

## Subject Description Form

<b>Subject Code</b>	AAE4301
<b>Subject Title</b>	Avionics Systems
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	To provide students with knowledge of communications, electronics aspects of avionics, including aircraft instruments and integrated systems, and navigation systems.
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>a) understand the function and possess essential knowledge and skills the components of avionics systems.</li> <li>b) use the techniques, skills and modern computational and information technology necessary for engineering practice; and</li> <li>c) extend the knowledge of avionics systems to different situations of professional engineering context to communicate effectively and professionally with appropriate languages and tools in avionics system.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Regulatory Agencies &amp; related documents:</b> ICAO Annex 10, F AA, RTCA; Concept of TSO; ARINC; DO-160.</p> <p><b>Airborne Communications Systems:</b> VHF &amp; HF transceivers, VDL modes; NAVCOM; EPIRB.</p> <p><b>Terrestrial Radio Navigation &amp; Landing Aids:</b> NDB; VOR; DVOR; DME; ILS &amp; GP; Radar altimeters &amp; AID.</p> <p><b>Surveillance Systems:</b> Primary &amp; Secondary Radars; ATCRBS replies; TCAS; ADS-B.</p> <p><b>Air Data Computer:</b> Pitot tube, the principles and roles of ASI, VSI, barometer and machmeter.</p> <p><b>Inertial Navigation Systems:</b> Magnetometer, gyroscope, accelerometer, artificial horizon. Gimbal and strapdown INS. Dead-reckoning.</p> <p><b>On Board Data Buses:</b> ARINC 429; ARINC 629; ARINC 825 CAN Bus.</p> <p><b>Electronic Flight Control:</b> FBW flight control features. Control laws. Safety and integrity. Redundancy and failure survival. Digital implementation and problems. Flight control software functions including autopilot and flight management system.</p> <p><b>Case study:</b></p> <ul style="list-style-type: none"> <li>• Case study on an avionics system/avionics subsystem/avionics component</li> </ul>

<b>Teaching/Learning Methodology</b>	<ol style="list-style-type: none"> <li>The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.</li> <li>The continuous assessment and examination are aimed at providing students with integrated knowledge required for avionics systems.</li> <li>The laboratory will provide the students with hand-on experience on the instrumentation and measurement of physical variables such flight simulator or avionics trainer.</li> <li>Technical/practical examples and problems are raised and discussed in class/tutorial sessions.</li> </ol>				
	Teaching/Learning Methodology		Intended subject learning outcome		
			a	b	c
	1. Lecture		✓	✓	✓
	2. Homework assignment		✓	✓	✓
	3. Laboratory		✓	✓	
4. Case study report		✓	✓	✓	

<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="3">Intended subject learning outcomes to be assessed</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>1. Homework assignment</td> <td>20%</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>2. Lab Report</td> <td>10%</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>3. Case study report</td> <td>30%</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>4. Examination</td> <td>40%</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			a	b	c	1. Homework assignment	20%		✓		2. Lab Report	10%	✓	✓		3. Case study report	30%			✓	4. Examination	40%	✓	✓		Total	100 %			
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	4. Examination	40%	✓	✓																																		
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<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Overall Assessment:</p> $0.40 \times \text{End of Subject Examination} + 0.60 \times \text{Continuous Assessment}$ <p>The continuous assessment consists of three components: homework assignments, test, and case study report. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.</p> <p>The examination is used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.</p>																																						

<b>Student Study Effort Expected</b>	Class contact:	
	▪ Lecture/Tutorial	39 Hrs.
	Other student study effort:	
	▪ Self Study	44 Hrs.
	▪ Case Study	22 Hrs.
	Total student study effort	105 Hrs.
<b>Reading List and References</b>	<ol style="list-style-type: none"> <li>1. Helfrick A, Principles of Avionics, 9th Edition, Avionics Communications, 2015.</li> <li>2. Tooley M, and Wyatt, Aircraft Electrical and Electronic Systems: Principles, Maintenance and Operation, Elsevier Ltd, 2009.</li> <li>3. Collinson R.P.G., Introduction to Avionics Systems, Third Edition, Springer, Feb 2011.</li> <li>4. Kayton Myron Walter R. Fried, Avionics Navigation Systems, Second Edition, John Wiley and Son, Published online 2007.</li> <li>5. Pilot's Handbook of Aeronautical Knowledge, U.S. Department of Transportation, FAA, Flight Standards Service, 2008.</li> <li>6. Advanced Avionics Handbook, U.S. Department of Transportation, FAA, Flight Standards Service, 2009.</li> <li>7. Alexander V. Nebylov, Aerospace sensors, Momentum Press, 2013.</li> </ol>	

Revised in January 2022