative analysis.*

ASCHM-406-1501: Industrial Chemical Reactions

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

For a reaction to occur, two or more molecules must interact to cause a chemical change. However, no reaction would proceed unless the condition is suitable for the reactants. This is because for any reaction to take place, bonds have to be broken before a new one can be formed. The activation energy determines the feasibility of chemical reactions which is influenced by factors such as temperature, concentration of reactants, pressure of the reaction vessel and the presence of catalysts.

The energetics of the chemical reaction plays a vital role in determining the reaction conditions to make it economically viable. Because some reactions require a large supply of heat or release a vast amount of energy as a result of the reaction, the security issues must be considered in order to guarantee safety.

In this Unit, learners will initially look into enthalpy changes that take place during chemical reactions and discover why some factors influence the rate of reactions using particle models. This is followed by the study of the reaction kinetics that determines how fast the reaction would proceed and the chemical equilibrium of the reaction that determines how far the reaction would proceed to give the desired products.

Upon understanding the effects of factors on the chemical reactions learners will apply their knowledge on to industrial processes.

Through theoretical and practical approaches, this Unit will enable learners to discover the life of chemists in the manufacturing industry.

Learning Outcomes

On completion of this unit learners will be able to

1. *Calculate enthalpy changes from experimental and bond energy data.*
2. *Investigate how the factors affect the rates of chemical reaction.*
3. *Apply the principles of chemical equilibrium in the reaction systems.*

ASCHM-406-1502: Industrial Applications of Organic Chemistry

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This unit will begin with the basics of organic chemistry required for proper understanding of the industrial applications of different organic compounds. It will then introduce the learner to the classifications, nomenclature, structure, properties and industrial applications of organic compounds. Organic compounds such as petrochemicals and pharmaceuticals are extremely useful in everyday life for clothing, transport, and medicine among others and come from natural or artificial sources. In this unit, learners will be familiarised with these important organic compounds, their sources, chemistry and the industrial processes that make them useful.

Of particular interest in this unit are hydrocarbons which are organic compounds composed entirely of carbon and hydrogen. Learners will study their sources, physical and chemical properties, classifications, industrial processes and uses. Non-hydrocarbon organic compounds like ketones, alcohols and amines which are derivatives of hydrocarbons will also be studied, here learners will learn about bonding and functional groups which are responsible for the properties of these organic compounds.

The carbon atoms of organic compounds can bond with metals as well to form organometallic compounds; learners will study organometallics and their properties. Emphasis will be placed on the industrial processes and reactions of organic compounds hence, learners will learn about the organic compounds used as starting materials in organic synthesis, their conversion into other organic compounds, the kinds of reactions they undergo and important commercial uses.

Learning Outcomes

On completion of this unit learners will be able to:

1. *Explain the diversity of organic compounds.*
2. *Describe industrial hydrocarbon processes.*
3. *Discuss the properties of non-hydrocarbon organic compounds.*
4. *Examine types organic reactions and their commercial importance.*

ASAPS-406-1508: Resource Based Training

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit description

This is a skills based unit that will allow learners to demonstrate they have the necessary skills and knowledge of the basic laboratory techniques and processes to work in line with the current GxP relevant to laboratory practices.

The Unit is relevant to learners wishing to develop further their knowledge of working in a laboratory within a science based industry. The applications of analytical chemistry are various and wide ranging – however the principles are similar and relevant to various laboratories.

Upon completion of the unit, learners will be able to carry out a number of qualitative and quantitative tests using standard, and perhaps some more specialised, procedures in the laboratory. Learners will understand how to carry out procedures accurately and precisely and be aware of how changes in procedure can have an effect on the result obtained. They will also be able to use a wide range of laboratory equipment which are applicable to both the general aspect of science laboratories and also for more specific areas of study such as microbiology, the food industry, pharmaceutical or environmental laboratories. They will be able to communicate the used methodology and results using recognised protocols and appropriate language. Furthermore, all testing will need to be carried out in line with the current Health and Safety legislation.

Learning Outcomes

On completion of this unit learners will be able to:

1. *Carry out procedures accurately and precisely.*
2. *Demonstrate how analysis is used in a specific area of study.*
3. *Operate a range of analytical equipment in the laboratory.*
4. *Follow GxP relevant to laboratory practice.*

ASWBL-403-2000: Work Based Module 1

Unit Level (MQF/EQF): 4
Credits: 3
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 75

Unit Description

This is a skills-based unit that prepares the learner to prepare for a place of work. The learner will be given hands-on training to master various basic skills and techniques to be able to work within the scientific workplace. The focus of the unit is to assess the learner's technical competences through an accredited assessment methodology compromising of a series of established learning outcomes and respective grading criteria. In addition, the learners will be given the opportunity to enhance soft skills to be able to function better at the place of work.

Learning Outcomes

On completion of this unit the student will be able to

1. *Recognise the importance of different sectors within the science-related industry.*
2. *Prepare for a job application.*
3. *Prepare for a job interview.*
4. *Assess legally binding documents.*

ASAPS-406-1509: Energy Changes, Sources and Applications

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This unit enables learners to gain a broad theoretical and practical knowledge of energy changes whilst develop skills and knowledge. The technicians and professionals working in industries require a working knowledge and skills to use science. This unit fuses on linking scientific principles with engineering and practical applications.

Learners will know the force and its unit derived from the first principles of mechanics. They will understand the work done by application of force and energy used. Energy can change from one form to another; learners will understand the transformation of energy by working quantitatively. They will learn the gravitational potential energy, kinetic energy and electrical energy and their applications.

Learners will understand the importance of energy and its efficient use. They will know the different forms of energy including renewable and alternate energy, impact of energy use on environment and climate change.

They will learn the nature of solar radiation and know how to use it for heating water with different kinds of materials. They will know the absorption coefficient and thermal conductivity of materials. They will also know the use of solar radiation for generating electricity using photo-voltaic cells, storing it in electrical batteries and distributing it using inverters and transformers.

Learning Outcomes

On completion of this unit learners will be able to

1. *Explain the nature of force, work and energy.*
2. *Explain the nature of heat and temperature.*
3. *Explain the process of conduction, convection and radiation.*
4. *Explain the nature and generation of electrical energy.*

ASELE-406-1517: Electrical Circuits and their Applications

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This unit aims to allow learners to gain a broad theoretical and practical knowledge of electricity and its application in electrical circuits. The technicians and professionals in industries require a working knowledge of electrical circuits and skills to use scientific principles. They should know the basic electrical quantities, their fundamental units and derivatives.

This unit focusses on linking scientific principles with practical applications in engineering, industrial and medical fields. Learners will know the nature of atom, molecules, electron flow, direct current flow and alternating current. They will know the network theorems, single-phase series circuits and single-phase parallel networks. They will understand working of electrical instruments, equipment and their components.

Learners will understand the importance of energy and its efficient use. They will know the function of electromagnetic machines which links an electrical energy system to another energy system in its magnetic field. Learners will know the working of converters and transducers. They will know the analogue instruments and digital meters. They will understand the operation of graphical display devices and working of cathode ray oscilloscopes (CROs). They will know the health and safety requirements in laboratories and relevant regulations and how it applies in the electrical work.

Learning Outcomes

On completion of this unit learners will be able to

1. *Explain and know the basic electrical quantities.*
2. *Explain and know the working of parallel & series electrical circuits.*
3. *Explain and know the direct current and alternating current circuits.*
4. *Explain and know the transducers and measurement devices.*

ASLAB-409-2000: Chemical Laboratory Techniques 2

Unit Level (MQF/EQF): 4
Credits: 9
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 225

Unit Description

This unit is designed to advance the learners' skills within a laboratory setting. The unit aims to further develop the learners' writing and research skills, with special importance given to the synthesis, extraction, quantification, and analysis of organic and inorganic substances. A wide range of practical work will allow learners to demonstrate their ability to identify substances through separation and analysis.

Similar to unit carried out in semester 1, learners will gain autonomy to work safely in a science laboratory by wearing appropriate personal protective equipment (PPE) and following instructions when carrying out reactions and operating equipment. Learners will also master record keeping skills where observations and measurements are recorded using a suitable format. Identify risk hazards associated with the chemicals used, read and understand a MSDS and take the necessary precautions associated with the chemicals used.

This unit is targeted for more experienced learners, whereby the learner is expected to show possible improvements to the procedure and good time management which is essential in any industrial setting. Full data analysis including accuracy, reliability, purity and yield are to be expected from the learners in this credit.

On completion of the unit, learners will gain competence in many aspects of analytical, physical and organic chemistry and experience what it is like to work in a science laboratory.

Learning Outcomes

On completion of this unit learners will be able to

1. *Understand the concepts of physical chemistry through experiments.*
2. *Recognise the various routes for organic and inorganic synthesis.*
3. *Recognise the concepts of various forms of analytical wet chemistry.*
4. *Apply various forms of advanced separation techniques.*

ASWBL-409-2000: Work Based Module 2

Unit Level (MQF/EQF): 4
Credits: 9
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 225

Unit Description

This is a skills-based unit that prepares the learner to work in industry and reflect on performance and preferences. The learner will be given hands-on training to master various basic skills and techniques to be able to work in the scientific workplace. The focus of the unit is to assess the learners' technical competences through an accredited assessment methodology consisting of a series of established learning outcomes and respective grading criteria. In addition, the learner will be given the opportunity to enhance own soft skills to be able to enhance the work experience.

Learning Outcomes

On completion of this unit learners will be able to

1. *Undertake a work-related experience.*
2. *Review the work experience.*
3. *Deal with challenges that arise in scientific-related employment.*
4. *Implement financial literacy.*

ASCHM-406-2106: Practical Chemical Analysis

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

Food labelling, drug analysis, product development, analysing environmental samples, awareness of instrumentation and the ability to carry out calculations, are all essential skills for chemists, laboratory analysts and technicians.

Determination of unknown quantities of a substance requires mathematical and practical skills that ensure accuracy. This often requires standards that can be used as reference points so that comparisons can be made with the unknown substance to determine its identity or quantify its value. For example, determination of the unknown concentration of a solution requires standard solutions with known concentration. Preparations of primary and secondary standard solutions require calculating the amount of solids needed for making up the stock solution and making dilutions.

Analysts should be aware of different units and measures used in chemistry, and how to interpret results from various techniques, from titrations, column, paper and thin layer chromatography, to modern instrumental techniques.

Learning Outcomes

On completion of this unit learners will be able to

1. *Prepare standard solutions, perform calculations for dilutions and use various units of concentration and different types of titrations.*
2. *Perform calculations for reactions involving gases, limiting reactants, percentage yield and, molecular and empirical formulae.*
3. *Use various spectroscopic techniques to identify and quantify substances.*
4. *Use chromatographic techniques to separate, identify and quantify substances.*

CDKSK-406-2319: English

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This unit typically refers to English language skills needed for specific careers or vocational training programmes. The main objective of this unit is to prepare learners to understand and respond to spoken English on a variety of topics, including abstract or unfamiliar topics, to read and comprehend a variety of texts, including more extended and more complex texts, and to write in a more precise and structured way. Particular focus is given to summarising and paraphrasing.

At this level, learners should have a good understanding of English grammar, vocabulary and usage. They should be able to communicate effectively in written and spoken English, express opinions, and understand complex texts and conversations as required by various but often specific technical contexts within their selected field of study. Learners should also start acquainting themselves with researching reliable and authoritative sources of information. Moreover, they should also be able to cite this information and follow the conventions of the referencing style stipulated by their respective institute.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Read and understand written English effectively to improve knowledge of the subject area.*
2. *Understand extended speech and follow an argument provided the topic is related to one's own subject area.*
3. *Speak with a degree of fluency and spontaneity on topics related to one's own subject area.*
4. *Produce a research-based report or essay with appropriate choice of linguistic style and structure.*

CDKSK-406-2320: Mathematics

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This unit provides a framework for students to develop mathematical thinking skills further to the level 3 unit specification to solve problems related to real-life situations. Students also develop skills, attributes and knowledge that contribute to their personal growth and effectiveness within their training and work environment and within the community.

The unit is designed to adapt for the needs of a particular field of study (business & finance or engineering & transport and others). To reach this goal the unit was divided into eight learning outcomes from which four learning outcomes are chosen and taught, which are related to statistics, algebra and graphical representation, geometry, areas and volumes, game theory and finance. Through these different areas students will be able to develop the effective skills for information processing, reasoning, evaluation creative thinking and enquiry, all fundamental skills for the problem-solving process. This will prepare students in applying and evaluating a range of strategies to solve real-life problems. Through this unit the learner will also learn to present and communicate results and conclusions effectively.

On successful completion of the unit the learner will be equipped with mathematical thinking skills which make them aware of and understand their thought process, to reassess and identify areas for development. Students learn to evaluate, reflect on their strategies, understand, and verify results to solve problems. These skills will equip students with managerial skills, to further their studies and for work employability.

Learning Outcomes

Learning Outcomes are electives out of which 4 are to be chosen

On completion of this unit the learner will be able to:

1. *Use algebraic techniques to simplify expressions and solve equations.*
2. *Identify how to simplify more complex expressions and solve harder equations.*
3. *Demonstrate visual and logical techniques in evaluating graphical representations and communication skills in presenting the results effectively.*
4. *Demonstrate skill in calculating angles, sides, areas, and volumes for any given situation.*
5. *Apply information processing skills to solve problems in a relevant statistical context.*
6. *Apply thinking skills and demonstrate evaluation skills to solve problems in a relevant game theory context.*
7. *Demonstrate evaluation and communication skills in solving and presenting problems applied to costing methods and techniques.*

CDKSK-406-2322: Information Technology

Unit Level (MQF/EQF): 4
Credits: 6
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 150

Unit Description

This unit aims to impart to the learners the necessary skills to produce, report, and analyse their work in a digital environment. Based on six learning outcomes, out of which learners need to focus on five, chosen by the lecturer, which when combined give the learners the possibility to create advanced reports, represent data visually, understand the target audience and prepare outstanding presentations as well as manipulate images and videos and create websites.

Using word processing software, spreadsheet software and presentation software this unit will demonstrate to the learners how to create advanced charts, create what-if scenarios as well as how to analyse and validate the data being inputted. Building upon previous learning, this unit demonstrates how to create presentations which are adequate for the audience and the venue. Moreover, the presentations will be enriched with multimedia content to enrich the experience of the audience.

Throughout the unit, the learners will be making use of images and video. Learners are taught about the creation of websites as an aid to keeping a visible online profile. Another two topics delved into in this module are Artificial Intelligence and Digital Marketing. Learners are taught about creating simple programs as well, through the use of drag and drop techniques.

Learning Outcomes

5 learning outcomes need to be chosen. LO3 is a pre-requisite of LO5.

On completion of this unit the learner will be able to:

1. *Use office essential tools, including word processing, spreadsheets and presentations.*
2. *Create images and videos by making use of image and video creating software.*
3. *Apply web editing techniques.*
4. *Apply computational thinking techniques to create apps.*
5. *Identify concepts related to Artificial Intelligence.*
6. *Use concepts related to Digital Marketing.*

CDKSK-402-2324: Community Social Responsibility

Unit Level (MQF/EQF): 4
Credits: 2
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 50

Unit Description

This unit focuses on Community Social Responsibility and provides an opportunity for learners to better understand themselves and others to establish life goals. Community social responsibility enables learners to understand their strengths, areas for improvement, opportunities offered to them during their lifespan and threats which can hinder their achievements. This unit will prepare students for life, employment and how to become active citizens in society.

Lectures will differ from traditional delivery of other units where learners will be empowered to take ownership of their learning process. This means that this unit will be delivered through a combination of discussions, presentations, debates and application of theory through voluntary work. The sessions will focus on students becoming more self-aware of their strengths and limitations and what can be done to improve themselves. Skills needed on working and interacting with other people in the community and the right work ethics when doing the voluntary work. These sessions will help them prepare themselves for life after college and also instil civic duty to become active citizens.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Discover oneself through personal reflection and planning personal goals.*
2. *Interact and cooperate with other people effectively.*
3. *Develop active participation and promote community work.*

CDKSK-404-2325: Entrepreneurship Essentials

Unit Level (MQF/EQF): 4
Credits: 4
Delivery Mode: Fully Face-to-Face Learning
Total Learning Hours: 100

Unit Description

One of the main policy goals for the EU and Member States over the past years has been the development of the entrepreneurial capacity of European individuals and organizations, since there is a growing understanding that entrepreneurial abilities and information, can be learned, which in turn spurs the development of an entrepreneurial mindset and culture that is advantageous to both people and society at large.

Entrepreneurship is a transversal skill that may be used to launch businesses as well as foster personal growth, actively participate in society, and (re)enter the job market as an employee or self-employed individual (cultural, social, or commercial). Hence, it encompasses a variety of entrepreneurial endeavours, such as intrapreneurship, social entrepreneurship, green entrepreneurship, and digital entrepreneurship. It relates to value creation, and it is applicable to both individuals and groups (teams or organizations), as outlined in the definition below:

'Entrepreneurship is when you act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural, or social' (FFE-YE, 2012)

Therefore, the main objective of this unit is to familiarize the learners with the above-mentioned concept of entrepreneurship, with a view on enhancing entrepreneurial skills by building a strong foundation in this area of studies. Through this unit, learners will be guided on various ideation and creativity techniques, which will enable them to recognize opportunities and/ or generate ideas that address needs which are not currently being met, whilst being driven by sustainability when making these decisions. For example, through the use of the global sustainable developmental goals (SDGs) the learners are encouraged to understand the importance of sustainable development and inspire them to create businesses that contribute to this cause.

Throughout the unit, learners will be encouraged to think critically, creatively, and ethically about entrepreneurship, and to consider the impact of their ventures on society and the environment, by utilising a variety of tools such as the Business Model Canvas(BMC) as a framework, and they will also have the opportunity to develop various other transversal skills such as communication and teamwork skills.

Upon completion of this unit, learners will have developed an appreciation for the role of entrepreneurship in society and acquired an entrepreneurial mindset that will enable them to identify and pursue opportunities for innovation and growth in their personal and professional lives.

Learning Outcomes

On completion of this unit the learner will be able to:

1. *Identify an entrepreneurial opportunity.*
2. *Apply creative thinking tool(s) and technique(s) to generate idea(s).*
3. *Develop an entrepreneurial idea through a strategic plan.*
4. *Use effective communication skills to persuade various stakeholders.*