	Ministry of Higher Education and Scientific Research - Iraq Warith Al-Anbiyaa University College of Engineering Department of Aircraft Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Aircraft Electrical and Electronic Systems منظومات كهربائية والكترونية للطائرة			**Module Delivery**	
Module Type	CORE			**Theory** **Lab**	
Module Code	AIEN366				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	6	
Administering Department	ME		**College**	ME	
Module Leader	Dr.		**e-mail**		
Module Leader's Acad. Title	Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.		**e-mail**		
Review Committee Approval	01/12/2025		**Version Number**	2025	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	***	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The goal of the course is for the student to learn how to deal with the electronic systems of aircraft, how to manage them, control their work performance, maintain their efficiency during operation, and get rid of the problems that may be exposed to them in order to avoid potential malfunctions and errors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student learns the basic concepts of aviation electronic systems 2. The student's understanding of aircraft electronics and how to deal with it, design it, and operate it 3. The student's ability to deal with electrical and electronic devices
Indicative Contents المحتويات الإرشادية	Electrical power sources in aircraft, General introduction. Main sources and drives, Auxiliary sources, Emergency sources [4hr] DC generators [4hr] AC generators [4hr] DC,AC motors [2hr] Generators and motors characteristics [2 hr] Torque, speed, and load characteristics [2hr] Power generation control: Stabilizers, Voltage regulators, Differential relays [4hr] Power supplies: Inverters/ Converters. Transformer Rectifier Units (TRU). Auto-Transformers. Auxiliary power unit [5hr] Power distribution and electrical loads [2hr] Emergency power generation[2hr], Electronic fundamentals [6hr] Major Avionic Systems [4hr] Aircraft Communication Addressing and Reporting System (ACARS). Electronic Flight Instrument Systems (EFIS) – Displays- Operation.[5hr] Electronic Centralized Aircraft Monitor (ECAM). Engine Indicating and Crew Alerting System (EICAS) [5hr] Flight Management System (FMS), Global Positioning System (GPS) Space, User, Control segments, GPS frequencies[6hr] Inertial Reference System (IRS)[4hr] Inertial Navigation System (INS)[2hr], Gimballed systems[4hr] Traffic Alert Collision Avoidance System (TCAS)[4hr] Automatic Test Equipment (ATE) [4hr] Built-In Test Equipment (BITE) [4hr]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in presenting this unit is to encourage students' participation in knowing the basics of aviation systems and familiarizing themselves with these systems. This will be achieved through classrooms and interactive educational programs.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 6,9,12	All
	Assignments	2	10% (10)	5, 10	All
	Report	Lab. 4	10% (10)	Continuous	
	Projects / Lab.	-	-	-	-
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Electrical power sources in aircraft:** General introduction. Main sources and drives. Auxiliary sources. Emergency sources.
Week 2	**DC generators:** Basic theory. Construction.
Week 3	**AC generators:** Basic theory. Construction.
Week 4	**DC,AC motors:** Basic theory. Construction.

Week 5	**Generators and motors characteristics:** Torque, speed, and load characteristics. Losses and efficiencies.
Week 6	**Power generation control:** Stabilizers. Voltage regulators. Differential relays.
Week 7	**Power supplies:** Inverters/ Converters. Transformer Rectifier Units (TRU). Auto-Transformers. Auxiliary power unit.
Week 8	**Power distribution and electrical loads:** Primary power distribution. Secondary power distribution. Electrical loads. Typical aircraft DC system.
Week 9	**Emergency power generation:** Ram air turbine. Backup power converters. Permanent Magnet Generators (PMG). Batteries: Lead-acid batteries, Nickel-cadmium batteries, Lithium batteries. Nickel-metal hydride batteries, Battery locations, Battery venting, Battery connections.
Week 10	**Electronic fundamentals:** Semiconductor theory. Diodes. Transistors. Integrated circuits.
Week 11	**Major Avionic Systems:** Aircraft Communication Addressing and Reporting System (ACARS).
Week 12	**Electronic Flight Instrument Systems (EFIS) –** Displays. Electronic Flight Instrument Systems (EFIS) – Operation.
Week 13	**Electronic Centralized Aircraft Monitor (ECAM).** Engine Indicating and Crew Alerting System (EICAS). Fly-By-Wire (FBW).
Week 14	**Flight Management System (FMS).** **Global Positioning System (GPS):** Space, User, Control segments. GPS frequencies. Inertial Reference System (IRS) Inertial Navigation System (INS) Gimballed systems.
Week 15	**Traffic Alert Collision Avoidance System (TCAS).** **Test Equipment:** Automatic Test Equipment (ATE). Built-In Test Equipment (BITE).
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp.1: Aircraft Electrical Drive Systems
Week 2	Exp. 2: Aircraft Electrical Actuating Devices
Week 3	Exp. 3: Aircraft APU & GPU Systems Auxiliary Power Unit – Ground Power Unit
Week 4	Exp. 4: Aircraft RAT & TRU Systems (Ram Air Turbine – Transformer Rectifier Unit

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Ian Moir and Allan Sea bridge" Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration ", 3rd edition, John Wiley & Sons, Ltd., 2008. 2. Mike Tooky, "Aircraft Electrical and Electronic systems", Butterworth-Heinemann, 2017.	Yes
Recommended Texts	1. Mike Tooley, "Aircraft Digital Electronic and Computer Systems", ELSEVIER, 2007.	Yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.