MQF Level 4

ME4-A2-21

Advanced Diploma in Aircraft Maintenance (Avionics)

Course Specification

Course Description

This programme is designed to equip learners with the necessary theoretical knowledge of aircraft maintenance and related electrical and avionics systems at technician level. This is also backed by practical experience in dedicated workshops.

Learners attending this course will be prepared to sit for the relative examinations organised by awarding bodies, which may lead to being awarded the EASA Part66 Category B2 licence. Subject to authorisation by the Part-145 Organization, the licence will permit the holder to issue Certificates of Release to Service following maintenance on electrical and avionics systems. This training programme includes work-related training and practice.

Applicants have to be able to work within the industries concerned. During the course the learner will also have the possibility of achieving an Advanced Diploma which would mean that the learner would be able to access higher level learning at degree level.

Programme Learning Outcomes

At the end of the programme the learner is able to

1. *Develop a theoretical knowledge of the aircraft`s applicable systems, structure, operations, maintenance, repair, and troubleshooting according to the approved maintenance data.*
2. *Understand on how to use correctly the manuals and the approved procedures.*
3. *Make decisions in respect of fault diagnosis and rectification to the maintenance manual level;*
4. *Prepare for the examinations organised by the Transport Malta Civil Aviation Directorate with regards of Part-66 Category B2 licence.*

Entry Requirements

EASA Part-66 Aircraft Maintenance Category A Licence Course **or** Any MCAST MQF Level 3 Diploma offered by the Institute of Engineering and Transport (Applicants must have obtained grades that when averaged will yield an overall Grade B) **or** 4 SEC/O-Level/SSC&P (Level 3) passes Compulsory: Mathematics, Physics (Grade 4 or better), English Language;

Other Entry Requirements

Applicants will be asked to attend an Interview and/or sit for an Aptitude Test in Technical Understanding and Technical English. A pass in the Aptitude Test together with a positive outcome following a Colour Blindness test, are a pre-requisite for entry to the course.

Current Approved Programme Structure

Unit Code	Unit Title	ECVET	Year
ETELE-408-2001	Electrical Fundamentals	8	1
ETELX-404-2001	Electronic Fundamentals	4	1
ETELX-404-2002	Digital Techniques and Electronic Instrument Systems	4	1
ETACT-412-2002	Aircraft Workshop Principles and Safe Practices	12	1
ETACT-409-2003	Aircraft Maintenance Practices	9	1
ETACT-405-2004	Basic Aerodynamics	5	1
ETACT-406-2016	Advanced Digital Techniques and Electronics	6	1
CDKSK-406-2015	Mathematics for Aviation Technicians	6	1
CDKSK-406-2016	Physics for Aviation Technicians	6	1
ETACT-412-2005	Materials and Hardware for Aircraft Design, Manufacture and Maintenance	12	2
ETACT-406-2006	Human Factors	6	2
ETACT-406-2007	Aviation Legislation	6	2
ETACT-409-2013	Turbine Engine Powered Aircraft Propulsion Systems	9	2
ETACT-406-2014	Aircraft Aerodynamics, Structures and Systems	6	2
ETACT-409-2015	Advanced Aircraft Electrical and Avionics Systems	9	2
CDKSK-406-2017	Vocational Competencies in Aviation	6	2
CDKSK-404-1915	Employability and Entrepreneurial Skills	4	2
CDKSK-402-2104	Community Social Responsibility	2	2
	Total ECVET	**120**	**/**

Unit: ETELE-408-2001 Electrical Fundamentals

Guided Learning hours: 100 hours
Unit level (MQF): 4
Credits: 8 ECVET

Unit Description

Since the safe operation of an aircraft is nowadays heavily reliant on electrical systems then it is logical that learners are expected to become familiar with such systems on board the aircraft. To be able to do so however it is therefore very important for the learners to achieve an understanding of electrical fundamentals. For this reason, this unit introduces the learner to a vast range of electrical related topics starting with the electron theory and typical electrical terminology, and then building up to the analysis of the generation of both DC and AC power. Furthermore, following this unit the learner would also be able to analyse DC and AC circuits and the components one would typically find in such circuitry, such as the resistor, capacitor and inductor. DC and AC motors would also be analysed including their construction and the methods of speed control and direction of rotation.

Learning Outcomes

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

1. *Apply the electron theory to explain aircraft electrical fundamental systems.*
2. *Apply AC theory to explain the different means of electrical generation and motion using AC generators and AC motors.*
3. *Explain the construction and basic chemical action of DC sources of electricity.*
4. *Explain the theory, construction and operation of resistive, capacitive and inductive devices, and the principles and properties of magnetism and RLC circuits.*
5. *Carry out calculations with regards to power efficiency, live and phase voltages and currents.*

Unit: ETELX-404-2001 Electronic Fundamentals

Guided Learning hours: 40 hours
Level: 4
Credits: 4 ECVET

Unit Description

The diode, being the very basic component of active electronic devices, is a fundamental topic of this unit. The learner is expected to achieve general knowledge of the theoretical and practical aspects of such component and furthermore be able to apply it. For this reason, following this unit the learner would have learnt in detail about the characteristics and properties of the diode, the operation of the diode in series and parallel connections, functional testing of a diode to determine the serviceability of a diode and the use of diodes in practical situations including SCRs, LEDs, Schottky diode, photo conductive diodes, varistors and rectifiers. The diode's PN junction ultimately forms the boundary between two types of semi-conductor materials. Since transistors are semiconductor devices and these form the basic building block of most electronics, it is therefore crucial that the learner understands how a potential across a PN junction is developed when the junction is unbiased, forward and reverse biased. The transistor is a very critical device in any electronic system and thus the learner in this unit will become familiar with the transistor symbols, its characteristics and properties.

Integrated Circuits (IC) are a keystone of modern electronics. ICs made it possible to gather a large number of electronic components (transistors, resistors, capacitors, etc…) and place them all into one chip. It is therefore inevitable that the learner becomes familiar with the operation of logic circuits and linear circuits (including the Op Amp). Ultimately these electronic components including ICs are attached onto a Printed Circuit Boards (PCB). In this unit the learner therefore also becomes familiar with the PCB and its purpose, explains the design stage, fabrication and the different types one could find today.

Finally, the unit concludes with the learner achieving a familiarization of open and closed loop systems, feedback, follow up and analogue transducers. The learner will also achieve familiarization with the principal elements of the following synchro systems: resolvers, differential, control and torque, transformers, inductance transmitters and capacitance transmitters.

Learning Outcomes

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

1. *Explain the operation, characteristics and properties of a diode.*
2. *Explain the operation, characteristics and properties of a transistor.*
3. *Apply the operation of logic circuits and operational amplifiers, and the use of printed circuit boards.*
4. *Describe the function and operation of open and closed loop systems and synchro system components.*

Unit:
ETELX-404-2002 Digital Techniques and Electronic Instrument Systems

Guided Learning hours: 40 hours
Level: 4
Credits: 4 ECVET

Unit Description

Through this unit the learner will obtain general knowledge of the theoretical and practical aspects of the typical systems arrangements and cockpit layout. This unit will allow the learners to develop their knowledge and achieve an understanding of the basic computer structure and its internal operations, and furthermore achieve an understanding of the hazards, procedures and aircraft operating environment that will influence the handling and associated maintenance of aircraft electronic equipment and systems.

Finally, the unit will conclude by going through a range of avionics systems one would typically find in modern aircraft including: ACARS (a data messaging system), EICAS and ECAM (fault reporting and aircraft system monitoring system), Fly-by-Wire (today's aircraft are not typically controlled using cables and pulleys but rather via an electronic interface), FMS (management of the flight), IRS (standalone navigation system), EFIS (flight and navigation display systems), the GPS (external navigation system), TCAS (collision avoidance system), Integrated Modular Avionics (IMA), Cabin and Information Systems.

Learning Outcomes

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

1. *Describe the operation of data conversion, the operation of data buses in aircraft systems, fibre optic data transmission and the structure of the basic computer.*
2. *Explain the numbering systems, the conversion from one numbering system to another and the identification and application of logic circuits as used in aircraft systems.*
3. *Describe the theoretical and practical aspects of the typical systems arrangements and cockpit layout.*
4. *Analyse the importance of the handling of components sensitive to ESD, the control mechanisms for computer software and the influence of an electromagnetic environment on the performance and operation of electronic systems.*

5. *Explain the general arrangement of typical digital aircraft systems and associated Built In-Test-Equipment (BITE).*

Unit: ETACT-412-2002 Aircraft Workshop Principles and Safe Practices

Guided Learning Hours: 120 hours
Level: 4
Credits: 12 ECVET

Unit Description

A fundamental requirement for all those that wish to work as aircraft maintenance technician or engineer is a good understanding of the principles and practices related to an aircraft maintenance hangar or workshop.

This unit will give the learner a thorough understanding of the safe working practices associated with practical activities performed in the hangar or workshop. Emphasis is given to the methods used for caring, control and safe use of tooling and equipment. This unit will help the learners to develop the skills required to carry out safely tasks associated with bench fitting practices, sheet metal work, use of fasteners, plumbing and transmission systems, and electrical wiring interconnecting systems (EWIS). Class delivery, as well as workshop activities will help learners to gain the required skills to become proficient in reading and interpreting engineering diagrams and drawings

This unit should cover part of the knowledge required by a person willing to take the European Aviation Safety Agency (EASA) Part-66 examinations in Category B, particularly the knowledge required for Module 7A – Maintenance Practices.

Learning Outcomes

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

1. *Apply the safe working practices associated with the care and control of tools and equipment used in the aircraft maintenance environment.*
2. *Read and interpret aircraft engineering drawings and diagrams.*
3. *Be responsible for the practices used to carry out Aircraft Workshop activities.*
4. *Carry out metalwork exercises in the workshop.*
5. *Describe the practical requirements of Electrical Wiring Interconnecting Systems (EWIS).*

Unit: ETACT-409-2003 Aircraft Maintenance Practices

Guided Learning Hours: 90 hours
Level: 4
Credits: 9 ECVET

Unit Description

Before an aircraft can be able to take off safely for the flight, careful preparation is essential. First and foremost, the required maintenance must be done before the Certificate of Release to Service can be raised by the Licensed and Authorised Staff. Proper aircraft servicing such as fuelling, cleaning and cargo loading is necessary. For such pre-flight activities require the use of the relevant ground equipment. Safety must be ensured during these pre-flight activities. Also, before starting the aircraft engines, safety must be ensured to avoid damage to the aircraft and injury to ground personnel. Hence, the proper understanding of aircraft handling and maintenance activities is essential for all those wishing to practice as an aircraft maintenance technician or engineer.

This unit has been designed to provide learners with the required knowledge and skills required to carry out a range of aircraft maintenance procedures in a safe, efficient and timely manner. Special emphasis is given to the health and safety issues related to all aspects of aircraft maintenance. A range of maintenance activities such as aircraft weighing, aircraft handling and storage, as well as procedures related to maintenance requirements following abnormal events are covered. Disassembly, inspection, repair and assembly techniques, as well as general maintenance procedures are also included in the content of this unit

This unit should cover part of the knowledge required by a person willing to take the European Aviation Safety Agency (EASA) Part-66 examinations in Category B, particularly the knowledge required for Module 7A – Maintenance Practices.

Learning Outcomes

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

1. *Describe the practices and procedures necessary for aircraft weighing and balancing.*
2. *Describe the maintenance practices and procedures directly associated with aircraft handling and storage.*
3. *Discuss the techniques required to carry out proper disassembly, inspection, repair and assembly on aircraft, associated components and parts.*
4. *Describe the maintenance procedures and requirements to be followed in the event of abnormal occurrences during the flight.*
5. *Explain the procedures and requirements associated with general Maintenance Procedures.*

Unit: ETACT-405-2004 Basic Aerodynamics

Guided Learning Hours: 50 hours
Level: 4
Credits: 5 ECVET

Unit Description

The intention of this unit is to help learners achieve a good understanding of how aircraft fly. This unit will therefore provide the learners with an understanding of the atmosphere and in addition to this the learners will also understand the importance of the International Standard Atmosphere (ISA) to aerodynamics. In this unit the learners will achieve an understanding of the basic flight principles, and how aircraft are controlled, manoeuvred and stabilised. This unit will mainly focus on subsonic flight, and will therefore explain the behaviour of airflow over different sections of the aircraft in such conditions. This includes understanding the forces that result from such airflow and the effect such forces would have on the performance of the aircraft during flight. Finally, this unit concludes with an analysis of the two types of stability, these being static and dynamic stability. Here the learner will understand how the aircraft manages to maintain its original flight path after displacement.

Learning Outcomes

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

1. *Discuss the application of the International Standard Atmosphere (ISA) to aerodynamics.*
2. *Analyse the generation of lift and drag for different aerodynamics conditions.*
3. *Explain the behaviour and performance of an aircraft with the surrounding atmosphere during flight.*
4. *Describe the longitudinal, lateral and directional stability of an aircraft.*

Unit: ETACT-406-2016 Advanced Digital Techniques and Electronics

Guided Learning Hours: 85 hours
Level: 4
Credits: 6 ECVET

Unit Description

This unit intends to further expand the learner's knowledge and understanding of electronics and digital techniques as applied to the world of aviation.

During this unit the diode is elaborated further as it expands on its operation and the materials used to make the diode. This also includes analysing a number of applications of the diode such as full and half wave rectifiers. This unit also elaborates further on the transistor and the different means of testing it. The Operational Amplifier, a voltage amplifier, will be explained in different configurations and its application in the world of electronics will be explored. Ultimately these electronic components are attached onto a Printed Circuit Board (PCB) whose design stage and fabrication process are explored as well. This unit also expands further on servomechanisms and furthermore the learner will be also taught about a number of synchro systems necessary for the operation of certain instruments.

The computer, being a fundamental system of today's aircraft, will be explored into further detail to allow the learner to become more acquainted with the computer's own internal structure and operation and the way it interfaces with the outside world.

Fibre optics technology has found increased application in modern technology and to some extent has found a place in aviation as well as it offers numerous advantages over conventional technology. For this reason, the learner will obtain general knowledge of the theoretical and practical aspects of the numerous pros and cons of such technologies, the way fibre optics are used for data transmission and the different components one would typically find in a fibre optic link.

Learning Outcomes

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

1. *Analyse electronic components and systems.*
2. *Analyse in detail the numbering systems, data conversion techniques and logic diagrams.*
3. *Understand the major components in a computer system.*
4. *Describe in detail fibre optics buses and typical systems arrangements and cockpit layout of electronic instruments systems.*

Unit: CDKSK-406-2015 Mathematics for Aviation Technicians

Guided Learning Hours: 60 hours
Level: 4
Credits: 6 ECVET

Unit Description

This unit has been designed to fulfil the requirements for EASA Part-66 Module 1 which consists of basic to intermediate level of mathematics. Furthermore, it acts as an essential basis for the successful completion of other units within the programme of study.

Initially, the learner will become familiar with basic rules governing rational and irrational numbers and then proceed to more advanced calculations as to include, but not limited to, exponential, conversion, ratios and proportions.

This will lead the learner to be able to understand and apply algebraic techniques to manipulate expressions and solve algebraic equations commonly found in engineering. This includes simple algebraic expressions and rules, linear and quadratic equations with one unknown, linear simultaneous equations, indices and powers, binary systems and logarithms.

Eventually, the learner will be introduced to geometry and trigonometry. The knowledge transmitted to the learner will enable him/her to be able to construct and determine the area and volume of simple and compound geometrical figures, graph equations of third order, use trigonometric ratios and translate a cartesian coordinates to polar coordinates.

In the last learning outcome, the learner will be engaged in topics related to costing methods and techniques such as, type of costs, simple and compound interest, taxes and discounts. This will prepare the learner for real-life problems related to cost management and forecasting.

Learning Outcomes

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

1. *Understand the use of rational and irrational numbers by applying the correct arithmetic process.*
2. *Apply algebraic techniques to manipulate expressions and solve equations.*
3. *Use trigonometric techniques to solve engineering problems.*
4. *Use geometric techniques to solve engineering problems.*

Unit: CDKSK-406-2016 Physics for Aviation Technicians

Guided Learning Hours: 60 hours
Level: 4
Credits: 6 ECVET

Unit Description

This unit has been designed to fulfil the requirements for EASA Part-66 Module 2 which covers matter, mechanics, thermodynamics, optics, sound and wave motion.

Initially, the learner will enhance their knowledge about the nature of different materials together with their physical and chemical properties. Also, the learner will be able to distinguish between the different states of matter.

In the second learning outcome, the learner will be introduced to mechanics. In relation to aviation, mechanics is divided into the following branches: statics which is the branch of mechanics that is concerned with the analysis of loads acting on physical systems that do not experience an acceleration but rather, are in static equilibrium with their environment; kinetics which is the branch of mechanics that is concerned with the relationship between motion (linear and circular) and its causes, specifically, forces and torques; dynamics which is the branch of mechanics that deals with the effect that forces have on the motion of objects; and fluid dynamics which is the branch in mechanics that describes the flow of fluids—liquids and gases. Fluid dynamics includes aerodynamics and hydrodynamics.

In the third learning outcome, the learner will be introduced to thermodynamics. The learner will be made familiar with different temperature scales, how heat is transferred and the relationships between heat and other forms of energy. In particular, the learner would be able to understand the application of the first and second law of thermodynamics together with other relevant theories, the effect of thermal energy when it is converted to and from other forms of energy, and how it affects matter.

In the final learning outcome, the learner will be introduced to concepts related to optics, wave motion and sound. In optics, the learner will be expected to understand laws related to reflection and refraction. Through the knowledge gained on wave motion, the learner will be able to understand better the effects and causes of mechanical waves and interferences. When dealing with sound, the leaner must be aware that sound travels through acoustic waves in matter. This will help the learner to understand better terms like the production, intensity, pitch and quality of sound, and of the Doppler effect.

Learning Outcomes

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

1. *Distinguish between different materials based on their physical and chemical properties.*
2. *Apply mechanics theory to an aviation setup.*
3. *Understand and apply principles of thermodynamics in an aviation setup.*
4. *Apply concepts of wave theory to optics, wave motion and sound.*

Unit:
ETACT-412-2005 Materials and Hardware for Aircraft Design, Manufacture and Maintenance

Guided Learning Hours: 120 hours
Level: 4
Credits: 12 ECVET

Unit Description

A fundamental requirement for all those that wish to practice as aircraft maintenance technicians is the understanding of the materials and hardware that is used to design, manufacture and maintenance. This applies to all levels of specialisation.

This unit will provide the learners with knowhow about the characteristics, properties and identification of common aircraft materials such as ferrous and non-ferrous metals, composite materials, wood and fabric. Methods used for testing aircraft materials for strength, as well as methods used for identifying the nature of corrosion that may occur on aircraft and detecting defects and levels of deterioration are covered.

The unit also provides in-depth understanding of the types of hardware found on aircraft. Fastening and locking devices are first tackled, followed by riveting, fluid, and aircraft mechanical control hardware. The final outcome of this unit is the understanding of the types, construction, characteristics, identification methods and use of electrical cables and connectors.

This unit should cover part of the knowledge required by a person willing to take the European Aviation Safety Agency (EASA) Part-66 examinations in Category B, particularly the knowledge required for Module 6 – Materials and Hardware.

Learning Outcomes

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

1. *Identify the main characteristics and properties of metallic materials used in aircraft design and construction.*
2. *Discuss the structural properties of non-metallic materials used in aircraft design and construction.*
3. *Describe the nature of and the methods used to identify the cause of defects and deterioration of different aircraft material.*
4. *Illustrate the types, characteristics and applications of fasteners and the general hardware used in aircraft mechanical systems.*

5. *Explain the characteristics, construction and applications of the hardware used for aircraft Electrical Wiring Interconnecting Systems (EWIS).*

Unit: ETACT-406-2006 Human Factors

Guided Learning Hours: 60 hours
Level: 4
Credits: 6 ECVET

Unit Description

This unit has been designed to fulfil the requirements for EASA Part-66 Module 10 and aims at providing an understanding of the role of the human factors in the aviation industry and also to increase the aircraft maintenance technicians' awareness regarding the consequences that a human error can have upon the safety of an aircraft.

Understanding human factors has become very important in the aviation industry since most of the aviation incidents and accidents are most of the time a consequence of a human error (73%) rather than that of a technical fault (11%). This course will provide the learner a comprehensive understanding of human factors that could impact the safety of an aircraft and to encourage all stakeholders to pay maximum attention at their workplace. Human factors discuss all elements that might lead to a lack of concentration, and/or a decrease in performance, and/or misunderstanding communication between team members, team leaders and other parties.

This unit is significant for technicians as it will enable them to perform requested tasks with more responsibility which will in turn lead to risk mitigation.

Learning Outcomes

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

1. *Identify the human factors (physical, psychological, environmental) that could affect ones' performance while carrying out a task in an aviation setup.*
2. *Evaluate human factors while performing tasks related to their job description.*
3. *Understand the type and implications of human errors while carrying out a task in an aviation setup.*
4. *Identify, mitigate and manage hazardous situations in an aviation setup.*

Unit: ETACT-406-2007 Aviation Legislation

Guided Learning Hours: 60 hours
Level: 4
Credits: 6 ECVET

Unit Description

This unit has been designed to fulfil the requirements for EASA Part-66 Module 10 which consists of understanding EASA Aviation Legislation applicable to the awareness needs of said licence including the structure of the rules, the role of the International Civil Aviation Organisation (ICAO), and the national authority (Transport Malta).

The learner will become familiar with the role of the different aviation regulatory bodies at a global, European and national level, and how regulations are implemented at different levels within member states. Moreover, the learner will be able to understand the relationship between the various annexes (Parts) such as Part-21 Part-145, Part-66, Part-147 and Part- M, and Regulation EU 965/2012.

Besides understanding the relationship between the various annexes, the learner will also be presented with a detailed explanation of the Certification Specifications (CS) of each annex and the requirements of Regulation EU 965/2012 for aircraft operations.

Finally, the learner will also be made aware of the applicable national and international requirements for the various processes to be carried out in relationship to maintenance and airworthiness.

Learning Outcomes

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

1. *Understand the role of aviation regulatory bodies and the relationship between the different annexes.*
2. *Analyse various laws, regulations and international conventions related to aviation and their application.*
3. *Discuss the certification specifications of different annexes as set by the different aviation regulatory bodies.*
4. *Identify and apply national and international legislation in tasks related to maintenance, repair and overhaul in the aviation industry.*

Unit: ETACT-409-2013 Turbine Engine Powered Aircraft Propulsion Systems

Guided Learning Hours: 90 hours
Level: 4
Credits: 9 ECVET

Unit Description

Modern medium sized and large aircraft are powered by Turbine engines. This unit is aimed to people that intend working in Aircraft Avionics Systems. As such it covers the basics related to the constructional arrangements and operation of different types of turbine engines like turbojet, turbofan, turboshaft and turbo-propeller engines. However, it covers in detail the control systems of modern turbine engines, that is an Electronic Control with full authority (Full Authority Digital Engine Control – FADEC).

Other aspects of special interest to the avionics trade that are covered in depth by this unit are the Indicating Systems related to turbine engines, as well as the Starting and Ignition Systems of Turbine Engines. This includes Temperature Indication, which is critical for ensuring proper and safe engine operation during the flight, and Speed indications, which are usually used as an indication of the thrust being produced by the turbine engine during flight. Maintenance Safety requirements related to the starting and ignition systems of turbine engines are also covered by this unit.

This unit should cover part of the knowledge required by a person willing to take the European Aviation Safety Agency (EASA) Part-66 examinations in Category B2 or B2L, particularly the knowledge required for Module 14 – Propulsion.

Learning Outcomes

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

1. *Identify the basic constructional arrangement and operation of different types of turbine engines.*
2. *Define the function and operation of the Full Authority Digital Engine Control.*
3. *Describe the function and operation of Turbine Engine Indicating Systems.*
4. *Describe the basic function and operation of turbine engine starting and ignition systems.*

Unit: ETACT-406-2014 Aircraft Aerodynamics, Structures and Systems

Guided Learning Hours: 60 hours
Level: 4
Credits: 6 ECVET

Unit Description

The intention of this unit is for the learner to become knowledgeable about the various systems one would typically find on an aircraft. In this unit the learner will become familiar with the theory of flight specifically with regards to aeroplane aerodynamics and flight controls, high speed flight and rotary wing aerodynamics. The learner will also become familiar with the fundamentals of structural systems and achieve general knowledge concerning zonal and station identification systems, electrical bonding and lighting strike protection provisions. The learner will also achieve a detailed understanding of the equipment and furnishings one would expect to find in an aircraft. General knowledge of the flight controls will also be taught including but not limited to the primary controls. Furthermore, the learner is expected to achieve detailed knowledge of the operation of the fly-by-wire system. The air conditioning and cabin pressurisation system will be analysed as well. Fire protection will also be covered in this unit giving special attention to fire and smoke detection and warning systems, fire extinguishing systems and systems tests. This unit will provide the learner with general knowledge about the fuel systems giving special attention to indications and warnings and the longitudinal balance of fuel systems. Hydraulic Power will also be covered in this unit where the learner is expected to achieve detailed knowledge for instance on pressure generation both during normal and emergency situations. Ice and Rain protection systems are a necessity for the safe operation of aircraft as these are natural occurrences during flight and thus must be tackled through necessary means. For this reason, this unit provides general knowledge to the learner with regards to such systems giving particular attention to de-icing systems and also probe and drain heating. The landing gear is also explained were the learner is expected to achieve detailed knowledge about: the extension and retraction systems during both normal and emergency operations, indications and warnings, steering, indications and warnings. The learner is also expected to achieve detailed knowledge about oxygen systems. This unit also provides the learner with general knowledge about water and waste systems and also pneumatic and vacuum systems.

Learning Outcomes

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

1. *Explain the theory of flight, the function and operation of flight controls and the general concepts of structures.*
2. *Discuss the electronic emergency equipment requirements and the cabin entertainment equipment, water and waste systems, and the ice, rain and fire protection systems.*
3. *Describe the oxygen, air conditioning, cabin pressurisation, pneumatic and vacuum systems.*
4. *Describe the fuel, hydraulic power and landing gear systems.*

Unit: ETACT-409-2015 Advanced Aircraft Electrical and Avionics Systems

Guided Learning Hours: 90 hours
Level: 4
Credits: 9 ECVET

Unit Description

This unit requires that the learners achieve detailed knowledge of the theoretical and practical aspects of electrical and avionics systems of an aircraft and furthermore be able to apply the separate elements of knowledge in a logical and comprehensive manner. This unit focuses in detail on the instruments, communication, navigation and autoflight systems one would typically find on an aircraft.

The autoflight system, responsible for automatically flying the aircraft, is a crucial avionics system of today's commercial aircraft. The learner gets to understand how autoflight systems process command signals coming from other avionics systems during different phases of the flight.

Communication and Navigation systems are very crucial systems for the safe operation of the aircraft. Communication systems allow the pilots to create a communication link between them and Air Traffic Controllers. Navigation Systems allow the avionics systems on board the aircraft to precisely calculate the position of the aircraft during all phases of the flight. Fundamentals of radio wave propagation, antennas, transmission lines, communication, receivers and transmitters will be studied in this unit.

Instrumentation allows the flight crew to understand the situation of the flight and therefore allows the crew to perform a safe and efficient flight. Instruments play an important role in avionics and therefore this topic is of great importance. Considering that commercial aircraft nowadays make use of what is referred to as a glass cockpit the learners during this topic get to appreciate the typical layout of such cockpits together with its benefits. A number of instruments will be studied in this case starting from the classification of instruments where for instance one can find the flight instruments and the engine indication ones.

Learning Outcomes

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

1. *Understand the working principle of the Autoflight system.*
2. *Explain the function of an aircraft communication system.*
3. *Analyse the principle function of a navigation system of an aircraft.*
4. *Classify the instruments found in the cockpit of a typical aircraft.*