

## Subject Description Form

<b>Subject Code</b>	ME45002
<b>Subject Title</b>	Aircraft Systems
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Pre-requisite: ME34004 Fluid Mechanics
<b>Objectives</b>	To develop students' fundamental knowledge and basic concepts on components and operating principles of essential mechanical and electrical systems in civil transport aircraft.
<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. Demonstrate good understanding of the principles of flight control and various systems in civil transport aircraft; and formulate and solve problems relating to aircraft systems.</li> <li>b. Identify the flight control and utility functions to be considered in the design of an aircraft hydraulic system.</li> <li>c. Explain major electrical loads and the characteristics of modern aircraft electrical system.</li> <li>d. Explain the need for cabin and avionics conditioning and outline recent advances in aircraft environmental control system design.</li> <li>e. Explain the design philosophy and objectives of aircraft emergency systems.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b><i>Flight Control Systems</i></b> - Principles of flight control. Primary and secondary flight controls. Flight phases.</p> <p><b><i>Power Plant</i></b> - Fuel efficiency. Effect of specific thrust. Specific fuel consumption and flight speed. Engine cycle and performance.</p> <p><b><i>Fuel Systems</i></b> - Characteristics of aircraft fuel systems. Fuel system components. Aircraft mass and payload.</p> <p><b><i>Hydraulic Systems</i></b> - Flight control and utility functions. Emergency power sources. Landing-gear system. Braking and anti-skid.</p> <p><b><i>Electrical systems</i></b> - Characteristics of civil aircraft electrical system. Electrical loads. Emergency power generation.</p> <p><b><i>Pneumatic systems</i></b> - Pitot-static systems. Use of engine bleed air. Bleed air control. Thrust reversers.</p> <p><b><i>Environmental Control Systems</i></b> - The need for cabin and equipment conditioning. Environmental control system design. Air distribution systems. Cabin pressurization.</p> <p><b><i>Emergency Systems</i></b> - Warning systems. Fire detection and suppression. Emergency oxygen. Explosion suppression. Passenger evacuation.</p>

**Teaching/Learning Methodology**

Lectures are used to deliver the fundamental knowledge in relation to various aircraft systems (outcomes a to e).

Tutorials are used to illustrate the application of fundamental knowledge to practical situations (outcomes a to e).

Industrial visits and special seminars delivered by invited industrial professionals are used to relate the concepts learnt on class to engineering practices. Students are expected to achieve better understanding of aircraft systems through these activities (outcomes a to e).

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lecture	√	√	√	√	√
Tutorial	√	√	√	√	√
Industrial field visit and special seminar	√	√	√	√	√

**Assessment Methods in Alignment with Intended Learning Outcomes**

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
1. Examination	50%	√	√	√	√	√
2. Assignment and test	40%	√	√	√	√	√
3. Industrial field visit and visit report, report for special seminars	10%					√
Total	100%					

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

Overall Assessment:  
 $0.50 \times \text{End of Subject Examination} + 0.50 \times \text{Continuous Assessment}$

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by continuous assessment including assignments, closed-book tests, industrial visits and special seminars. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus.

<b>Student Study Effort Expected</b>	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Course work	20 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	104 Hrs.
<b>Reading List and References</b>	<ol style="list-style-type: none"> <li>1. The Rolls-Royce Book of the Jet Engine, latest edition, Rolls-Royce Ltd, latest edition.</li> <li>2. SAE Aerospace Information Report 5005, Aerospace – Commercial Aircraft Hydraulic Systems, latest edition.</li> <li>3. I. Moir and A.G. Seabridge, Design and Development of Aircraft Systems – An Introduction, First Edition, AIAA Education Series, latest edition.</li> </ol>	

*Revised July 2014*