

Course Title	<b>Radio Navigation</b>				
Course Code	AVM221				
Course Type	Compulsory for Air Operations Specialization				
Level	Bachelor (1 <sup>st</sup> cycle)				
Year / Semester	2 <sup>nd</sup> Year / 2 <sup>nd</sup> Semester				
Instructor's name	TBA				
ECTS	5	Lectures / week	3 Hours /14 Weeks	Laboratories / week	None
Course Purpose and Objectives	<p>The purpose of the Radio Navigation course is to provide the student with knowledge regarding the theories and systems that enable radio navigation in an aircraft. It will essentially provide the background knowledge that will enable the student pilot to gain competency in using those instruments during practical training. The course aims in covering subjects that include basic radio propagation theory, radio aids (e.g. Ground D/F, NDB/ADF, VOR, DME, ILS etc.), Radar theory and systems, Area Navigation Systems (RNAV, FMS) and Global Satellite Navigations Systems.</p>				
Learning Outcomes	<p>Upon successful completion of this course students should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the main principles of radio propagation theory.</li> <li>• Describe the main characteristics and types of antennas.</li> <li>• Explain the principles, application, usage and error handling of radio aids such as Ground D/F, NDB/ADF, VOR, DME, ILS etc.</li> <li>• Describe the main principles of radar theory.</li> <li>• Explain the principles, application, usage and error handling of radar systems (Ground Radar, Airborne Weather Radar, Secondary Surveillance Radar and Transponder).</li> <li>• Explain the principles and application of the area navigation and flight management systems (RNAV/FMS).</li> <li>• Explain the principles and application of the main Global Navigation Satellite Systems (GPS, GLONASS, GALILEO, EGNOS).</li> </ul>				
Prerequisites	AVM213	Co-requisites	None		

Course Content

The material included in this course cover the following subjects:

- **Basic radio propagation theory:** Basic Principles (Electromagnetic Waves, Frequency, wavelength, amplitude, phase angle, Frequency bands, sidebands, single sideband, Pulse characteristics, Carrier, modulation, Kinds of modulation), Antennas (Characteristics, Polarisation, Types of antennas), Wave propagation (Structure of the ionosphere, Ground waves, Space waves, Propagation with the frequency bands, Doppler principle, Factors affecting propagation).
- **Radio aids:** Ground D/F (Principles, Presentation and interpretation, Coverage and range, Errors and accuracy), NDB/ADF (Principles, Presentation and interpretation, Coverage and range, Errors and accuracy, Factors affecting range and accuracy), VOR and Doppler-VOR (Principles, Presentation and interpretation, Coverage and Range, Errors and accuracy), DME (Principles, Presentation and interpretation, Coverage and Range, Factors affecting range and accuracy), ILS (Principles, Presentation and interpretation, Coverage and Range, Errors and accuracy, Factors affecting range and accuracy), MLS (Principles, Presentation and interpretation, Coverage and Range, Errors and accuracy).
- **Radar:** Pulse Techniques and Associated Terms, Ground Radar (Principles, Presentation and interpretation), Airborne Weather Radar (Principles, Presentation and interpretation, Coverage and Range, Errors, accuracy, limitations, Factors affecting range and accuracy, Application for navigation), Secondary Surveillance Radar and Transponder (Principles, Modes and codes, Presentation and interpretation, Elementary surveillance, Enhanced surveillance, Errors and Accuracy).
- **Area Navigation Systems (RNAV/FMS):** General Philosophy and Definitions (Basic RNAV (B-RNAV)/precision RNAV (P-RNAV)/ RNP-PNAV, Principles of 2D RNAV, 3D RNAV and 4D RNAV, Required Navigation Performance (RNP) in accordance with ICAO DOC 9613), Simple 2D RNAV (Flight deck equipment, Navigation computer, VOR/DME navigation, Navigation computer input/output), 4D RNAV (Flight deck equipment, Navigation computer, VOR/DME navigation, Navigation computer input/output), FMS and General Terms (Navigation and flight management, Flight management computer, Navigation data base, Performance data base, Typical input/output data from the FMC, Determination of the FMS-position of the aircraft), Typical Flight Deck Equipment Fitted on FMS Aircraft (Control and display unit (CDU), EFIS instruments (attitude display, navigation display), Typical modes

	<p>of the navigation display, Typical information on the navigation display).</p> <ul style="list-style-type: none"> <li>• <b>Global Navigation Satellite Systems:</b> GPS/GLONASS/GALILEO (Principles, Operation), NAVSTAR GPS (Space segment, Control Segment, User Segment, NAVSTAR GPS Integrity), GLONASS, GALILEO (GALILEO future developments, Errors and Factors affecting accuracy, Ground , Satellite and Airborne Based Augmentation Systems, Ground based augmentation systems, Satellite Based Augmentation Systems ( SBAS)), EGNOS (Airborne Based Augmentation Systems ( ABAS)).</li> </ul>						
Teaching Methodology	Face-to-face						
Bibliography	<ul style="list-style-type: none"> <li>• Bristol ATPL (A) Groundschool Manual &amp; CBT Software</li> </ul>						
Assessment	<table border="0"> <tr> <td>Examinations</td> <td style="border: 1px solid black; text-align: center;">90%</td> </tr> <tr> <td>Participation</td> <td style="border: 1px solid black; text-align: center;">10%</td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: center;">100%</td> </tr> </table>	Examinations	90%	Participation	10%		100%
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	100%						
Language	English						