Subject Description Form

Subject Code	ME583
Subject Title	Advanced Avionics Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in mathematics, electronics, and physics.
Objectives	To provide students with knowledge of communications, electronics and electrical aspects of avionics, including aircraft electrical systems, aircraft instruments and integrated systems, and navigation systems
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. possess state-of-the-art knowledge and skills in the area of advanced avionics systems; b. apply their knowledge, skills and hand-on experience to design, develop, manufacture, and analyze new products with advanced avionics systems for desired needs; c. extend their knowledge of advanced avionics systems to different situations of engineering context and professional practice; and d. have recognition of the need for, and an ability to engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	***Typical Avionics Systems:*** Radio Terrestrial Navigation Aids (NDB/ADF, VOR, DME, ILS), Radar, ADS-B and their working principles. ***Inertial Sensors and Navigation Systems:*** Gyros and accelerometers. Inertial navigation system. Strapdown system. Attitude and heading reference systems. ***Global Navigation Satellite System:*** the required navigation performance; accuracy and integrity; least squares and estimation theory; satellite position determination; DOP. ***Aircraft Based Augmentation System:*** single point positioning, RAIM, consistency check, protection level, availability prediction ***Satellite Based Augmentation System:*** large area differential positioning, ionosphere correction, integrity information, example systems ***Ground Based Augmentation System:*** local area differential positioning, threats characterization, integrity monitoring, future development. ***Aircraft Integrated Systems:*** Integrated system of substantially all aircraft attitude and flight path command and control parameters and mode annunciation for the flight director and automatic pilot systems. Real time software and advanced distributed architectures. ***Case study and/or Technical Visits:*** • Technical visits to an aircraft maintenance organization's avionics workshop and/or flight simulator. • Case study on an avionics system/avionics subsystem/avionics component.

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 advanced avionics systems.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

Teaching/Learning Methodology	Intended subject learning outcomes			
	a	b	c	d
1. Lecture	√	√	√	√
2. Tutorial	√	√	√	√
3. Homework assignment	√	√	√	√
4. Case study report and presentation	√	√	√	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignment	20%	√	√	√	√
2. Test	20%	√	√		
3. Case study report and presentation	20%	√	√	√	
4. Examination	40%	√	√	√	√
Total	100%				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Overall Assessment:

$0.40 \times$ End of Subject Examination + $0.60 \times$ Continuous Assessment

The continuous assessment consists of three components: homework assignments, test, and case study report & presentation. 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	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Collinson R.P.G., *Introduction to Avionics Systems*, Springer, latest edition.
2. Tooley M, and Wyatt, *Aircraft Electrical and Electronic Systems: Principles, Maintenance and Operation*, Elsevier Ltd, latest edition.
3. Helfrick A, *Principles of Avionics*, Avionics Communications, latest edition.
4. Kayton Myron Walter R. *Fried Avionics Navigation Systems*, John Wiley and Son, Published online, latest edition.