MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Advanced automotive technology			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU12032				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	**Semester of Delivery**		1
Administering Department		ATU12	**College**	PMTE	
Module Leader	Ahmed Dheyaa Rabee		**e-mail**	coj.ahm1@atu.edu.iq	
Module Leader's Acad. Title		assistant lecturer	**Module Leader's Qualification**		MS.c
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. provides the students with an up-to-date knowledge of the latest technology adopted in automotive industry 2. future trends and up to date of automotive industry 3. innovations in automotive technology. 4. Satellite connection and vehicle to vehicle networking
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Achieving the highest utilization of fuel by using lightweight structures 2. Knowledge of the parts of modern systems to keep pace with developments in the automotive industry 3. Know how to maintain modern systems. 4. Find out what the automakers have achieved so far. 5. Knowing the parts and components of each car system and finding solutions to actual problems. 6. Know the pros and cons of each of the modern and old systems. 7. Briefly identify self-driving systems 8. Know the actual and practical ways to reduce toxic gas emissions and reduce air pollutants to preserve the environment. 9. Achieve maximum utilization of fuel by hybrid-vehicle. 10. Increasing awareness of the security aspect in order to preserve cars and property from theft.
Indicative Contents المحتويات الإرشادية	Part A – Enhance fuel consumption Increase power to weight ratio by reduce the gross weight of the vehicle by use light weight materials . The term engine downsizing is widely used to describe the high performance engines , And to achieve this goal a high compression ratio should be used [30 hrs] Part B – Enhancement Power-Train and vehicle stability The usage of modern transmission can give the vehicle more maneuverability and get maximum benefits of the new technology as well as more stability and more safety. [25 hrs] Part C – the safety and security systems This technologies can increase the safety and security for the humans and vehicles. [25 hrs] Part D- The new technology to assist the driver This technologies is an introduction to auto-driver systems also can be used to reduce the driving effort especially at long time driving and urban driving while traffic jam situations. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	By taking advantage of the laboratories located within the university campus and the vehicles of the teaching staff and students, it is possible to practice examining the various systems in the car, watching the real parts and knowing their locations in the vehicle. It is possible to conduct seminars and discussions inside the classroom to transfer and exchange experiences among the students of the same class.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Modern automotive materials and light weight construction
Week 2	Advanced engine technologies Direct gasoline injection GDI

Week 3	Variable Compression Ratio (VCR)
Week 4	Engine downsizing and turbocharging system
Week 5	Electric vehicles (Batteries, Electric motor, System controller or power converter, Drivetrain), Advantages and disadvantages of electric vehicles
Week 6	Hybrid vehicles with Integrated Motor Assist (IMA), Regenerative braking
Week 7	**Advanced automotive Transmission** Continuously variable transmission (CVT) and Automated manual transmissions (AMT)
Week 8	**Advanced automotive Suspension** Electronically controlled suspension, Active and semi-active suspension,
Week 9	Advanced automotive Steering Electrical assist steering, Steer by wire, Four-wheel active steering (4WAS)
Week 10	**Advanced automotive Braking and traction control** Anti-lock braking system (ABS) Electronic brake-force distribution (EBD), Emergency Brake Assistance (EBA), Traction Control System (TCS), Acceleration Skid Regulation (ASR)
Week 11	**Occupants safety systems** Restrain systems (Seat belts and seat-belt tensioners, Headrests, Knee diverters) Air bags, Smart air bags
Week 12	**Security systems** Resistance key, Transponder key, Voice recognition, Alcohol ignition interlock
Week 13	**Driver assistance systems** • Adaptive cruise control (ACC) • Lane departure warning systems • Lane keeping systems • Blind Spot warning system and active blind spot assist • Collision avoidance systems • Road departure warning system • Rear sensing for parking • Vision enhancement/ Night vision systems • Head-up display
Week 14	**Networking and navigation** • Digital maps and Satellite positioning • Navigation systems • Vehicle tracking systems • Automotive networking • Vehicle to vehicle wireless communication • Cooperative vehicle-highway systems • Cooperative intersection collision avoidance
Week 15	**Autonomous driving (self-driving cars)** • Automated vehicle guidance systems • Intelligent vehicle highway systems (platoon) • Fully automated vehicles
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Modern electric, hybrid electric, and fuel cell vehicles_ fundamentals, theory, and design	No
Recommended Texts	Automobile Mechanical and Electrical Systems_ Automotive Technology_ Vehicle Maintenance and Repair	No
Websites	https://auto.howstuffworks.com/ , https://www.youtube.com/user/howstuffworks	

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks 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.