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| Course Title | **Introduction to Air Traffic Services** | | | | |
| Course Code | AVM115 | | | | |
| Course Type | Major elective | | | | |
| Level | Bachelor (1st cycle) | | | | |
| Year / Semester | 1st Year / 2nd Semester | | | | |
| Instructor's name | TBA | | | | |
| ECTS | 5 | Lectures / week | 3 Hours/ 14 Weeks | Laboratories / week | None |
| Course Purpose and Objectives | The purpose of the Introduction to Air Traffic Services (ATS) course is to provide the student with the basic knowledge of the services provided by States to the users of the airspace. The course spans subjects like the aviation legal framework and international organizations, airspace structure, the basic International Civil Aviation Organization Annexes relating to ATS, the description and basic obligations of States regarding air traffic services, air traffic flow and capacity management, the basics of air traffic control and an overview of air traffic controller training and licensing. The course will also span the latest technological developments in the air traffic control and the European initiatives in the evolution of the profession. | | | | |
| Learning Outcomes | Upon successful completion of this course students should :<br>• Recognise the role of each organization in the development of civil aviation<br>• Be able to understand the main principles and issues relating to the provision of air traffic services including vital parts of the legal framework – obligation of States.<br>• Be able to describe the parts that constitutes each air traffic service.<br>• Understand how air traffic control works and the basic type of separations used.<br>• Have an overview of the latest air traffic controller systems and tools used for the provision of air traffic control.<br>• Recognise the different type of services per airspace classification and the associated type of flights.<br>• Be able to understand the role of air traffic flow and capacity management and the act of balancing demand to capacity and how air traffic control delays are generated. | | | | |

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<tr><td></td><td colspan="3"><ul><li>Be able to understand the range of the air traffic controller training through an overview of the basic elements of the training and the obligations of the air traffic controller.</li><li>Be able to appreciate the rapid evolution of the air traffic services via the latest European initiatives and current projects.</li></ul></td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Co-requisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">The material included in this course cover the following subjects:<ul><li>Aviation law - National and International Organisations, Name the key national and international aviation organisations, e.g. ICAO, ECAC, EASA, EUROCONTROL, National Authority, Describe the impact these organisations have on ATS.</li><li>ICAO- Explain the purpose and function of ICAO, describe the methods by which ICAO notifies and implements legislation, e.g. SARPS, PANS, ICAO Annexes, ICAO Documents, ICAO regional offices.</li><li>RULES AND REGULATIONS in the provision of ATS- Explain the objectives of ATS- Differentiate between the Air Navigation Services, explain the considerations, which determine the need for the ATS, analysis of ICAO Annex 11, differentiate between the various ATS.</li><li>Airspace and ATS routes- Explain ICAO airspace classification, differentiate between the different types of airspace. e.g. Control zones, control areas, airways, upper and lower airspace, restricted areas, prohibited and danger areas, FIR, aerodrome traffic zone, control zones, control areas, ATS routes, upper and lower airspace, restricted areas, prohibited and danger areas, FIR, aerodrome traffic zone, etc. etc. Differentiate between the different types of ATS routes- airway, arrival route, departure route, advisory route, controlled route, uncontrolled route. Decode information from aeronautical charts.</li><li>Rules of the Air- Explain the Rules of the Air (ICAO Annex 2 and ICAO Annex 11. Appreciate the influence of relevant flight rules on ATC. General flight rules, instrument flight rules, visual flight rules. Appreciate the differences between flying in accordance with VFR and IFR, in VMC and IMC. Explain the functions of a flight plan. Explain the different types of flight plans and associated update messages. Explain the pilot’s responsibilities in relation to adherence to flight plan</li></ul></td></tr>
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| | • **Aerodromes-** Describe the general design and layout of an aerodrome- Runway(s), taxiways, apron, movement area, manoeuvring area, designated positions on an aerodrome. Explain the numbering system and orientation of runways. Differentiate between different types of aerodromes- Controlled, uncontrolled, military, international, and regional. Describe designated positions in the traffic circuit, list the factors affecting the selection of runway in use.<br>• **AIR TRAFFIC MANAGEMENT -** *Air Traffic Control Service*- Define ATC service (ICAO Annex 11), Explain the division of the ATC service, Explain the responsibility for the provision of the ATC service, differentiate between the different methods of ATC service. **Flight Information Service**- Define FIS. Describe the scope of the FIS, explain the responsibility for the provision of the FIS. State the methods of transmitting information. *Alerting Service*- Define ALRS, Describe the scope of the ALRS. Explain the responsibility for the provision of the ALRS. Differentiate between the phases of emergency- Uncertainty, alert, distress. Describe the organisation of an ALRS. Responsibilities, local organisation- describe the cooperation between units providing the alerting services and the Search and Rescue units. Differentiate between distress and urgency signals, e.g. Mayday, Pan, visual signals, etc.<br>• **ATS System Capacity and Air Traffic Flow Management -** Define ATFM, state the scope of capacity management, explain the responsibility for the provision of ATFCM, and state the methods of providing ATFCM.<br>• **Airspace Management** - Define ASM, describe the scope of ASM, flexible use of airspace.<br>• **RADIOTELEPHONY (RTF)** - Explain the need for approved phraseology, communication techniques, Readback /verification of readback. *ATC CLEARANCES AND ATC INSTRUCTIONS* - Type and Content of ATC Clearances, Define ATC clearance, describe the contents of an ATC clearance. ATC Instructions- Define ATC Instructions, describe the contents of an ATC instructions, issue appropriate ATC instructions.<br>• **COORDINATION in ATC** - Explain the principles, types and content of coordination, e.g. notification, negotiation, agreement, transfer of flight data and local agreements, etc. Necessity for coordination- Local agreements. Describe the |

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| | means of coordination e.g. Data link, telephone, intercom, voice, etc.<br>• **SEPARATIONS-** State the vertical separation standards and procedures. State the longitudinal separation standards and procedures based on time and distance. State the lateral separation standards and procedures. Visual Separation, state the occasions when clearance to fly maintaining own separation while in VMC can be used. State the aerodrome separation standards and procedures. Separation on the manoeuvring area, in the traffic circuit, for departing and arriving aircraft. Wake Turbulence Separation. Explain the wake turbulence categories and separations. Separation based on ATS surveillance systems- Separation (e.g. vertical, longitudinal, lateral, aerodrome, based on ATS surveillance systems, distances from airspace boundaries), identification, monitoring, vectoring,<br>• **AIRBORNE COLLISION AVOIDANCE SYSTEMS AND GROUND-BASED SAFETY NETS -** Main characteristics of airborne warning systems and their relevance to ATC operations, e.g. ACAS, GPWS, Wind shear alerts. State the function of ACAS Traffic Alerts and Resolution Advisories. List, in the correct order, the actions of the pilot following the generation of ACAS event. Describe the controller responsibility during and following an ACAS RA reported by pilot. List the ACAS limitations. Differentiate between ACAS advisory thresholds and ATC separation standards. *Ground-based Safety Nets* -State the main characteristics of ground-based safety nets and their relevance to ATC operations e.g. STCA, MSAW, APW, APM<br>• **DATA DISPLAY**- Describe flight plan processing, e.g. AFTN, IFPS, encode and decode flight plans. Update the data display to accurately reflect the traffic situation.<br>• **Maps and Charts Used in Aviation**- Differentiate between the various maps and charts. State the specific use of various maps and charts. Decode symbols and information displayed on maps and charts.<br>• **INSTRUMENTAL NAVIGATION** - Explain the basic working principles of ground-based systems, VDF, NDB, VOR, DME, ILS. Basics of area navigation. |

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| | • **EQUIPMENT AND SYSTEMS**- Characterise the main items of ATC equipment, communication equipment, VDF/UDF, radars. RADIO- radio theory, limitations, characteristics and limitations of frequency bands, use in ATC, navigation and communications. *Air Ground Communications*- the use of controller pilot datalink communications (CPDLC). ***RADAR***- principles of radar. Recognise the characteristics of radar wavelengths. Recognise the use, characteristics and limitations of different radar types, e.g. frequency bands, long and short-range radar, weather radar, high-resolution radar. ***Primary Radar***- Explain the working principles of PSR. ***Secondary Radar*** - Explain the working principles of SSR, Mode A, Mode C. Explain SSR code management, discrete vs non-discrete codes, special codes. Explain the use of PSR/SSR in ATC, e.g. area, approach, aerodrome, surface movement radar, DFTI. Explain the link between PSR/SSR with automated systems. Explain the advantages and disadvantages of PSR/SSR. ***Mode S***- State the principles of Mode S and explain the use of Mode S in ATC systems. AUTOMATIC DEPENDENT SURVEILLANCE -State the working principles of ADS. Explain the use and limitations of ADS. FUTURE EQUIPMENT- developments in the equipment field. Aeronautical Fixed Telecommunication Network- Describe the principles of AFTN. Recognise the benefits of automatic exchange of ATS data in coordination and transfer processes. Accuracy, speed and safety, non-verbal communications.<br>• **HUMAN element** – the air traffic controller, selection process, characteristics, obligations, Professional Conduct, stress and fatigue, teamwork, human error. |
| Teaching Methodology | Face-to-face |
| Bibliography | • **Michael S. Nolan.** *Fundamentals of Air Traffic Control 5th Edition*. Delmar Cengage Learning; 2010. ISBN 978-1435482722<br>• **U. S. Department of Transportation, Federal Aviation Administration.** *Air Traffic Organization Safety Management System Manual*. CreateSpace Independent Publishing Platform (2013). ISBN 978-1490418971.<br>• **ICAO Annexes**<br>• **EUROCONTROL manuals** |

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| Assessment | Examinations | 70% |
| | Assignment(s) | 20% |
| | Participation | 10% |
| | | 100% |
| Language | English | |