

### Subject Description Form

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| <b>Subject Code</b>                              | EIE4112  |
| <b>Subject Title</b>                             | Avionics Systems   |
| <b>Credit Value</b>                              | 3  |
| <b>Level</b>                                     | 4  |
| <b>Pre-requisite</b>                             | AAE3005 Introduction to Aircraft Design & Aviation Systems or<br>EIE3331/EIE3381/EIE331/EIE381 Communication Fundamentals or<br>ME45002 Aircraft Systems   |
| <b>Co-requisite/<br/>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>1. Possess essential knowledge and skills in the area of avionics systems;</li> <li>2. Apply their knowledge, skills and hand-on experience to manufacture and maintain existing products; analyze and develop new modules and components in avionics systems for desired needs;</li> <li>3. Extend their knowledge of avionics systems to different situations of engineering context and professional practice.</li> </ol>   |
| <b>Subject Synopsis/<br/>Indicative Syllabus</b> | <p><b>Regulatory Agencies &amp; related documents:</b> ICAO Annex 10, FAA, 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>Satellite Navigation:</b> Introduction to GNSS and its impacts on Performance-based navigation – RNAV &amp; RNP.</p> <p><b>Surveillance Systems:</b> Primary &amp; Secondary Radars; ATCRBS replies; TCAS; ADS-B.</p> <p><b>Cockpit Integration:</b> Display technologies; Instrument Placement.</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.</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> |

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|---|--|------------------------------------|---|-----------|---|--|
| Teaching/Learning Methodology                                   | 1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.  |                                    |   |           |   |  |
|   | 2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for avionics systems.  |                                    |   |           |   |  |
|   | 3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.  |                                    |   |           |   |  |
|   | Teaching/Learning Methodology  | Intended subject learning outcomes |   |           |   |  |
|   |  | 1                                  | 2   | 3         |   |  |
|   |  | 1. Lecture                         | √   | √         |   |  |
|   |  | 2. Tutorial                        | √   | √         |   |  |
|   |  | 3. Homework assignment             | √   | √         |   |  |
| 4. Case study report  | √  | √                                  | √   |           |   |  |
| Assessment Methods in Alignment with Intended Learning Outcomes | Specific Assessment Methods/Tasks  | % Weighting                        | Intended subject learning outcomes to be assessed |           |   |  |
|   |  |                                    | 1   | 2         | 3 |  |
|   | 1. Homework assignment   | 20%                                | √   | √         | √ |  |
|   | 2. Test  | 20%                                | √   | √         |   |  |
|   | 3. Case study report   | 20%                                | √   | √         | √ |  |
|   | 4. Examination   | 40%                                | √   | √         | √ |  |
|   | Total  | 100%                               |   |           |   |  |
|   | Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:  |                                    |   |           |   |  |
|   | Overall Assessment:  |                                    |   |           |   |  |
|   | 0.40 × End of Subject Examination + 0.60 × Continuous Assessment   |                                    |   |           |   |  |
|   | 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. |                                    |   |           |   |  |
|   | 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.   |                                    |   |           |   |  |
| Student Study Effort Expected                                   | Class contact:   |                                    |   |           |   |  |
|   | • Lecture  |                                    |   | 26 Hours  |   |  |
|   | • Tutorial   |                                    |   | 13 Hours  |   |  |
|   | Other student study effort:  |                                    |   |           |   |  |
|   | • Self Study   |                                    |   | 44 Hours  |   |  |
|   | • Case Study   |                                    |   | 22 Hours  |   |  |
|   | Total student study effort:  |                                    |   | 105 Hours |   |  |

|                                    |  |
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| <b>Reading List and References</b> | <ol style="list-style-type: none"> <li>1. Helfrick A, Principles of Avionics, 7th Edition, Avionics Communications, 2012.</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> </ol> |
| <b>Last Updated</b>                | August 2017  |
| <b>Prepared by</b>                 | Dr Martin Chow   |