Academic program description form

University name: Babylon University

College or Institute: College of Engineering - Al-Musayyib

Scientific Section: Automotive Engineering Department

Name of the academic or professional program: Academic program for a Bachelor of Science in Automotive Engineering Department

Name of final degree: Bachelor of Science in Automotive Engineering Department

Academic system: semester+ Bologna

Description preparation date: (18/3/2025)

Fill date File: (14/2/2025)

Signature :

Name of the scientific assistant for

Scientific affairs :Assist.Prof.Dr.Sanaa Abd AL Razzaq Jassim

For a date : 20-5-2025

Signature :

Name of the Head of Department Head: Dr.Dhia Hassan Jawad

For a date : 20-5-2025

كلية الهندسة / المسيب
قسم
هندسة السيارات

File checked by

Unit of Ensuring quality and university performanceManager

name Section quality assurance and university performance:

Date:

Signature:

Authentication of the Dean

Assist.Prof. Dr Wissam Jalil Khudair

20/5/2025

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University of Babylon
2. College	College of Engineering\Al-Musayab
3. University Department/Centre	Automobiles Engineering Department
4. Program Title	An academic program to obtain a Bachelor's degree in Automotive Engineering
5. Title of Final Award	Bachelor of Science in Automotive Engineering
6. Modes of Attendance offered	quarterly
7. Accreditation	National Accreditation Standards for Engineering Education
8. Other external influences	Training courses for students to develop professional skills for students / field visits / summer training
9. Date of production/revision of this specification	20-9-2024 (date of preparation of self-assessment)
10. objectives	

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programmer.
7- Active participation in community service activities

11. Learning Outcomes, Teaching, Learning and Assessment Methods
1) An ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science
2) An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process.

3) An ability to create and carry out proper measurement and tests with quality assurance, analyze and interpret results, and utilize engineering judgment to make inferences.

4) An ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels.

5) An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations.

6) An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly.

7) An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty

Teaching and Learning Methods

1- How to give lectures
2- Student Center
3- Student Groups Team Project
4- Work shop
5- Scientific trips to follow the practical reality of the manufacture and assembly of auto parts
6- Learning Technologies on Campus
7- Experiential learning
8-Thinking strategy according to the student's ability to understand the problem in terms of physics and engineering application of physical concepts
9- High thinking skill strategy
10- Critical thinking strategy in learning
11- Brainstorming

Assessment methods

1- Exams
2- continuous assessment
3- reports
4- stimuli
5- feedback from students
6- Learning Triangle

12. Program Structure			
Level/Year	Course or Module Code	Course or Module Title	Credit rating

First Year									
1st Semester					**2nd Semester**				
Subject	units	Theo	Tut	Lab	Subject	units	Theo	Tut	Lab
English Language	1	1	1	-	Arabic language	1	1	-	-
Human rights & Democracy	1	1	-	-	Introduction to Computer Programming	3	2	-	2
Mathematics I	3	3	1	-	Mathematics II	3	3	1	-
Engineering Drawing & Descriptive Geometry I	3	2	-	3	Engineering Mechanics (Statics)	4	4	2	-
Electrical Engineering	3	2	-	2	Engineering Drawing II	2	1	-	3
Metallurgy	3	2	-	2	Automobile Electrical, Electronics and Instrumentation Systems	3	2	-	2
Manufacturing Processes	4	3	-	3	Automobile Materials	2	2	-	-
					Automobiles Technology I(Engines)	2	1	-	2
Total	18	14	2	10	Total	20	16	3	9
		26					28		

Second Year

1st Semester					2nd Semester				
Subject	units	Theo	Tut	Lab	Subject	units	Theo	Tut	Lab
Computer Programming, I (FORTRAN)	3	2	-	2	English Language	1	1	1	-
Engineering Mathematics I	2	2	1	-	Computer Programming II (FORTRAN)	3	2	-	2
Strength of Materials	5	4	2	2	Engineering Mathematics II	2	2	1	-
Fluid Mechanics	4	3	1	2	Engineering Mechanics II (Dynamics)	4	4	2	-
Mechanical Construction, I (with AutoCAD of 20% weight)	3	1	-	4	Automobile Pneumatic & Hydraulic Systems	2	2	1	-
Automobiles Technology II (Power Transmission + suspension System)	2	1	-	2	Thermodynamics	5	4	2	2
					Mechanical Construction, I (with Solid Works of 20% weight)	3	1	-	3
Total	19	13	4	12	Total	20	16	7	7
		29					30		

Third Year									
1st Semester					2nd Semester				
Subject	units	Theo	Tut	Lab	Subject	units	Theo	Tut	Lab
Heat Transfer I	3	2	1	2	Heat Transfer II	3	2	1	2
Mechanical Element Design I	2	2	1	-	Design of Machine System II	2	2	1	-
Theory of Machines	3	2	1	2	Theory of Vehicles	3	2	1	2
Corrosion and coating	2	2	-	-	Fuel and combustion	2	2	-	-
Aerodynamic	2	2	-	-	Tribology	2	2	-	-
Internal Combustion Engines I	3	2	1	2	Internal Combustion Engines II	3	2	1	2
Engineering Analysis	2	2	1	-	Numerical Analysis	2	2	1	-
Vehicle Maintenance II	2	1	1	2	Vehicle Technology II	2	1	1	2
Total	19	15	6	8	Total	19	15	6	8
		29					29		

Four Year

1st Semester					2nd Semester				
Subject	units	Theo	Tut	Lab	Subject	units	Theo	Tut	Lab
Mechanical Vibration I	3	2	1	2	Mechanical Vibration II	3	2	1	2
Hydraulic Systems	2	2	-	-	Design & Selection of Materials	2	2	-	-
Measurement systems	3	2	1	2	Control systems	3	2	1	2
Vehicle Design I	2	1	-	-	Vehicle Design II	2	2	1	-
CAE I	2	2	-	2	CAE II	2	2	-	2
Automobile Air Conditioning I	3	2	1	2	Automobile Air Conditioning II	3	2	1	2
Industrial Engineering, I	2	2	-	-	Eng. Project	2	1	-	2
Eng. Project	2	1		2			13	4	10
Total	19	14	3	10	Total	17			
		27					27		

13. Awards and Credits

Bachelor Degree Requires (3500 hour) credits

14. Personal Development Planning

-1 VERBAL COMMUNICATION
Student able to express his ideas clearly and confidently in speech
-2 TEAMWORK
Work confidently within a group
3- ANALYSING & INVESTIGATING
Gather information systematically to establish facts & principles. Problem solving
-4 INITIATIVE/SELF MOTIVATION

Curriculum Skills Map

,Able to act on initiative identify opportunities & proactive in putting forward ideas & solutions
-5 WRITTEN COMMUNICATION
Student able to express himself clearly in writ

15. Admission criteria.

central

16. Key sources of information about the programme

College and University website
University Guide
The most important books and resources for the department

please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed											
program learning outcomes							Core (C) Title or Option (O)	Course Title	**Course Code**	No	Year / Level
7	6	5	4	3	2	1					
*		*	*				C	English Language		**1**	First Year
		*	*				C	Human rights & Democracy		**2**	
*		*	*		*	*	C	Mathematics I		**3**	
*	*		*		*	*	C	Engineering Drawing & Descriptive Geometry I		**4**	
	*	*	*	*		*	C	Electrical Engineering		**5**	
*		*	*		*	*	C	Metallurgy		**6**	
	*	*	*		*	*	C	Manufacturing Processes		**7**	
	*	*	*				C	Arabic language		**8**	
	*		*	*	*	*	C	Introduction to Computer Programming		**9**	
*		*	*			*	C	Mathematics II		**10**	
	*	*			*		C	Engineering Mechanics (Statics)		**11**	
*	*		*		*	*	C	Engineering Drawing II		**12**	
	*	*			*	*	C	Automobile Electrical, Electronics and Instrumentation Systems		**13**	
	*			*		*	C	Automobile Materials		**14**	
	*	*	*	*		*	C	Automobiles Technology I (Engines)		**15**	
	*		*	*	*	*	C	Computer Programming, I (FORTRAN)		**16**	Second Year
	*	*	*			*	C	Engineering Mathematics I		**17**	
*	*	*	*		*		C	Strength of Materials		**18**	
*	*	*	*		*	*	C	Fluid Mechanics		**19**	
*	*	*	*		*		C	Mechanical Construction, I (with AutoCAD of 20% weight)		**20**	
	*	*		*	*	*	C	Automobiles Technology II (Power Transmission + suspension System)		**21**	
*		*	*				C	English Language		**22**	
	*	*	*		*		C	Computer Programming II		**23**	
*		*			*	*	C	Engineering Mathematics II		**24**	
	*	*	*		*	*	C	Engineering Mechanics II (Dynamics)		**25**	
	*	*		*	*	*	C	Automobile Pneumatic & Hydraulic Systems		**26**	
	*			*		*	C	Thermodynamics		**27**	
	*	*	*		*		C	Mechanical Construction, I (with Solid Works of 20% weight)		**28**	

*	*	*				*	C	Heat Transfer I		**29**	Third Year
	*		*	*	*	*	C	Mechanical Element Design I		**30**	
	*	*			*		C	Theory of Machines		**31**	
	*	*	*	*	*		C	Corrosion and coating		**32**	
		*			*	*	C	Aerodynamic		**33**	
	*				*	*	C	Internal Combustion Engines I		**34**	
	*	*	*			*	C	Engineering Analysis		**35**	
	*			*		*	C	Vehicle Maintenance I		**36**	
	*	*		*	*		C	Heat Transfer II		**37**	
	*		*	*	*	*	C	Design of Machine System II		**38**	
	*	*			*		C	Theory of Vehicles		**39**	
	*				*	*	C	Fuel and combustion		**40**	
*		*		*	*	*	C	Tribology		**41**	
	*	*			*	*	C	Internal Combustion Engines II		**42**	
	*	*	*		*	*	C	Numerical Analysis		**43**	
*	*	*	*	*	*	*	C	Vehicle Technology II		**44**	
	*	*	*	*	*	*	C	Mechanical Vibration I		**45**	Four Year
	*	*	*	*	*	*	C	Hydraulic Systems		**46**	
*	*	*	*	*	*	*	C	Measurement systems		**47**	
*	*			*	*	*	C	Vehicle Design I		**48**	
*			*	*	*	*	C	CAE I		**49**	
	*	*	*		*	*	C	Automobile Air Conditioning I		**50**	
	*	*			*		C	Industrial Engineering, I		**51**	
*	*	*	*	*	*	*	C	Eng. Project		**52**	
*			*	*	*	*	C	Mechanical Vibration II		**53**	
*	*	*			*	*	C	Design & Selection of Materials		**54**	
*	*		*	*	*	*	C	Control systems		**56**	
*	*	*			*	*	C	Vehicle Design II		**57**	
	*		*	*	*	*	C	CAE II		**58**	
*	*	*			*	*	C	Automobile Air Conditioning II		**60**	

First Year

1st Semester

نموذج وصف المقرر

Code	Course/ModuleTitle	ECTS	Semester
UOBAB0302011	EnglishLanguage	4	1
Class(hr/w)	**Pr/semi**	**SSWL(hr/sem)**	**USWL(hr/w)**
2	1	44	56
Description			
Vocabulary:AcademicEnglishemploysawiderangeofvocabulary,includingdiscipline-specific terminology. It is important to use precise and accurate terms to convey ideas effectively. GrammarandSyntax:AcademicEnglishfollowsstandardgrammarrulesandsyntax.Itemphasizesclear and coherent sentence structure, appropriate verb tenses, and accurate word order. Formality: Academic English tends to be more formal than everyday spoken English. It avoids colloquial language, slang, and contractions. Instead, it employs more formal expressions and academic register. Objectivity:Academicwritingandspeakingoftenrequireanobjectivetone. Personalopinionsshouldbe supported by evidence and presented in a balanced manner. Impersonal language is frequently used, such as passive voice and third-person pronouns. Cohesion and Coherence: Academic English emphasizes logical organization and coherence in writing and speaking. Clear connections between ideas, the use of transitional words and phrases, and well-structured paragraphs are essential. Citations and References: In academic writing, proper citation and referencing are crucial. Academic Englishusesspecificcitationstyles,suchasAPA(AmericanPsychologicalAssociation)orMLA(Modern Language Association), to acknowledge and give credit to the sources used. AcademicConventions:Differentacademicdisciplinesmayhavespecificconventionsandexpectations regardingwritingstylesandformats.Understandingandadheringtotheseconventionsisimportantin academic English.			

Code	Course/ModuleTitle	ECTS	Semester
UOBAB0302012	HumanRights&Democracy	2	1
Class(hr/w)	**Lect**	**SSWL(hr/sem)**	**USWL(hr/w)**
1	1	30	20
Description			

Human Rights: Human rights are inherent rights and freedoms to which every individual is entitled simply by virtue of beinghuman. They are universal, inalienable, and indivisible. Human rights include civil,political,economic,social,andculturalrights.Someexamplesofhumanrightsincludetherightto life, liberty, equality, freedom of speech, education, and healthcare.
The concept of human rights is rooted in the belief that every person deserves dignity, respect, and protectionfromabuseanddiscrimination.Internationalhumanrightsinstruments,suchastheUniversal.

Code	**Course/ModuleTitle**	**ECTS**	**Semester**
UOBAB0302013	Physics	6	1
Class(hr/w)	**Lab/tur**	**SSWL(hr/sem)**	**USWL(hr/w)**
2	3	76	76
Description			
ClassicalMechanics:Classicalmechanicsdealswiththemotionofobjectsundertheinfluenceofforces. It includes the study of concepts such as motion, forces, energy, momentum, and gravitation. Thermodynamics:Thermodynamicsfocusesonthestudyofheat,temperature,andenergytransfer.It explores the behavior of systems in terms of concepts like entropy, work, and the laws of thermodynamics. Electromagnetism:Electromagnetismisconcernedwiththestudyofelectricandmagneticfieldsand their interactions. It encompasses topics like electrostatics, magnetism, electromagneticwaves, and electromagnetic induction. Optics:Opticsexaminesthebehaviorand propertiesoflight.Itcoversthestudyofreflection,refraction, diffraction, interference, and polarization of light. QuantumMechanics:Quantummechanicsisabranchofphysicsthatdescribesthebehaviorofparticles at the atomic and subatomic levels. It introduces the concept of wave-particle duality, quantization of energy, and probabilistic nature of quantum systems. Relativity:Relativitytheory,bothspecialandgeneralrelativity,exploresthebehaviorofobjectsathigh			

Code	**Course/ModuleTitle**	**ECTS**	**Semester**
UOBAB0302014	EngineeringDrawingwith AutoCAD I	7	1
Class(hr/w)	**Lab./Prac**	**SSWL(hr/sem)**	**USWL(hr/w)**
1	5	90	85
Description			

This course focuses on definition of the Methods of Isometric drawing. Study the Methods of finding missingviews.Learnhowtodrawsectionalviews.Studytypesofsectionalviews,learningaboutParts that cannot be sectioned. Studying of Exercises in sectional views.
This course offers you an advance learning skill of the operation of Computer Aided Design (CAD) software.ItisidealforanyonelookingforprofessionaltrainingtoAutoCAD3Dwithaninterestinusing the software to produce 3D drawings for architectural, engineering or design purposes. Thiscourseismadeforstudentswhowanttolearnallabout AutoCAD3Dinaneasytofollowself-paced way. The major highlights of this course are as follows. Almost all topics of AutoCAD 3D are covered in detail including isometric drawing, conclusion of projection of the engineering geometry and sectional views for engineering geometries. Practical example-based tutorials.

Code	**Course/ModuleTitle**	**ECTS**	**Semester**
UOBAB0302015	ElectricalEngineering	6	1
Class(hr/w)	**Lab./Tutor**	**SSWL(hr/sem)**	**USWL(hr/w)**
2	3	74	76
Description			
PowerSystems:Powersystemsengineeringfocusesonthegeneration,transmission,anddistributionof electrical power. It involves designing and optimizing electrical grids, power plants, renewable energy systems, and power distribution networks. Electronics:Electronicsdealswiththedesignandapplicationofelectroniccircuitsanddevices.It includesareassuchasanalogganddigitalcircuitdesign,integratedcircuits,microelectronics,and electronic components. ControlSystems:Controlsystemsengineeringinvolvesthedesignandanalysisofsystemsthatregulate			

Code	**Course/ModuleTitle**	**ECTS**	**Semester**
UOBAB0302016	ManufacturingProcessesand Engineering Workshops	5	1
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL(hr/sem)**	**USWL(hr/w)**
2	2	59	66
Description			
Thecourseaimstoidentifythedifferentmethodsofmanufacturingengineeringmaterials,suchas welding and its various types, how to obtain the necessary heat to accomplish welding, and the difference between the different methods.			

First Year

2nd Semester

Code	Course/ModuleTitle	ECTS	Semester
UOBAB0302021	Arabiclanguage	2	2
Class(hr/w)	**Lect**	**SSWL(hr/sem)**	**USWL(hr/w)**
1	1	30	20
Description			

تهدف مواد تخصص اللغة العربية إلىتمكينالطالب من مهارات اللغة العربي مفختلفمستوياتهاالصوتية،
والرصفية،والنحوية،والداللية،واألسلوبيةوالكتابية،ولذلكتتنوعموادتخصصاللغةالعربيةبتنوعمستويات
اللغة
مليوننسمة،476تعداللغةالعربيةمنأكثاللغا اتلمحكيةوألكثانتشارايالفعالم،إذيتحدثبهامايقارب
يتوزعونيأفماكنمتفاوتةيالفعالم،وعليهتحتلاللغةالعربيةالمركزالرابعأوالخامسنالعالممنحيث االنتشار،تع د
اللغةالعربيةلغةمهمةبالنسبةللمسلمنخياصةإذليهغةكتابهمالمقدسألوهوالقرآن بالإضافة إىلأنها لغةالصالةوالكثمنالعباداتوالشعائرالدينيةألخرى،ولميقترصد ورهاهنابليه وعُدّانلحديثعناللغةالعر بيةالب ُمّ ِنذك ُر أهّذهاللغةيِ أيضا لغة شعائرية
لدىالعديدمنالك ائسالمسيحيةانلفوطئعيجام،علونتتنوعموادتخصص اللغةالعربيةمابأيلدبوالنحووغثها ي
مح بويةارسيذيرسوتهالتخصص

Code	Course/ModuleTitle	ECTS	Semester
UOBAB0302024	computerscience	3	2
Class(hr/w)	**Lab**	**SSWL(hr/sem)**	**USWL(hr/w)**
1	2	46	29
Description			

Algorithms and Data Structures: Algorithms are step-by-step procedures or instructions for solving problemsorperformingtasks.Datastructuresarethewaysinwhichdataisorganizedandstoredin computermemory.Understandingalgorithmsanddatastructuresisessentialforefficientproblem- solving and software development.
ProgrammingLanguages:Programminglanguagesareusedtowriteinstructionsthatacomputercan understand and execute. Understanding programming languages and their syntax, semantics, and features is fundamental for software development and coding.
Computer Architecture: Computer architecture involves the design and organization of computer systems,includingthestructureandfunctionofcomponentssuchasprocessors,memory,input/output devices, and storage. It provides an understanding of the underlying hardware on which software operates.
Operating Systems: Operating systems are software systems that manage computer hardware and provide an interface for other software applications. Concepts like process management, memory management,filesystems,anddevicedriversarefundamentaltounderstandingoperatingsystems.

Code	**Course/ModuleTitle**	**ECTS**	**Semester**
UOBAB0302025	Mathematics	7	2
Class(hr/w)	**Tutor**	**SSWL(hr/sem)**	**USWL(hr/w)**
4	2	89	86
Description			

Aftercompletingthecourse,studentsshouldbeableto
1. Describethecharacteristicsandpropertiesofnumbersets,andobtainthenumbersystems,
2. DescribeandStatetheconceptoffunction,drawthegraphoffunctions,theliststypesoffunctions.
3. Tounderstandsthemeaningoflimitandcontinuousfunction.
4. Toknowsthemeaningofderivativefunctionandapplications.
5. Describethetranscendentalfunction.
6. DescribetheUnitvector,vectorequation,crossproduct,dotproduct.
7. Tounderstandsthemeaningofcomplexnumber.
8. Describethematrixanditsoperationsandtoknowthedetermentofits
8- Elementary,transcendental,Exponential,hyperbolic&logarithmicfunctionsofarealvariable
9- Differentialcalculus:Differentialoffunctionsofoneandseveralvariables:thederivative(definitions & theorems); Rules
of differentiation, the differentiability theorem; Differentiation of functions with exponential functions, logarithmic functions, or hyperbolic functions; Some consequences of differentiability; Maximaandminima;Indeterminateforms –hospital'srule;Identificationof extremausingsecond derivative;Partial&Totaldifferentiation;Differentiationbychainrule;Changeofvariables;implicit functions & the derivatives of inverse circular functions. Higher order partial derivatives.
10- The Engineering Mathematics major offered through the Engineering Science Program offers students an opportunity to study applied mathematics as essential components of modern engineering. By combining courses in pure mathematics, applied mathematics, statistics, the physical sciences,andengineering,astudentmayindividualizeaprogramofstudy,oftheory, orofapplications of both. It provides a broad foundation for graduate studies in theoretical branches of engineering, as well as in mathematics, and can prepare students for a career in specific sectors of industry or business.

Code	**Course/ModuleTitle**	**ECTS**	**Semester**
UOBAB0302024	EngineeringMechanics(Statics)	6	2
Class(hr/w)	**Tutor**	**SSWL(hr/sem)**	**USWL(hr/w)**
4	2	89	61
Description			
Forces: Forces are the interactions between objects that can cause changes in their motion or deformation.Instatics,forcesarerepresentedasvectorsanddescribedbytheirmagnitude,direction,			

Code	Course/ModuleTitle	ECTS	Semester
UOBAB0302024	EngineeringDrawingwithAutoCADII	7	2
Class(hr/w)	**Lab./Prac.**	**SSWL(hr/sem)**	**USWL(hr/w)**
1	5	90	85
Description			
This course focuses on definition of the Methods of Isometric drawing. Study the Methods of finding missingviews.Learnhowtodrawsectionalviews.Studytypesofsectionalviews,learningaboutParts that cannot be sectioned. Studying of Exercises in sectional views. This course offers you an advance learning skill of the operation of Computer Aided Design (CAD) software.ItisidealforanyonelookingforprofessionaltrainingtoAutoCAD3D withaninterestinusing			

Code	Course/ModuleTitle	ECTS	Semester
UOBAB0302026	Metallurgy&AutomobileMaterials	5	2
Class(hr/w)	**Lab.**	**SSWL(hr/sem)**	**USWL(hr/w)**
3	2	75	50
Description			
Metallurgy is a domain of materials science and engineering that studies the physical and chemical behavior of metallic elements, their inter-metallic compounds, and their mixtures, which are known as alloys.Metallurgyencompassesboththescienceandthe technologyofmetals;thatis,thewayinwhich science is applied to the production of metals, and the engineering of metal components used in products for both consumers and manufacturers. This course deals with study the following subject: Internal Structure of Metals , Equilibrium states of binary systems, Phases in alloy system Properties of Metals and Alloy: Mechanical deformation and recrystallization Ferrous Alloy (Iron-Carbon): Fe-C equilibrium diagram, Carbon steel classification and applications, Cast iron and applications,Heat treatment of Metals, TTT, CCT diagrams, Fracture, classification and types, creep, Characteristics of Materials . Also this course covers study Composite materials, proper Selection of materials to automotive components, Coating and corrosion resistance.			

SECOND YEAR

1st and 2nd SEMESTER

2. Undergraduate Courses 2025-2024

Module 1

Code	Course/Module Title	ECTS	Semester
UREC110	English Language	4	1
Class (hr/w)	**Pr / semi**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	44	56
Description			
Vocabulary: Academic English employs a wide range of vocabulary, including discipline-specific terminology. It is important to use precise and accurate terms to convey ideas effectively. Grammar and Syntax: Academic English follows standard grammar rules and syntax. It emphasizes clear and coherent sentence structure, appropriate verb tenses, and accurate word order. Formality: Academic English tends to be more formal than everyday spoken English. It avoids colloquial language, slang, and contractions. Instead, it employs more formal expressions and academic register. Objectivity: Academic writing and speaking often require an objective tone. Personal opinions should be supported by evidence and presented in a balanced manner. Impersonal language is frequently used, such as passive voice and third-person pronouns.Cohesion and Coherence: Academic English emphasizes logical organization and coherence in writing and speaking. Clear connections between ideas, the use of transitional words and phrases, and well-structured paragraphs are essential. Citations and References: In academic writing, proper citation and referencing are crucial. Academic English uses specific citation styles, such as APA (American Psychological Association) or MLA (Modern Language Association), to acknowledge and give credit to the sources used. Academic Conventions: Different academic disciplines may have specific conventions and expectations regarding writing styles and formats. Understanding and adhering to these conventions is important in academic English.			

Module 7

Code	Course/Module Title	ECTS	Semester
UREC120	Arabic language	2	2
Class (hr/w)	**Lect**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	30	20
Description			

تهدف مواد تخصص اللغة العربية إلى تمكين الطالب من مهارات اللغة العربية في مختلف مستوياتها الصوتية، والصرفية، ..والنحوية، والدلالية، والأسلوبية والكتابية، ولذلك تتنوع مواد تخصص اللغة العربية بتنوع مستويات اللغة

تعد' اللغة العربية من أكثر اللغات المحكية والأكثر انتشارًا في العالم، إذ يتحدث بها ما يقارب 476 مليون نسمة، يتوزعون في أماكن متفاوتة في العالم، وعليه تحتل اللغة العربية المركز الرابع أو الخامس من العالم من حيث الانتشار، تعد' اللغة العربية لغة

مهمة بالنسبة للمسلمين خاصة إذ هي لغة كتابهم المقدس ألا وهو القرأن بالإضافة إلى أنها لغة الصلاة والكثير من العبادات والشعائر الدينية الأخرى، ولم يقتصر دو رها هنا بل هي أيضا لغة شعائرية لدى العديد من الكنائس المسيحية في الوطن العربي. وعند الحديث عن اللغة العربي'ة لا بد' من ¸ذكر أ 'ن لهذه اللغة محب'ين ودارسين يدرسونها كتخصص جامع 'ي، وتتنوع مواد تخصص

اللغة العربية ما بين الأدب والنحو وغيرها

Module 8

Code	**Course/Module Title**	**ECTS**	**Semester**
UREC121	computer science	3	2
Class (hr/w)	**Lab**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	46	29
Description			
Algorithms and Data Structures: Algorithms are step-by-step procedures or instructions for solving problems or performing tasks. Data structures are the ways in which data is organized and stored in computer memory. Understanding algorithms and data structures is essential for efficient problem-solving and software development. Programming Languages: Programming languages are used to write instructions that a computer can understand and execute. Understanding programming languages and their syntax, semantics, and features is fundamental for software development and coding. Computer Architecture: Computer architecture involves the design and organization of computer systems, including the structure and function of components such as processors, memory, input/output devices, and storage. It provides an understanding of the underlying hardware on which software operates. Operating Systems: Operating systems are software systems that manage computer hardware and provide an interface for other software applications. Concepts like process management, memory management, file systems, and device drivers are fundamental to understanding operating systems.			

Module 9

Code	**Course/Module Title**	**ECTS**	**Semester**
MATH122	Mathematics	7	2
Class (hr/w)	**Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	89	86
Description			
After completing the course, students should be able to			

1. Describe the characteristics and properties of number sets, and obtain the number systems,
2. Describe and State the concept of function, draw the graph of functions, the lists types of functions.
3. To understands the meaning of limit and continuous function.
4. To knows the meaning of derivative function and applications.
5. Describe the transcendental function.
6. Describe the Unit vector, vector equation, cross product, dot product.
7. To understands the meaning of complex number.
8. Describe the matrix and its operations and to know the determent of its
8- Elementary, transcendental, Exponential, hyperbolic & logarithmic functions of a real variable
9- Differential calculus: Differential of functions of one and several variables: the derivative (definitions & theorems); Rules
of differentiation, the differentiability theorem; Differentiation of functions with exponential
functions, logarithmic functions, or hyperbolic functions; Some consequences of differentiability; Maxima and minima; Indeterminate forms – hospital's rule; Identification of extrema using second derivative; Partial &Total differentiation; Differentiation by chain rule; Change of variables; implicit functions & the derivatives of inverse circular functions. Higher order partial derivatives.
10- The Engineering Mathematics major offered through the Engineering Science Program offers students an opportunity to study applied mathematics as essential components of modern engineering. By combining courses in pure mathematics, applied mathematics, statistics, the physical sciences, and engineering, a student may individualize a program of study, of theory, or of applications of both. It provides a broad foundation for graduate studies in theoretical branches of engineering, as well as in mathematics, and can prepare students for a career in specific sectors of industry or business.

Module 12

Code	**Course/Module Title**	**ECTS**	**Semester**
AEREC125	Metallurgy & Automobile Materials	5	2
Class (hr/w)	**Lab.**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	75	50
Description			
Metallurgy is a domain of materials science and engineering that studies the physical and chemical behavior of metallic elements, their inter-metallic compounds, and their mixtures, which are known as alloys. Metallurgy encompasses both the science and the technology of metals; that is, the way in which science is applied to the production of metals, and the engineering of metal components used in products for both consumers and manufacturers. This course deals with study the following subject: Internal Structure of Metals , Equilibrium states of binary systems, Phases in alloy system Properties of Metals and Alloy: Mechanical deformation and recrystallization Ferrous Alloy (Iron-Carbon): Fe-C equilibrium diagram, Carbon steel classification and applications, Cast iron and applications, Heat treatment of Metals, TTT, CCT diagrams, Fracture, classification and types, creep, Characteristics of Materials . Also this course covers study Composite materials, proper Selection of			

materials to automotive components, Coating and corrosion resistance.

Module 13

Code	Course/Module Title	ECTS	Semester
UREC210	English Language II	4	3
Class (hr./w)	**Lect/semn**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	44	56

Description

History and Global Reach: English originated from the Germanic tribes in England and has evolved over centuries through various influences, including Latin, French, and other languages. Due to the expansion of the British Empire and later the global influence of the United States, English has become the most widely spoken second language worldwide.
Vocabulary and Grammar: English vocabulary is vast and diverse, drawing from different sources and languages. It consists of words, phrases, idioms, and expressions that are constantly evolving and adapting. English grammar follows a subject-verb-object word order, although it does have exceptions and flexible structures.
Phonetics and Pronunciation: English has a complex phonetic system with a wide range of sounds and accents. Pronunciation varies among different English-speaking regions, such as American English, British English, Australian English, etc. There are also variations in intonation and stress patterns.
Writing Systems: English uses the Latin alphabet, consisting of 26 letters. It employs a combination of uppercase and lowercase letters, punctuation marks, and other symbols for writing and communication. Spelling can be challenging due to inconsistencies in English orthography.
Varieties and Dialects: English exhibits a great deal of variation, both regionally and culturally. Different countries and regions have their own distinct dialects, accents, and vocabulary. Examples include American English, British English, Canadian English, Indian English, and many more.
Business and Academic Language: English is commonly used in the business world and academia. Many international conferences, research publications, and academic programs are conducted in English. Proficiency in English is often a requirement for global employment opportunities and higher education.
Influence on Other Languages: English has had a significant impact on other languages through loanwords, cultural exchanges, and the dominance of English-speaking media. Many non-English languages incorporate English terms and expressions in their vocabulary.
Global Communication: English serves as a common language for international communication, enabling people from different linguistic backgrounds to interact and understand one another. It facilitates cross-cultural understanding, trade, and diplomacy.

Literature and Cultural Significance: English literature has a rich tradition and includes renowned authors and works from different periods. English-language literature has made substantial contributions to world literature and is studied and appreciated globally.
Online and Digital Communication: The rise of the internet and digital technology has further increased the prevalence and influence of the English language. English dominates online platforms, social media, and digital content, making it an essential skill for participating in the digital age

Module 14

Code	**Course/Module Title**	**ECTS**	**Semester**
MATH211	Engineering Mathematics I	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	47	53

Description

Calculus: Calculus forms the basis of engineering mathematics. It includes differential calculus, which deals with rates of change and derivatives, and integral calculus, which focuses on accumulation and integration. Concepts such as limits, derivatives, integrals, and differential equations are used to model and analyze engineering systems.
Linear Algebra: Linear algebra is the study of vector spaces, matrices, and linear transformations. It is widely used in engineering for solving systems of linear equations, eigenvalue problems, and matrix operations. Linear algebra provides tools for analyzing and manipulating multidimensional data and systems
Differential Equations: Differential equations are equations that involve derivatives or differentials of an unknown function. They are extensively used in engineering to model and solve problems related to dynamic systems, vibrations, fluid flow, heat transfer, and more. Engineering mathematics covers both ordinary differential equations (ODEs) and partial differential equations (PDEs).
Complex Analysis: Complex analysis deals with functions of complex numbers. It is employed in engineering for analyzing and solving problems related to electric circuits, signal processing, control systems, and fluid dynamics. Complex analysis provides insights into the behavior of functions in the complex plane.
Probability and Statistics: Probability theory and statistics are essential in engineering for analyzing uncertainty, making predictions, and designing experiments. Concepts such as probability distributions, statistical inference, hypothesis testing, and regression analysis are used to analyze data, assess risk, and make informed decisions.
Numerical Methods: Numerical methods involve using computational algorithms to solve mathematical problems that cannot be solved analytically. Numerical techniques, such as numerical integration, numerical differentiation, and numerical solution of differential equations, are used to obtain approximate solutions to engineering problems.
Fourier Analysis: Fourier analysis is used to decompose complex waveforms into simpler sinusoidal components. It has applications in signal processing, image processing, data compression, and communication

systems. Fourier series and Fourier transforms are utilized to analyze and manipulate signals and data in the frequency domain.
Optimization: Optimization techniques are employed to find the best possible solution among a set of alternatives. Engineering mathematics covers optimization algorithms and methods, such as linear programming, nonlinear programming, and constrained optimization. Optimization is used to optimize system performance, resource allocation, and decision-making in engineering.
Numerical Linear Algebra: Numerical linear algebra focuses on solving linear algebraic problems using numerical methods and algorithms. It includes techniques for solving large systems of linear equations, eigenvalue problems, least squares problems, and matrix factorizations. Numerical linear algebra is crucial for engineering simulations and computations.

Module 16

Code	**Course/Module Title**	**ECTS**	**Semester**
AEREC213	Fluid Mechanics	6	3
Class (hr/w)	**Lab/Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	89	61

Description

Fluid Properties: Understand the fundamental properties of fluids, including density, viscosity, pressure, temperature, and surface tension. Study how these properties affect fluid behavior and flow characteristics.
Fluid Statics: Explore the behavior of fluids at rest and analyze the distribution of pressure within a fluid. Learn about hydrostatic forces, buoyancy, stability of floating bodies, and applications such as dams and manometers.
Fluid Dynamics: Study the motion and behavior of fluids in motion. Analyze fluid flow patterns, velocity distribution, and pressure gradients. Understand the principles of conservation of mass, momentum, and energy in fluid flow.
Fluid Flow Measurements: Learn about various techniques and instruments used to measure fluid flow rates, velocities, and pressures. Explore devices such as flowmeters, Pitot tubes, and pressure transducers.
Bernoulli's Equation: Understand Bernoulli's equation, which describes the relationship between fluid pressure, velocity, and elevation. Apply the equation to analyze fluid flow in pipes, nozzles, and other flow systems.
Reynolds Number and Flow Regimes: Study the concept of Reynolds number, which characterizes the type of flow (laminar or turbulent) based on fluid velocity, density, viscosity, and characteristic length. Understand the transition between laminar and turbulent flow regimes.
Pipe Flow: Analyze the behavior of fluids in pipes and ducts. Study topics such as flow resistance, friction losses, head loss, and pipe network analysis. Explore flow distribution, flow measurement, and pump selection in pipe systems.
Boundary Layer Theory: Understand the concept of boundary layers, which form near solid surfaces in fluid flow. Study laminar and turbulent boundary layers, boundary layer separation, and their effects on drag and heat transfer.
Fluid Forces on Immersed Bodies: Explore the forces exerted by fluids on objects immersed in them. Study topics such as drag, lift, and their applications in designing vehicles, aircraft, and other objects moving through fluids.
Computational Fluid Dynamics (CFD): Gain knowledge of numerical methods and computer simulations used to analyze and predict fluid flow behavior. Learn to use CFD software to model and simulate complex fluid flow phenomena.

Module 17

Code	**Course/Module Title**	**ECTS**	**Semester**

AEREC214	Mechanical Drawing, I with Solid Works	6	3
Lab (hr/w)	**Prac.**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	76	74
Description			

2D Sketching: In SolidWorks, the design process often begins with 2D sketching. The software provides tools to create 2D sketches by drawing lines, arcs, circles, and other basic geometric shapes. These sketches serve as the foundation for creating 3D models.
Parametric Modeling: SolidWorks is a parametric modeling software, which means that it allows you to create models that are driven by dimensions and relationships. You can define dimensions, constraints, and relationships within the sketch to control the size, shape, and behavior of the model.
3D Modeling: Using SolidWorks, you can extrude, revolve, sweep, loft, and perform other operations to transform 2D sketches into 3D models. The software provides a wide range of tools and features to create complex geometries, add fillets and chamfers, and incorporate features like holes, threads, and ribs.
Assemblies: SolidWorks enables the creation of assemblies, which are collections of multiple components that fit together to form a mechanical system. You can define relationships between parts, such as mates (e.g., coincident, concentric, parallel), to ensure proper fit and movement between components.
Exploded Views: With SolidWorks, you can easily create exploded views of assemblies to illustrate the relationship and positioning of components. Exploded views help in understanding the assembly process and identifying individual parts.
Detailed Drawings: SolidWorks allows the creation of detailed engineering drawings from 3D models. You can generate 2D drawings with accurate dimensions, annotations, and tolerances. The software provides tools for adding dimensions, geometric tolerances, section views, and other annotations to the drawing.
Bill of Materials (BOM): SolidWorks can automatically generate a bill of materials (BOM) from an assembly. The BOM lists the components and quantities required to build the assembly. It provides a structured overview of the parts needed and can be used for procurement and manufacturing purposes.
Rendering and Visualization: SolidWorks offers rendering capabilities to create realistic images of your 3D models. You can apply materials, textures, lighting, and background settings to enhance the visual representation of your designs.
Simulation and Analysis: SolidWorks includes simulation tools that allow you to analyze the behavior and performance of your designs. You can perform structural analysis, motion analysis, thermal analysis, and more to evaluate factors like stress, deformation, and motion within your mechanical systems.
File Formats and Collaboration: SolidWorks supports various file formats for sharing and collaboration, including native SolidWorks files, STEP, IGES, and STL. This enables you to work with other CAD software users and exchange designs with manufacturing and prototyping facilities.

Module 18

Code	**Course/Module Title**	**ECTS**	**Semester**
AEREC215	Automobiles Technology I	3	3
Class (hr/w)	**Prac**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	2	45	30

Description

1. Engine and Powertrain: The heart of an automobile is its engine, which converts fuel (usually gasoline or diesel) into mechanical energy. Engine technology has evolved significantly over the years, with advancements in efficiency, power output, and emission control. Powertrain systems encompass components such as transmissions, differentials, and drivelines that transfer power from the engine to the wheels.
2. Fuel Systems: Automobiles use various fuel systems to deliver fuel to the engine, including carburetors and fuel injection systems. Fuel efficiency and emission control have become crucial aspects of modern fuel systems, leading to the development of electronic fuel injection systems and hybrid/electric vehicle technologies.
3. Chassis and Suspension: The chassis provides the framework and structural support for the vehicle. It includes components such as the frame, body panels, and suspension systems that ensure stability, handling, and comfort. Suspension systems consist of springs, shock absorbers, and linkages that absorb road shocks and maintain tire contact for improved control and ride quality.
4. Braking Systems: Braking technology is essential for vehicle safety. Traditional braking systems utilize hydraulic mechanisms to transfer force from the driver's input to the wheels. Anti-lock braking systems (ABS) and electronic stability control (ESC) are advanced technologies that enhance braking performance and vehicle stability during emergency maneuvers.
5. Electrical and Electronics: Automobiles increasingly rely on sophisticated electrical and electronic systems for various functions. These include ignition systems, lighting (headlights, taillights, etc.), instrument clusters, entertainment systems, navigation systems, and advanced driver-assistance systems (ADAS) like adaptive cruise control, lane-keeping assist, and collision warning.
6. Safety Systems: Automobile technology prioritizes safety features such as seatbelts, airbags, crumple zones, and reinforced structures to protect occupants in the event of a collision. Advanced safety technologies like lane departure warning, blind-spot detection, and automatic emergency braking contribute to accident prevention and mitigation.
7. Connectivity and Telematics: Modern vehicles often incorporate connectivity features that enable integration with smartphones, wireless communication, and internet-based services. Telematics systems provide functionalities like GPS navigation, remote diagnostics, vehicle tracking, and emergency services.
8. Environmental Considerations: Automobile technology aims to reduce the environmental impact of vehicles. This involves developing cleaner and more efficient engines, promoting alternative fuel options (electric, hybrid, hydrogen), and implementing emission control measures such as catalytic converters and particulate filters.

Module 19

Code	Course/Module Title	ECTS	Semester
UREC220	Computer Programming	3	4

Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
2	2	44	31

Description

Programming Languages: Programming languages are used to write code and communicate instructions to computers. There are various programming languages available, each with its own syntax and rules. Popular programming languages include Python, Java, C++, JavaScript, Ruby, and many more. Different languages are suited for different types of applications and have different levels of complexity.
Syntax and Semantics: Programming languages have specific syntax and rules that govern how code should be written. Syntax refers to the structure and grammar of the language, while semantics define the meaning and behavior of the code. Following the correct syntax and semantics is essential for writing valid and functional code.
Variables and Data Types: Variables are used to store and manipulate data in computer programs. They can hold different types of data, such as numbers, strings (text), Boolean values (true/false), and more. Each programming language has its own set of data types and rules for declaring and using variables.
Control Structures: Control structures allow programmers to control the flow of execution in a program. Common control structures include conditionals (if-else statements, switch statements), loops (for loops, while loops), and branching (function calls, return statements). Control structures determine which sections of code are executed based on certain conditions or criteria.
Functions and Procedures: Functions and procedures are reusable blocks of code that perform specific tasks. They help in organizing and modularizing code by breaking it down into smaller, manageable units. Functions can take inputs (parameters) and produce outputs (return values) to perform specific operations.
Algorithms and Problem Solving: Algorithms are step-by-step procedures or sets of rules for solving a specific problem. They form the core of computer programming by providing a logical and systematic approach to problem-solving. Understanding algorithms and applying problem-solving techniques is crucial for writing efficient and optimized code.
Debugging and Troubleshooting: Debugging is the process of finding and fixing errors or bugs in a program. Programming often involves testing and identifying issues in code, such as logical errors, syntax errors, or runtime errors. Debugging tools and techniques help programmers locate and resolve these issues to ensure the correct functioning of the program.
Software Development Tools: There are numerous software development tools available to assist programmers in writing, testing, and debugging code. Integrated Development Environments (IDEs) provide an integrated environment for writing, running, and managing code. They often include features such as code editors, syntax highlighting, debugging tools, and version control systems.
Object-Oriented Programming (OOP): Object-Oriented Programming is a programming paradigm that organizes code around objects and their interactions. It focuses on encapsulating data and behavior within objects, allowing for modular and reusable code. OOP principles include concepts such as classes, objects, inheritance, polymorphism, and encapsulation.
Continuous Learning and Adaptation: Computer programming is a rapidly evolving field, with new languages, frameworks, and technologies emerging regularly. Successful programmers embrace

continuous learning and adaptation to stay up to date with the latest trends, best practices, and advancements in the field.

Module 20

Code	Course/Module Title	ECTS	Semester
UREC221	Modern Vehicle Technology	4	4
Class (hr/w)	**Prac.**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	59	41

Description

1. Advanced Driver Assistance Systems (ADAS): ADAS technologies are designed to assist drivers and enhance safety on the road. These systems include features such as adaptive cruise control, lane-keeping assist, automatic parking, forward collision warning, and pedestrian detection. ADAS technologies utilize sensors, cameras, radar, and sophisticated algorithms to detect and respond to potential hazards.
2. Infotainment Systems: Infotainment systems in automobiles provide a combination of information and entertainment features. These systems integrate audio, video, and communication functionalities to offer navigation, multimedia playback, hands-free calling, smartphone integration, and internet connectivity. Touchscreens, voice recognition, and gesture control interfaces are commonly used to interact with infotainment systems.
3. Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) Communication: V2V and V2I communication technologies enable vehicles to communicate with each other and with the surrounding infrastructure. This facilitates the exchange of important safety-related information, such as traffic conditions, potential hazards, and road alerts. V2V and V2I communication systems contribute to improved traffic management and collision prevention.
4. Lightweight Materials: Automobile technology strives to reduce the weight of vehicles to enhance fuel efficie reduce emissions. Lightweight materials such as high-strength steel, aluminum, carbon fiber composites, and pol composites are used in vehicle construction. These materials offer a balance between strength, safety, and weigh
5. Energy Efficiency and Alternative Propulsion: With a growing focus on sustainability, automobile technology alternative propulsion systems. Electric vehicles (EVs) use electric motors powered by batteries or fuel cells to a zero-emission mobility. Hybrid vehicles combine internal combustion engines with electric motors to enhance fu efficiency. Additionally, advancements in regenerative braking and energy management systems contribute to en conservation.
6. Autonomous Driving: The development of autonomous vehicles aims to enable self-driving cars capable of op without human intervention. Autonomous driving technology involves a combination of sensors, cameras, lidar, GPS, and advanced algorithms to perceive the environment, make decisions, and control the vehicle. Autonomo have the potential to enhance road safety, traffic flow, and mobility services.
7. Manufacturing and Automation: Automobile technology extends to the manufacturing process itself. Automat assembly lines and robotics play a significant role in efficient and precise vehicle production. Robotics and auto improve manufacturing quality, reduce costs, and increase productivity

Module 21

Code	Course/Module Title	ECTS	Semester
MATH222	Engineering Mathematics II	7	4
Class (hr/w)	**Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	47	53

Description

Vector Calculus: Vector calculus extends the concepts of differentiation and integration to vector-valued functions. It includes topics such as vector fields, line integrals, surface integrals, and the fundamental theorems of vector calculus (such as Green's theorem, Stokes' theorem, and the divergence theorem). Vector calculus is important for understanding and analyzing fields like electromagnetics, fluid dynamics, and heat transfer.
Differential Equations: Building on the basics of ordinary differential equations (ODEs) covered in Engineering Mathematics I, Engineering Mathematics II delves into more advanced topics. This may include higher-order linear ODEs, systems of linear ODEs, Laplace transforms, series solutions, and applications of differential equations in engineering, such as vibrations, circuits, and control systems.
Complex Analysis: Complex analysis focuses on functions of complex numbers. It covers topics such as complex differentiation, contour integration, Cauchy's theorem, and residue theory. Complex analysis is applicable in various engineering fields, including signal processing, control systems, and electrical engineering.
Fourier Series and Transforms: Fourier series and Fourier transforms are used to analyze periodic and non-periodic signals and functions. Engineering Mathematics II explores the Fourier series representation of periodic functions, Fourier transforms for non-periodic functions, and their applications in signal processing, communications, and image analysis.
Partial Differential Equations (PDEs): PDEs are equations involving partial derivatives and are used to describe phenomena involving multiple independent variables. Engineering Mathematics II introduces various types of PDEs, such as heat equations, wave equations, and Laplace's equation. It covers techniques for solving these equations, including separation of variables, Fourier series methods, and numerical methods.
Probability and Statistics: Probability and statistics play a crucial role in engineering for analyzing uncertainty, making predictions, and data analysis. Engineering Mathematics II may cover topics such as probability distributions, random variables, statistical inference, hypothesis testing, regression analysis, and design of experiments. These concepts are valuable for engineering research, quality control, and decision-making.
Numerical Methods: Numerical methods involve using computational algorithms to approximate solutions to mathematical problems that cannot be solved analytically. Engineering Mathematics II may introduce numerical techniques for solving differential equations, systems of equations, interpolation, numerical integration, and numerical optimization. These methods are essential for solving complex engineering problems and conducting simulations.
Linear Algebra: Linear algebra concepts may be further expanded in Engineering Mathematics II. This may include eigenvalues and eigenvectors, diagonalization of matrices, applications of linear algebra in solving differential equations and systems of equations, and advanced topics such as singular value decomposition and least squares methods.
Transform Methods: In addition to Fourier transforms, other transform methods may be covered in Engineering

Mathematics II. This could include Laplace transforms, Z-transforms, and their applications in solving differential equations, analyzing control systems, and signal processing.

Module 22

Code	Course/Module Title	ECTS	Semester
AEREC223	Engineering Mechanics (Dynamics)	7	4
Class (hr/w)	**Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	89	86

Description

Kinematics: Kinematics is concerned with the description of motion without considering the causes of motion. It involves the study of position, velocity, and acceleration of particles and rigid bodies. Concepts such as displacement, speed, and trajectory are analyzed to understand the motion of objects.
Particle Dynamics: Particle dynamics deals with the motion of individual particles and involves the application of Newton's laws of motion. It focuses on analyzing the forces acting on particles and determining their resulting motion, including linear motion, projectile motion, and circular motion.
Newton's Laws of Motion: Newton's laws of motion form the foundation of Engineering Mechanics (Dynamics). These laws describe the relationship between the motion of an object and the forces acting upon it. Newton's first law states that an object at rest will remain at rest, and an object in motion will continue moving with a constant velocity unless acted upon by an external force. Newton's second law relates the net force acting on an object to its mass and acceleration. Newton's third law states that for every action, there is an equal and opposite reaction.
Equations of Motion: Equations of motion are mathematical expressions that relate the position, velocity, acceleration, and time for objects in motion. These equations, derived from Newton's laws, are used to solve problems involving the motion of particles and rigid bodies.
Work and Energy: Work and energy concepts are extended to Engineering Mechanics (Dynamics) to analyze the effects of forces and motion on the energy of a system. The work-energy principle states that the work done on an object is equal to the change in its kinetic energy. This principle is used to analyze the transfer and transformation of energy in mechanical systems.
Impulse and Momentum: Impulse and momentum principles are used to analyze the effects of forces acting over a period of time on the motion of objects. Impulse is the product of force and time, and the change in momentum of an object is equal to the impulse applied to it. These principles are applied to collisions and impact analysis.
Rotational Motion: Engineering Mechanics (Dynamics) also includes the study of rotational motion. It involves the analysis of forces, torques, moments of inertia, angular velocity, and angular acceleration of rotating bodies. Concepts such as rotational equilibrium, angular momentum, and conservation of angular momentum are examined.
Vibrations: Vibrations are the periodic oscillations or motions of bodies about their equilibrium positions. Engineering Mechanics (Dynamics) explores the principles of vibrations, including single-degree-of-freedom systems, natural frequencies, damping, and resonance.
Planar Motion: Planar motion refers to the motion that occurs in a single plane. Engineering Mechanics

(Dynamics) focuses on analyzing the motion of objects in a two-dimensional plane, considering both translational and rotational motion.
Applications: Engineering Mechanics (Dynamics) is applied to various engineering fields, such as mechanical engineering, civil engineering, aerospace engineering, and robotics. It is used to analyze and design systems involving moving parts, such as machinery, vehicles, structures, and mechanisms.

Module 23

Code	**Course/Module Title**	**ECTS**	**Semester**
AEREC224	Thermodynamics	7	4
Class (hr/w)	**Lect/Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	117	58

Description

Energy: Thermodynamics revolves around the concept of energy, which is the capacity to do work or cause change. The two main forms of energy in thermodynamics are kinetic energy (energy of motion) and potential energy (energy associated with position or state). Thermodynamics analyzes how energy is transferred and converted between different forms.
Laws of Thermodynamics: The laws of thermodynamics are fundamental principles that govern energy and heat transfer. They provide the foundation for understanding and analyzing thermodynamic systems. The laws of thermodynamics are:
a. First Law of Thermodynamics (Law of Energy Conservation): It states that energy cannot be created or destroyed; it can only be transferred or transformed from one form to another. The total energy of a system and its surroundings remains constant.
b. Second Law of Thermodynamics: The second law deals with the concept of entropy, which is a measure of the degree of disorder or randomness in a system. It states that in natural processes, the entropy of an isolated system tends to increase over time. It also defines the concept of heat flow from higher temperature regions to lower temperature regions (entropy increase).
c. Third Law of Thermodynamics: The third law states that as the temperature approaches absolute zero (0 Kelvin or -273.15 degrees Celsius), the entropy of a pure, perfect crystalline substance becomes zero. It provides a reference point for measuring entropy values.
Thermodynamic Systems and Processes: Thermodynamics examines systems, which can be defined as a specific region of space or a particular object or substance under consideration. Systems can be classified as open (exchanges both energy and matter with the surroundings), closed (exchanges energy but not matter with the surroundings), or isolated (no exchange of energy or matter with the surroundings).
Thermodynamic processes describe the transformations that a system undergoes. Common processes include isothermal (constant temperature), adiabatic (no heat transfer), isobaric (constant pressure), and isochoric (constant volume) processes.
Properties of Substances: Thermodynamics studies the properties of substances, including temperature, pressure, volume, and specific heat. These properties play a crucial role in determining the behavior and state of a system. Equations of state, such as the ideal gas law, relate these properties in different thermodynamic situations.
Heat and Work: Heat and work are two forms of energy transfer in thermodynamics. Heat transfer is the transfer of thermal energy between a system and its surroundings due to a temperature difference. Work is the transfer of

energy that results from the application of a force over a distance. Thermodynamics examines the mechanisms and calculations involved in heat transfer and work done on or by a system.
Thermodynamic Equilibrium: Thermodynamic equilibrium refers to a state in which the properties of a system remain constant over time, indicating a balance between energy and matter. Equilibrium conditions provide valuable insights into the behavior and stability of thermodynamic systems.
Thermodynamic Cycles: Thermodynamic cycles are processes that return a system to its initial state after undergoing a series of transformations. Common examples include the Carnot cycle, Rankine cycle, and refrigeration cycles. These cycles are fundamental in energy conversion systems, such as heat engines and power plants.
Applications: Thermodynamics finds wide-ranging applications in engineering and science. It is crucial in areas such as power generation, refrigeration and air conditioning, chemical reactions and processes, combustion engines, materials science, and environmental studies.

Module 24

Code	Course/Module Title	ECTS	Semester
AEREC225	Mechanical Drawing II	5	4
Class (hr/w)	**Lab**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	62	63

Description

Orthographic Projection: Orthographic projection is a technique used to represent a three-dimensional object on a two-dimensional plane. Mechanical Drawing II further explores orthographic projection, including the creation of multiple views (front view, top view, side view, etc.) of an object and the use of projection lines, auxiliary views, and section views to provide additional information and details.
Dimensioning and Tolerancing: Dimensioning is the process of adding accurate and clear measurements to a technical drawing. Mechanical Drawing II delves into more complex dimensioning techniques, including the use of different types of dimensions (linear, angular, radial, etc.), tolerances, and geometric dimensioning and tolerancing (GD&T) symbols. Proper dimensioning is crucial for ensuring accurate manufacturing and assembly of the designed object.
Sectional Views: Sectional views are used to show the internal details of an object by cutting it along a plane and displaying the cross-sectional view. Mechanical Drawing II covers the creation and interpretation of sectional views, including full sections, half sections, offset sections, revolved sections, and broken-out sections.
Assembly Drawings: Assembly drawings are used to represent how multiple components come together to form a complete product or system. In Mechanical Drawing II, you may learn techniques for creating assembly drawings, including exploded views, detailed part drawings, and bill of materials (BOM) for identifying and labeling components.
Threads and Fasteners: Mechanical Drawing II explores the representation of threaded components, such as bolts, screws, and nuts. It covers the use of standard thread representation, thread callouts, and thread specifications. Additionally, the drawing of fasteners, such as washers, pins, and rivets, may be covered.
Surface Finish and Symbols: Surface finish symbols are used to indicate the desired surface texture or roughness of a part. Mechanical Drawing II may include the interpretation and application of surface finish symbols according to standard industry practices, such as the ISO 1302 standard.

Geometric Constructions: Mechanical Drawing II may involve geometric constructions and techniques for accurately creating complex shapes, curves, and angles using a compass, ruler, and other drafting tools. This includes constructing tangents, bisecting angles, dividing lines, and other geometric operations.
CAD (Computer-Aided Design): Mechanical Drawing II may introduce the use of computer-aided design (CAD) software for creating technical drawings. Students may learn how to use CAD tools and commands to create, modify, annotate, and manage technical drawings efficiently. This includes understanding layer management, dimensioning tools, and generating different views and sections automatically.

Third Year
1st Semester

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. College	College of Engineering\Al-Musayab
3. University Department / Center Scientific Department	Automobiles Engineering Department
4. Course name/code	Heat Transfer I
5. Programs in which it enters	Bachelor
6. Forms of attendance available	Weekly
7. Semester/year	First/ 2024- 2025
8. Number of hours of study (total)	75 Hours
9. The date of preparing this - description	5-9-2024
10. Course objectives	

1. **Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering**
2. **Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.**
3. **Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.**

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
3و2	1,2	Introduction/ Modes of heat transfer/ Thermal conductivity/ Steady state conduction	2%	5	1
4و3و2	2,3	Conduction in Plane wall /Radial system/Insulation	2%	5	2
3و2و1	5,6	Overall heat transfer coefficient/Critical thickness of insulation/Heat source systems	3%	5	3
4و2و1	3,4	Extended surface/Thermal contact resistance /Steady state multi Dimension /Introduction/Graphical Analogy and conduction, shape factor	3%	5	4
3و2	5,6	Electrical Analogy for two-dimensional conduction	5%	5	5
4و3و2	5,6	Unsteady state conduction /Introduction/Lumped Heat- Capacity system	5%	5	6
5و4و3و2	5,6	Transient Heat flow in a semi-Infinite slap and cylinder	5%	5	7
3و2	5,6	Principle of convection/Introduction /The thermal Boundary layer/The relation between fluid friction and heat transfer	5%	5	8
4و3	5,6	Heat transfer in laminar Tube flow	3%	5	9
5و2و1	5,6	Heat transfer in Turbulent flow in a tube	3%	5	10
5و3و2	5,6	Flow across cylinders and spheres/Flow across Tube banks	3%	5	11
5و2	5,6	Empirical and practical relations for forced convection/Introduction	3%	5	12
5و3و2و1	5,6	Empirical Relations for free convection/Free infection from vertical plane sand cylinder	3%	5	13
5و2و1	5,6	Empirical relations for pipe and Tube flow	3%	5	14

3) Homework

2	5,6	Flow across cylinders and spheres/Flow across Tube banks	2%	5	15

12-Infrastructure	
Holman (Heat Transfer)10th	-Required readings: Basic Texts Course Books
john wiley & sons, inc.(introduction to heat transfer) sixth edition	**Main references (sources)**
	Recommended books and references (.(scientific journals, reports, etc
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Theory of Machine
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First / 2024- 2025
7. Number of hours of study (total	75 Hours
8. The date of preparing this - description	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering	
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.	
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)	

4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.

6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational program.

7- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labor market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.

2) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.

3)Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
و23	و2و3و15	Mechanisms	5%	3	1
و3و24	و12	Velocity in Mechanism	5%	3	2
و2و13	3,5	Acceleration in Mechanism	5%	3	3
و2و14	و2و15	Turning Moment Diagram	5%	3	4
و23	2,3,5	Single Cylinder Double Acting Steam Engine	7%	3	5
و3و24	1,2,5	Four Stroke Cycle Internal Combustion Engine	8%	3	6
و3و4و25	2,4,5	Multicylinder Engine	8%	3	7
و23	و2و13	Fluctuation of Energy	8%	3	8
و34	2,5	Flywheel	7%	3	9
و2و15	1,2,5	Coefficient of Fluctuation of Speed	7%	3	10
و3و25	و2,5	Energy Stored in a Flywheel	7%	3	11
و25	2,3,5	Dimensions of the Flywheel Rim	7%	3	12
و2و3و15	2,5	Gear types and Terminology	7%	3	13
و2و15	2,3,5	Gear Trains	7%	3	14
2	1,2,5	Kinematics of Gears	7%	3	15

12-Infrastructure	
Khurmi, R. S., & Gupta, J. K. (2005). Theory of machines. S. Chand Publishing.	Required readings:- Basic Texts Course Books Other
Singh, S. (2005). Theory of machines. Pearson Education India.	**Main references (sources)**
	Recommended books and references (scientific journals, reports, etc(.
	Electronic references, websites...

13- Course development plan
improvement plans Realistic improvement plans derived from consideration of available evidence and assessments. It may be applied for more than one year, but it is prepared and reviewed every year at the level of courses, academic programs and the educational institution.

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Corrosion& coating
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First/ 2024- 2025
7. Number of hours of study (total	30 Hours
-8. The date of preparing this description	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering	
2- Preparing qualified automotive engineers that meet both the local specialised standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.	
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management	

System)
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognising the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programme.
7- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment
1) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
2) The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
3) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
4) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
5)Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
Teaching and learning methods
1- The method of giving lectures. 2- Student groups 3- Workshops 4- Scientific trips to follow up the practical reality of the relevant companies.

5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
Continuous evaluation, Reports	The method of giving lectures	Introduction to Corrosion and Corrosion Control	5%	2	1
Continuous evaluation, Reports	The method of giving lectures	Corrosion Mechanisms	5%	2	2
Continuous evaluation, Reports	The method of giving lectures	Thermodynamics of Corrosion	5%	2	3
Continuous evaluation, Reports	The method of giving lectures	Electrochemical Kinetics of Corrosion	5%	2	4
Continuous evaluation, Reports	The method of giving lectures	Types of Corrosion	7%	2	5
Continuous evaluation, Reports	The method of giving lectures	Corrosion in Specific Materials	8%	2	6
Continuous evaluation,	The method	Corrosion Prevention and Control	8%	2	7

Reports	of giving lectures				
Continuous evaluation, Reports	The method of giving lectures	Corrosion Testing, Monitoring and Inspection	8%	2	8
Continuous evaluation, Reports	The method of giving lectures	Rheology and Surface Chemistry	7%	2	9
Continuous evaluation, Reports	The method of giving lectures	Coating Calculations, Infrared Spectroscopy of Coatings, Thermal Analysis for Coatings Characterizations	7%	2	10
Continuous evaluation, Reports	The method of giving lectures	Color Measurement for the Coatings Industry	7%	2	11
Continuous evaluation, Reports	The method of giving lectures	The Use of X-ray Fluorescence for Coat Weight Determinations	7%	2	12
Continuous evaluation, Reports	The method of giving lectures	COATING AND PROCESSING TECHNIQUES, Wire-Wound Rod Coating	7%	2	13
Continuous evaluation, Reports	The method of giving lectures	Electrodeposition of Polymers, Electroless Plating	7%	2	14
		Final exam	7%		15

12-Infrastructure	
	Required readings:- Basic Texts
Coatings technology handbook,edited by arthur a. tracton, corrosion science and engineering- pietro pedeferri	**Main references (sources)**
Special requirements (including, for example, workshops, periodicals, software and websites)	Recommended books and references
	Electronic references, websites...

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Aerodynamics
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First / 2024- 2025
7. Number of hours of study (total	30 Hours
8. The date of preparing this - description	5-9-2024

9. Course objectives

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering

2- Preparing qualified automotive engineers that meet both the local specialised standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.

3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)

4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of

professional knowledge and how to locate, evaluate, compile, and correctly apply it.

6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programme.

7- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyse the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.

2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.

3) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.

Teaching and learning methods

1- The method of giving lectures.

2- Student groups

3- Workshops

4- Scientific trips to follow up the practical reality of the relevant companies.

5- E-learning inside and outside the university campus

6- Experiential learning

Evaluation methods

1- exams

2- Continuous evaluation

3- Reports

4- stimulation

5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2,3,5	1,2	- Introduction to aerodynamic - Aerodynamic forces	5%	2	1
1,2,5	2,3	Basic principles for compressible and incompressible fluid flow	5%	2	2
2,4,5	5,6	Kinematics of fluid - Lagrangian method Eulerian method	5%	2	3
13و2	3,4	Material derivative and acceleration	5%	2	4
3,4,5	5,6	-Streamline -Stream function	7%	2	5
3,4,5	5,6	Velocity potential	7%	2	6
15و3و2	5,6	Boundary layer theory -Laminar boundary layer -turbulent boundary layer	7%	2	7
12و	5,6	Boundary layer separation	7%	2	8
1,2,5	5,6	Compressible flow -speed of sound -mach number	8%	2	9
2,4,5	5,6	-Stagnation properties -Critical condition -Isentropic relation	8%	2	10
1,2,5	1,2,5	Isentropic relation	8%	2	11
2,4,5	2,4,5	Isentropic flow with variable area duct	8%	2	12
1,2,5	5,6	Shock waves -Normal shock wave	8%	2	13
2,4,5	2,5	Fanno flow	7%	2	14
2	2,5	Rayleigh flow	5%	2	15

12-Infrastructure	
	Required readings:- Basic Texts
Fluid Mechanics Fundamentals and Applications, 3rd Edition by Yunus Cengel and John Cimbala,2014 Foundations of Fluid Mechanics (Original, 1967 by S.W. Yuan) Fundamentals of Aerodynamics, Anderson J.D (2nd edition., McGraw-Hill ,1991	**Main references (sources)**
Special requirements (including, for example, workshops, periodicals, software and websites)	Recommended books and references (scientific journals, reports, etc(.
	Electronic references, websites...

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Internal Combustion Engines I
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First 2024- 2025
7. Number of hours of study (total	90 Hours
8. The date of preparing this - description	5-9-2024

9. Course objectives

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering.
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
4. Active contribution to the development of the engineering management system and scientific capabilities in the field of design, manufacturing, and quality control through the production of scientific research and graduation projects in the specialty of the department.

10-Learning outcomes and methods of teaching, learning and assessment

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programmer.

Subject-specific skills

Learn how to study the design, manufacture, assembly, and determination of the defect for cars, calculating thermal, mechanical, volumetric efficiencies, work done, identifying engine performance, combustion types and stages, abnormal phenomena of the engine, as well as the supercharging and turbocharging process for the engine.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2و3	1و2و3و5	Parts of Engine	5%	5	1
2و3و4	1و2	work of engines	5%	5	2
2و3و4و5	3,5	Comparison between Two and Four Stroke	5%	5	3
2و3	1و2و5	Four stroke engines	5%	5	4
3و4	2,3,5	Otto Cycle	8%	5	5
1و2و5	و2,5	Standard diesel cycle	8%	5	6
2و3و5	2,3,5	Dual Cycle	7%	5	7
1و2و3	2,5	Practical pressure Diagram	7%	5	8
1و2و4	2,3,5	Perfomance of Engines	8%	5	9
2و3	1,2,5	Heat Balance Sheet	7%	5	10
2و3و4	1,2,5	Fuel injection systems	8%	5	11
2و5	2,4,5	Mechanical pumps	7%	5	12
1و2و3و5	1و2و3	Petrol fuel injection	6%	5	13
1و2و5	2,5	Engine cooling system	7%	5	14
1	2,5	Lubrication system	7%	5	15

12-Infrastructure	
Introduction to Internal Combustion Engines **Richard Stone** **Internal Combustion Engine Fundamentals Heywood, John**	-Required readings: Basic Texts Course Books Other
Papers from the network	**Main references (sources)**
Special requirements (including, for example, workshops, periodicals, software and websites(	Recommended books and references (scientific journals, (.reports, etc
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Engineering Analyses
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First / 2024- 2025
7. Number of hours of study (total	45 Hours
8. The date of preparing this description-	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree	

in Automotive Engineering
2- Preparing qualified automotive engineers that meet both the local specialised standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognising the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programme.
7- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment
1) The ability to analyse the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
3) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
4)Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
Teaching and learning methods
1- The method of giving lectures. 2- Student groups

3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
Continuous evaluation	The method of giving lectures	Laplace Transformation and Applications.	4%	3	1
Continuous evaluation	The method of giving lectures	Laplace Transformation and Applications.	5%	3	2
Feedback from students	The method of giving lectures	Fourier Series	7%	3	3
Feedback from students	The method of giving lectures	Fourier Series	7%	3	4
stimulation	The method of giving lectures	Fourier Series	7%	3	5
Exam	The method of giving lectures	Power series solutions of differential equations (Legendre, Bessel).	7%	3	6
Continuous evaluation	The method of giving lectures	Complex integration (integral by residual method)	7%	3	7
Continuous evaluation	The method of giving lectures	Laplace Partial differential equation	7%	3	8
Continuous evaluation	The method of giving lectures	Poisson and heat Partial differential equation	7%	3	9
Continuous evaluation	The method of giving lectures	wave Partial differential equation	7%	3	10
Continuous evaluation	The method of giving lectures	Line integrals	7%	3	11
Continuous evaluation	The method of giving lectures	surface integrals	7%	3	12
Continuous evaluation	The method of giving lectures	Conformal Mapping	7%	3	13

Continuous evaluation	The method of giving lectures	Special functions (Gamma, Beta, Error)	7%	3	14
		Final exam	4%		15

12-Infrastructure	
	Required readings:- Basic Texts
Advanced Engineering Mathematics, by C. R. Wylie	**Main references (sources)**
Special requirements (including, for example, workshops, periodicals, software and websites)	Recommended books and references (scientific journals, reports, etc(.
	Electronic references, websites...

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Vehicle Maintenance
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First / 2024- 2025
7. Number of hours of study (total	45 Hours
8. The date of preparing this description-	5-9-2024

9. Course objectives
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2- Preparing qualified automotive engineers that meet both the local specialised standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognising the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programme.
7- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
4) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
5) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course structured

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2,3	1,2	**Module 1: Introduction to Vehicle Maintenance** • Overview of the automotive industry • Importance of vehiclemaintenance • Safety procedures and guidelines in a workshop • Introduction to vehicle systems and components	4%	2	1
2,4,3	2,3	**Module 2: Engine Systems** • Engine types and configurations • Engine maintenance and lubrication • Cooling system and radiator maintenance • Fuel system inspection and repairs • Ignition system overview and troubleshooting	6%	2	2
1,2,3	5,6	**Module 3: Transmission and Drivetrain** • Automatic and manual transmission systems • Clutch, gearbox, and differential maintenance • Troubleshooting transmission issues	5%	2	3
2,3,4	3,4	**Module 4: Suspension and Steering** • Types of suspension systems • Wheel alignment and balancing • Steering system maintenance and repairs	5%	2	4
2,3	5,4	**Module 5: Braking Systems** • Brake components and types	7%	2	5

		• Brake maintenance and replacement • Brake troubleshooting and common issues			
2,3,4	5,4	**Module 6: Electrical Systems** • Basics of automotive electrical systems • Battery maintenance and testing • Wiring diagrams and troubleshooting electrical issues	8%	2	6
2,3,4	5,3	**Module 7: Routine Maintenance** • Oil and filter changes • Tire rotation and replacement • Fluid checks and top-ups	8%	2	7
2,3	5,2	Mid Examination	8%	2	8
3,4	5,2	**Module 8: Troubleshooting and Diagnostics** • Common vehicle problems and their causes • Using diagnostic tools and equipment • Interpretation of diagnostic codes	7%	2	9
1,2,5	5,4	**Module 9: Preventive Maintenance and Inspection** • Importance of preventive maintenance • Scheduled maintenance tasks • Vehicle inspection checklist	7%	2	10
2,3,5	5,2	**Module 10: Environmental and Regulatory Awareness** • Environmental impact of vehicle maintenance • Compliance with regulations and standards	7%	2	11

2,5	5,2,4	**Module 11: Advanced Vehicle Systems (optional for advanced courses)** • Introduction to hybrid and electric vehicles • Advanced vehicle diagnostics and repair techniques	7%	2	12
3,5	1,2,3	**Module 12: Communication and Customer Service** • Effective communication with customers • Providing estimates and explanations of repairs	7%	2	13
2,3,5	2,3,5	**Module 13: Business and Ethics (optional for courses focused on entrepreneurship)** • Basics of running an automotive maintenance business • Ethics and professionalism in the automotive industry	7%	2	14
2	5,4	Final Examination	7%	2	15

12-Infrastructure

"Automotive Technology: Principles, Diagnosis, and Service" by James D. Halderman: This comprehensive book covers all major vehicle systems, their operation, diagnostics, and service procedures. It is widely used in automotive technology courses.	Required readings: - Basic Texts Course Books Other
"Modern Automotive Technology" by James E. Duffy: Another popular textbook that provides a thorough understanding of automotive systems and repair practices, suitable for both beginners and experienced technicians.	**Main references (sources)**
"Automotive Wiring and Electrical Systems" by Tony Candela: For those interested in automotive electrical systems, this book is a valuable resource. It covers wiring diagrams, troubleshooting techniques, and electrical system repair.	Recommended books and references (scientific journals, reports, etc..)
http://www.autonomousvehicletech.com/	Electronic references, websites...

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Machine Elements Design I
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First/ 2024- 2025
7. Number of hours of study (total)	45 Hours
8. The date of preparing this description-	5-9-2024

9. Course objectives

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5- Participation in promoting engineering awareness, conducting scientific courses and site

visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.

6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programmer.
7- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment

1- The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2- The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3- The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
4- The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
5- Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Scientific trips to follow up the practical reality of the relevant companies.
4- E-learning inside and outside the university campus
5- Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
3و2	5و3و2و1	Design philosophy	4%	3	1
4و3و2	2و1	Design Procedure and review of Engineering Materials	5%	3	2
3و2و1	3,5	Stresses In Machine Elements	7%	3	3
4و2و1	5و2و1	Static Failure Theories For Ductile Materials 1	7%	3	4
3و2	2,3,5	Static Failure Theories For Ductile Materials 2	7%	3	5
4و3و2	1,2,5	Static Failure Theories For Brittle Materials	7%	3	6
5و4و3و2	2,4,5	Factors Of Safety And Design Codes	7%	3	7
3و2	3و2و1	Mechanism Of Fatigue Failure	7%	3	8
4و3	2,5	Fatigue Loads	7%	3	9
5و2و1	1,2,5	Fatigue Failure Under Uniaxial Loading	7%	3	10
5و3و2	2,5و	Design For Combined Fatigue Loading1	7%	3	11
5و2	2,3,5	Design For Combined Fatigue Loading	7%	3	12
5و3و2و1	2,5	Notches And Stress Concentrations	7%	3	13
5و2و1	2,3,5	Design Of Shafts	7%	3	14
2	1,2,5	Design Of Keys And Couplings	7%	3	15

12-Infrastructure	
	-Required readings: Basic Texts
Machine Design: An Integrated Approach, by Robert L. Norton	**Main references (sources)**
Shigley's Mechanical Engineering Design	Recommended books and references (.(scientific journals, reports, etc
https://www.coursera.org/browse/physical-science-and-engineering	...Electronic references, websites

Third Year
2nd Semester

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Heat Transfer II
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second / 2024- 2025
7. Number of hours of study (total)	75 Hours
8. The date of preparing this - description	2024-9-5

9. Course objectives

1. **Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering**
2. **Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.**
3. **Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.**

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
4) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
5) Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2,3	2,3,5	natural convection systems/introduction/ free-convection heat transfer on a vertical flat plate /empirical relations for free convection	2%	5	1
2,4,3	3,4,5	free convection from vertical planes and cylinders/ free convection from horizontal cylinders/ inclined surfaces/ spheres	2%	5	2
1,2,3	3,5	combined free and forced convection/ radiation heat transfer/ introduction/ radiation properties	3%	5	3
2,3,4	2,4,5	radiation shape factor/relations between shape factors	3%	5	4
2,3	2,3,5	heat exchange between nonblack bodies/ infinite parallel surfaces	5%	5	5
2,3,4	1,2,5	radiation shields/ gas radiation/ solar radiation	5%	5	6
2,3,4	2,4,5	condensation and boiling heat transfer/ introduction/ film condensation inside horizontal tubes/ boiling heat transfer	5%	5	7
2,3	4,5	simplified relations for boiling heat transfer with water/ the heat pipe	5%	5	8
3,4	2,5	heat exchangers/ introduction/ fouling factors/ types of heat exchangers	3%	5	9
1,2,5	1,2,5	the log mean temperature difference/ effectiveness-ntu method	3%	5	10
2,3,5	2,5	compact heat exchangers/ analysis for variable properties	3%	5	11
2,5	2,3,5	mass transfer/ introduction/ diffusion in gases	3%	5	12
3,5	2,5	diffusion in liquids and solids/ evaporation processes in the atmosphere	3%	5	13
2,3,5	2,3,5	summary and design information/ conduction problems/ convection heat-transfer relations	3%	5	14
2	1,2,5	radiation heat transfer/ heat exchangers	2%	5	15

12-Infrastructure

Holman (Heat Transfer)10th	-Required readings: Basic Texts
john wiley & sons, inc.(introduction to heat transfer) sixth edition	**Main references (sources)**
	(Recommended books and reference
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Theory of Automobiles
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second / 2024- 2025
7. Number of hours of study (total	75 Hours
8. The date of preparing this - description	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering	
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.	
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)	
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of	

specialty.

5- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labor market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.

2) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.

3)Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2,3	1,2	Davis Steering Gear	5%	3	1
2,4,3	2,3	Ackerman Steering Gear	5%	3	2
1,2,3	5,6	Universal or Hooke’s Joint	5%	3	3

2,3,4	3,4	Balancing of Rotating Masses	5%	3	4
2,3	5,4	Balancing of reciprocating masses	7%	3	5
2,3,4	5,4	kinematics of disc cams	8%	3	6
2,3,4	5,3	straight arc flank	8%	3	7
2,3	5,2	circular arc flank	8%	3	8
3,4	5,2	Governors	7%	3	9
1,2,5	5,4	Watt Governors	7%	3	10
2,3,5	5,2	porter Governors	7%	3	11
2,5	5,2,4	proell Governors	7%	3	12
3,5	1,2,3	Hartnell Governors	7%	3	13
2,3,5	2,3,5	Gyroscopes	7%	3	14
2	5,4	Gyroscopic effects	7%	3	15

12-Infrastructure	
Khurmi, R. S., & Gupta, J. K. (2005). Theory of machines. S. Chand Publishing.	Required readings:- Basic Texts Course Books Other
Singh, S. (2005). Theory of machines. Pearson Education India.	**Main references (sources)**
	Recommended books and references (scientific journals, reports, etc(.
	Electronic references, websites...
13- Course development plan	
improvement plans Realistic improvement plans derived from consideration of available evidence and assessments. It may be applied for more than one year, but it is prepared and reviewed every year at the level of courses, academic programs and the educational institution.	

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Fuel and combustion
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	second/ 2024- 2025
7. Number of hours of study (total	30 Hours
8. The date of preparing this - description	5-9-2024

9. Course objectives

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering

2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.

3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)

4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.

6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programme.

7- Active participation in community service activities

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2,3	3,4,5	-Introduction to fuel -Types of fuel	5%	2	1
2,4,3	3,4,5	Molecular structure of hydrocarbon fuel	5%	2	2
1,2,3	3,4,5		5%	2	3
2,3,4	3,4,5	Improvement quality of spark ignition engines fuel	5%	2	4
2,3	3,4,5	Liquified petroleum gas as fuel	7%	2	5
2,3,4	3,4,5	-Introduction to combustion -Chemical equations of combustion	7%	2	6
2,3,4	3,4,5	Quality of combustion -Complete combustion - Incomplete combustion	8%	2	7
2,3	3,4,5	Air-fuel ratio -Stoichiometric equivalence ratio -Rich mixture - Lean mixture	8%	2	8
3,4	3,4,5	-Combustion products analysis -Dissociation	7%	2	9
1,2,5	3,4,5	Equilibrium constant	7%	2	10
2,3,5	3,4,5	First law of thermodynamic applied to combustion process	8 %	2	11
2,5 3- Reports	3,4,5	Internal energy and enthalpy of Combustion	8%	2	12
3,5	3,4,5	Enthalpy of formation	7%	2	13
2,3,5	3,4,5	Calorific value of fuel	5%	2	14
2	3,4,5	Efficiency of combustion	8%	2	15

12-Infrastructure

	Required readings:- Basic Texts
Internal combustion engine fundamentals, by: John Heywood, pub. by :McGraw- Hill (1988) – USA -The internal combustion engines in theory and practice, 2 vols. by: C. F. Taylor, pub.: Wily. -Internal combustion engines Applied Thermodynamics, by: Colin R ,Ferguson and Allan T. Kirkpatrick, pub.: John Wiley & sons –	**Main references (sources)**

2001.	
Special requirements (including, for example, workshops, periodicals, software and websites)	Recommended books and references (scientific journals, reports, etc(.
	Electronic references, websites...

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Tribology
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	2nd/ 3rdyear 2024- 2025
7. Number of hours of study (total	30 Hours
8. The date of preparing this - description	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering 2- Preparing qualified automotive engineers that meet both the local specialized standards (the	

national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.

3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)

4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.

6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programmer.

7- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment

1- The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.

2- The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.

3- The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.

4- Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.

5- Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.

2- Student groups

3- Workshops

4- Scientific trips to follow up the practical reality of the relevant companies.

5- E-learning inside and outside the university campus

6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
1- exams 2- Continuous evaluation	1,2	Introduction to Tribology	5%	2	1
1- exams 2- Continuous evaluation 3- Reports	2,3	Classification of Lubricants	5%	2	2
1- exams 2- Continuous evaluation 3- Reports 4-stimulation	5,6	Oil Viscosity Classification	5%	2	3
1- exams 2- Continuous evaluation 3- Reports 4-stimulation	3,4	Classification of Bearings, Fluid Film Lubrication	5%	2	4
1- exams 2- Continuous evaluation 3- Reports 4-stimulation	5,6	Fluid Film Lubrication: Hydrostatic Lubrication, Hydrodynamic, Lubrication Theory, Elastohydrodynamic Lubrication, Mixed Lubrication,Boundary Lubrication	8%	2	5
1- exams 2- Continuous evaluation 3- Reports 4-stimulation	5,6	Hydrodynamic journal bearing, Viscous Flow and Reynolds Equation	8%	2	6
1- exams 2- Continuous evaluation 3- Reports 4-stimulation	5,6	Hydrodynamic journal bearing: long bearing , short bearing	8%	2	7
1- exams 2- Continuous evaluation 3- Reports 4-stimulation	2,3,5	Squeeze-Film Lubrication	7%	2	8
1- exams 2- Continuous evaluation	1,2,5	Engine Lubrication System	8%	2	9

3- Reports 4- stimulation					
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	2,4,5	Rolling Bearings	7%	2	10
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	4,5	ball Bearing	7%		11
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	2,5	Elasto-hydrodunamic Bearing, *Forms of Contacts, Line Contact, point contact*	8%		12
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Friction &wear	7%		13
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Abrasive wear	7%		14
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Application of Tribology	5%		15

12-Infrastructure

▪ Introduction to Tribology of Bearings, B. C. Majumder	-Required readings: Basic Texts
▪ Introduction to Tribology of Bearings, B. C. Majumder ▪ Basic Lubrication Theory, Alastair Cameron	**Main references (sources)**
Special requirements (including, for example, workshops, (periodicals, software and websites	Recommended books and (.references
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Internal Combustion Engines II
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second 2024- 2025
7. Number of hours of study (total	Hours75
8. The date of preparing this - description	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering. 2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders. 3- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty. 4. Active contribution to the development of the engineering management system and scientific capabilities in the field of design, manufacturing, and quality control through the production of scientific research and graduation projects in the specialty of the department.	

10-Learning outcomes and methods of teaching, learning and assessment

1-The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.

2-The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.

3-Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide

Teaching and learning methods

1- The method of giving lectures.

2- Student groups

3- Workshops

4- Scientific trips to follow up the practical reality of the relevant companies.

5- E-learning inside and outside the university campus

6- Experiential learning

Evaluation methods

1- exams

2- Continuous evaluation

3- Reports

4- stimulation

5- Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
3,4,5	1,2,3,6	Fuel and Combustion	5%	5	1
,3,4,5	1,2,3,6	Chemical Reactions	5%	5	2
, 3,4,5	4,5,6	Types of Reactions	5%	5	3
1,2,3,4,	1,2,3	Calculation of Exhaust Tem.	5%	5	4
3,4,5	1,2,3,6	Supercharger Engines	8%	5	5
1,,4,5	1,2,5,6	Systems of supercharger	8%	5	6
1,2,3,4,5	1,2,3,4,5,6	Turbocharger Engines	7%	5	7
,3,4,5	1,2,6	Stages of combustion	7%	5	8
1,4,5	1,2,3	Factors Effected on combustion	8%	5	9
1,2,5	1,2,3	Knock in Diesel Engines	7%	5	10
1,2,3,4,5	1,5,6	Two Stroke Engines	8%	5	11
1,2,3,4,5	1 ,6	Types of two strokes engines	7%	5	12
1,2,3,4,5	3,4,5,6	Terminologies and definitions	6%	5	13
1,2,5	1,2,5,6	Types of scavenging	7%	5	14
1,2,3	1,2,3,4	Scavenging pumps	7%	5	15

12-Infrastructure

Introduction to Internal Combustion Engines **Richard Stone** **Internal Combustion Engine Fundamentals Heywood, John**	-Required readings: Basic Texts Course Books Other
Papers from the network	**Main references (sources)**
Special requirements (including, for example, workshops, (periodicals, software and websites	Recommended books and references (.(scientific journals, reports, etc
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Numerical Analyses
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second 2024- 2025
7. Number of hours of study (total	45 Hours
8. The date of preparing this - description	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering	
2- Preparing qualified automotive engineers that meet both the local specialised standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.	
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)	
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.	

5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognising the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programme.
7- Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyse the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
4) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
5)Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
Continuous evaluation	The method of giving lectures	Introduction, Newton-Raphson method	5%	3	1
Continuous evaluation	The method of giving lectures	Solutions of Linear System	5%	3	2
Continuous evaluation	The method of giving lectures	Curve Fitting	5%	3	3
Continuous evaluation	The method of giving lectures	Interpolation	5%	3	4
Continuous evaluation	The method of giving lectures	Interpolation	8%	3	5
Continuous evaluation	The method of giving lectures	Numerical Differentiation	8%	3	6
Continuous evaluation	The method of giving lectures	Numerical Integration	8%	3	7
Continuous evaluation	The method of giving lectures	Numerical Integration	7%	3	8
Continuous evaluation	The method of giving lectures	Initial value problems for ordinary differential equations	8%	3	9
Continuous evaluation	The method of giving lectures	Finite difference Method	7%	3	10
Continuous evaluation	The method of giving lectures	Finite difference solution for one-dimensional heat equation	7%	3	11
Continuous evaluation	The method of giving lectures	Finite difference solution for one-dimensional wave equation	8%	3	12
Continuous evaluation	The method of giving lectures	Finite difference solution for one-dimensional wave equation	7%	3	13
Continuous evaluation	The method of giving lectures	Finite difference solution for two-dimensional Laplace and Poisson equations	7%	3	14
		Final exam	5%		15

12-Infrastructure	
	Required readings:-Basic Texts
Numerical Methods,by R. W. Hornbeck.	**Main references (sources)**
Numerical Methods Using MATLAB,by J. H. Mathew and K. D. Fink.	Recommended books and references (scientific journals, reports, etc(.
	Electronic references, websites...

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Automobile Technology II
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second / 2024- 2025
7. Number of hours of study (total)	30 Hours
8. The date of preparing this description-	5-9-2024

9. Course objectives

1. Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2. Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3. applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4. Contribute effectively to the growth of the engineering management system and

scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5. Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6. Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programmer.
7. Active participation in community service activities.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
4) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
5) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
6) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
7) Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
Quizzes and Tests	Lectures	Introduction to Automobile Technology	5%	2	1
Quizzes and Tests	Lectures	Automobile Power Plant	5%	2	2
Feedback and Formative Assessment	Lectures	VEHICLE STRUCTURE AND ENGINES	5%	2	3
Feedback and Formative Assessment	Lectures &Active Learning	Piston Engine Propulsion	5%	2	4
Observations	Lectures &Active Learning	SAL Institute of Technology and Engineering Research	8%	2	5
Self-Assessment	Lectures &Active Learning	ENGINE & WORKING PRINCIPLES	8%	2	6
Peer Assessment	Flipped Classroom	TORQUE MEASUREMENT	8%	2	7
Examinations	Flipped Classroom	Mid Examination	7%	2	8
Peer Assessment	Flipped Classroom	External Combustion	8%	2	9
Portfolios	Inquiry-Based Learning	internal Combustion	7%	2	10
Portfolios	Peer Learning	Four and Two strokes	7%	2	11
Assignments and Projects	Reflective Learning & Experimental Learning	Oral Presentation	8%	2	12
Assignments and Projects	Reflective Learning & Experimental Learning	Braking Systems	7%	2	13
Rubrics and Criteria-Based Assessments	Reflective Learning & Experimental Learning	Bearing	7%	2	14
Examinations		Final Examination	5%	2	15

12-Infrastructure	
Automotive Technology: Principles, Diagnosis, and Service" by James D. Halderman	-Required readings: Basic Texts
ModerAutomotive Engineering: Powertrain, Chassis System, and Vehicle Body" by David Crollan Automotive Technology by James E. Duffy	**Main references (sources)**
Automotive Service: Inspection, Maintenance, Repair" by Tim Gilles	Recommended books and references
How Cars Work" by Tom Newton	Electronic references, ...websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Machine Elements Design II
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second/ 2024- 2025
7. Number of hours of study (total)	45 Hours
8. The date of preparing this - description	5-9-2024

9. Course objectives

1. Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2. Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3. applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4. Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the

production of scientific research and graduation projects in the department's area of specialty.

5. Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6. Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programmer.
7. Active participation in community service activities

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
4) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
5) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures
2- . Student groups
3- Work shop
4- - Scientific trips to follow up the practical reality of the relevant companies
5- - E-learning inside and outside the university campus
6- - Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2,3	2,3,5	Types of welding process and welded joints	4%	3	1
2,4,3	3,4,5	Design of butt welded joints	5%	3	2
1,2,3	3,5	Design of lap welded joints	7%	3	3
2,3,4	2,4,5	Design of journal bearings	7%	3	4
2,3	2,3,5	Design of rolling elements bearings	7%	3	5
2,3,4	1,2,5	Design of mechanical clutches.	7%	3	6
2,3,4	2,4,5	Design of mechanical clutches 2.	7%	3	7
2,3	4,5	Design of mechanical breaks.	7%	3	8
3,4	2,5	Design of mechanical screws.	7%	3	9
1,2,5	1,2,5	Design of mechanical power screws.	7%	3	10
2,3,5	2,5	Design of gears.	7%	3	11
2,5	2,3,5	Design of gears 2.	7%	3	12
3,5	2,5	Design of mechanical chains	7%	3	13
2,3,5	2,3,5	Design of mechanical belts	7%	3	14
2	1,2,5	Design of mechanical ropes.	7%	3	15

12-Infrastructure	
	-Required readings: Basic Texts Course Books Other
Machine Design: An Integrated Approach, by Robert L. Norton	**Main references (sources)**
Shigley's Mechanical Engineering Design	Recommended books and references (scientific journals, (.reports, etc
https://www.coursera.org/browse/physical-science-and-engineering	Electronic references, ...websites

Four Years
1st Semester

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Mechanical Vibration I
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First / 2024- 2025
7. Number of hours of study (total	75 Hours
8. The date of preparing this description-	5-9-2024

9. Course objectives

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.

6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programmer.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
4) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
5) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
6) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
,3,4,	1,2,3,6	Basic concepts of vibration	5%	3	1
,3,4,5	3,6,	Introduction to oscillatory motion	5%	3	2
, 3,4,5	4,5,6	Free vibration of an undamped single degree of freedom	5%	3	3
1,2,3,4,	1,2,3	Simple energy method (Raleigh principle)	5%	3	4
3,4,5	1,2,3,6	Free vibration viscous damped single degree of freedom system	8%	3	5
1,,4,5	1,2,5,6	Equivalent springs and dampers	8%	3	6
1,2,3,4,5	1,2,3,4,5,6	Logarithmic decrement	7%	3	7
,3,4,5	1,2,6	Forced vibration of single degree offreedom	7%	3	8
1,4,5	1,2,3	Forced vibration for constant force	8%	3	9
1,2,5	1,2,3	Forced Vibration for sinusoidal force	7%	3	10
1,2,3,4,5	1,5,6	Rotating unbalance	8%	3	11
1,2,3,4,5	1 ,6	Support motion example	7%	3	12
1,2,3,4,5	3,4,5,6	Vibration isolation	6%	3	13
1,2,5	1,2,5,6	Vibration measuring instrument	7%	3	14
1,2,3	1,2,3,4	Two degree of freedom	7%	3	15

12-Infrastructure

	-Required readings: Basic Texts
	Main references (sources)
Special requirements (including, for example, workshops, periodicals, (software and websites	Recommended books and references (scientific (.journals, reports, etc
	Electronic references, ...websites

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Automobile Air-conditioning, I
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First / 2024- 2025
7. Number of hours of study (total)	75 Hours
8. The date of preparing this - description	5-9-2024

9. Course objectives

1. Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2. Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3. applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4. Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area

of specialty.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
4) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
5) 6) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.

2- Student groups

3- Workshops

4- Scientific trips to follow up the practical reality of the relevant companies.

5- E-learning inside and outside the university campus

6- Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
,3,4,5	1,2,3,6	Introduction in Air-condition	5%	6	1

,3,4,5	4,5,6	Air and Humidity Calculations	5%	6	2
, 3,4,5	1,2,3	Psychrometric Chart	5%	6	3
1,2,3,4,	1,2,5,6	Air-Conditioning Processes	5%	6	4
3,4,5	1,2,3,6	Heat transfer cross wall	7%	6	5
1,,4,5	1,2,5,6	Heat load	7%	6	6
1,2,3,4,5	1,2,3,4,5,6	Cooling load	7%	6	7
,3,4,5	1,2,6	Mid-term Exam	7%	6	8
1,4,5	1,2,3	Duct Design	8%	6	9
1,2,5	1,2,3	Refrigerant Systems, Carnot Cycle,	8%	6	10
1,2,3,4,5	1,5,6	Ideal single stage Cycles	8%	6	11
1,2,3,4,5	1 ,6	Liquid Sub cooling & Vapour Superheating Cycles	8%	6	12
1,2,5	1,2,5,6	Compressor Work	8%	6	13
1,2,3	1,2,3,4	Volumetric Efficiency	7%	6	14
1,2,5	1,4,5,6	Maintenance of an automobile air-conditioning system	5%	6	15

12-Infrastructure

Refrigeration of Air-conditioning / R.S. Khurmi & J.K. Gupta	-Required readings: Basic Texts
Environmental Engineering Analysis and Practice / B.H. Jennings (1970)	**Main references (sources)**
Automotive Heat and Air-Conditioning System / K. Mitchell (1989)	Recommended books and references (.(scientific journals, reports, etc
متطلبات خاصة (وتشمل على سبيل المثال ورش العمل والدوريات والبرمجيات والمواقع الالكترونية)	Electronic references, ...websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Hydraulics and Pneumatics Systems
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First/ 2024- 2025
7. Number of hours of study (total)	45 Hours
8. The date of preparing this description-	2024-9-5
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering	
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.	
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System,	

ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational program.

10-Learning outcomes and methods of teaching, learning and assessment
1) The ability to analyze the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
4) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
5) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
6)Knowledge and familiarity with the work and design of automobiles, as

well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

7) Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
1- exams 2- Continuous evaluation	1,2	Introduction to Hydraulics and Pneumatics	4%	3	1
1- exams 2- Continuous evaluation 3- Reports 4- stimulation 5- Feedback from students	2,3	Applications of fluid power system. A brief comparison - Electrical system – Hydraulic system – Pneumatic system.	6%	3	2
1- exams 2- Continuous evaluation 3- Reports 4- stimulation 5- Feedback from students	5,6	Pascal's law - Boyle's law. Types of fluid power system - Properties of hydraulic fluids - Properties of air.- Hydraulic and Pneumatic symbols.	5%	3	3
1- exams 2- Continuous evaluation 3- Reports 4- stimulation 5- Feedback from students	3,4	Hydraulic pumps: Pump classification – Gear pump, Vane pump, Piston pump, construction and working of pumps – Variable	5%	3	4
1- exams 2- Continuous evaluation 3- Reports 4- stimulation 5- Feedback from students	5,6	Displacement pumps. Hydraulic actuators: Classification – Linear hydraulic actuators – Types of hydraulic cylinders – single acting,	7%	3	5
1- exams 2- Continuous evaluation 3- Reports	5,6	Double acting and telescopic – Cushioning mechanism. Rotary actuators-Fluid motors, Gear, Vane and Piston motors. Hydraulic valves: Classification – Pressure – Flow – Direction controls.	8%	3	6
1- exams 2- Continuous evaluation	5,6	Hydraulic circuits – Reciprocating - Quick return – Sequencing – Synchronizing – Intensifier circuit	8%	3	7

3- Reports 4- stimulation					
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Accumulator circuits – Safety circuits –Milling Machine circuits	8%	3	8
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Press – Planner – Forklift. Electro hydraulic circuits	7%	3	9
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Fundamentals of Pneumatics	7%	3	10
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Control Elements - Logic Circuits - Position - Pressure Sensing - Switching – Electro Pneumatic Circuits - Robotic Circuits.	7%	3	11
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Design of Pneumatic circuits	7%	3	12
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Classic-Cascade-Step counter - Combination -Methods -	7%	3	13
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	PLC Microprocessors	7%	3	14
1- exams 2- Continuous evaluation 3- Reports 4- stimulation	5,6	Installation and Maintenance of Hydraulic and Pneumatic power packs - Fault finding - Principles of Low Cost Automation	7%	3	15

12-Infrastructure	
Anthony Esposito, ―Fluid Power with Applications‖, Pearson Education 2000.	Required readings:- Basic Texts Course Books Other
1. Andrew Parr, " Hydraulics and Pneumatics (HB) ", Jaico Publishing House, 1999. 2. Anthony Esposito, ―Fluid Power with Applications‖, Pearson Education 2000.	**Main references (sources)**
Special requirements (including, for example, workshops, periodicals, software and websites)	Recommended books and references (scientific journals, reports, etc(.
1. Dudleyt, A. Pease and John J. Pippenger, " Basic Fluid Power ", Prentice Hall, 1987. 2. Anthony Esposite, " Fluid Power with Applications ", Prentice Hall, 1980. 3. Majumdar S.R., ―Oil Hydraulics‖, Tata McGraw-Hill, 2000. 4. Majumdar S.R., ―Pneumatic systems – Principles and maintenance‖, Tata McGraw Hill, 1995 5. Anthony Lal, ―Oil hydraulics in the service of industry‖, Allied publishers, 1982. 6. Dudelyt, A. Pease and John T. Pippenger, ―Basic Fluid Power‖, Prentice Hall, 1987.	Electronic references, websites...
13- Course development plan	
improvement plans Realistic improvement plans derived from consideration of available evidence and assessments. It may be applied for more than one year, but it is prepared and reviewed every year at the level of courses, academic programs and the educational institution.	

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Measuring Systems
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First 2024- 2025
7. Number of hours of study (total	75 Hours
8. The date of preparing this - description	2024-9-5
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering	
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.	
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)	
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.	

5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational program.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyze the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
4) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
5) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
6)Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
1,2,3,6	5,6	Characteristics of measuring devices: Classifications of measuring devices	5%	3	1
,3,4,51,2	5,6	Characteristics of static and kinematic measuring devices	5%	3	2
, 3,4,51	5,6	Experimental error analysis - systematic and random	5%	3	3
1,2,3,4,	5,6	Statistical analysis - imprecision	5%	3	4
3,4,5,1	5,6	Experimental planning and selection of measuring instruments	7%	3	5
1,,4,,6,9	5,6	Hardware dependency	8%	3	6
1,2,3,4,5	5,6	Unit Two: Measurements of Natural Quantities: Thermometer - Physical Properties	8%	3	7
,3,4,5	5,6	Thermometers	8%	3	8
1,4,5,8,9	5,6	Pressure and flow measuring devices	7%	3	9
1,2,5,7	5,6	Module Three: -Advance Metrics Techniques: Shadow Graphing	7%	3	10
1,2,3,4,5	5,6	internal magnetic forces	7%	3	11
1,2,3,4,5	5,6	Schileren	7%	3	12
1,2,3,4,5	5,6	Laser Doppler Accelerometer	7%	3	13
1,2,,6,85	5,6	Hot wire speedometer	7%	3	14
1,2,9,3	5,6	Telemetry measures	7%	3	15

12-Infrastructure	
1. Engineering Metrology, R.K. Jain, Khanna Publishers, 1994. 2. Mechanical Measurements, Beckwith Marangoni and Lienhard, Pearson Education, 6th Ed., 2006	Required readings:- Basic Texts Course Books Other
1. Engineering Metrology, I.C. Gupta, Dhapat Rai Publications, Delhi. 2. Mechanical Measurements, R.K. Jain 3. Industrial Instrumentation, Alsutko, Jerry. D. Faulk, Thompson Asia Pvt. Ltd.2002.	**Main references (sources)**
Mechanical Measurements, Beckwith Marangoni and Lienhard, Pearson Education, 6th Ed., 2006.	Recommended books and references (scientific journals, reports, etc(.

1- Control Systems Principles and Design, M. Gopal, Tata McGraw Hill Publishing Co. Ltd., New Delhi Copyright Year: 2020, dissidents. 2- https://archive.nptel.ac.in/courses/112/106/112106139/	Electronic references, websites...
13- Course development plan	
improvement plans Realistic improvement plans derived from consideration of available evidence and assessments. It may be applied for more than one year, but it is prepared and reviewed every year at the level of courses, academic programs and the educational institution.	

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Vehicle design I
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second / 2024- 2025
7. Number of hours of study (total)	30 Hours
8. The date of preparing this description-	2025-05-30

9. Course objectives

1. Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2. Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3. applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4. Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyse the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2,3	2,3,5	Introduction Components of IC engine & its Function.	5%	6	1
2,4,3	3,4,5	Body design • Car Body Details: types • 1. Saloon Car	5%	6	2
1,2,3	3,5	• 2. Convertibles Car • 3. Estate Van Car • 4. Racing and Sports Car	5%	6	3
2,3,4	2,4,5	Design of Cylinder liners, cylinder head, number of studs	5%	6	4
2,3	2,3,5	Connecting Rod: Thrust in connecting rod	7%	6	5
2,3,4	1,2,5	stress due to whipping action on connecting rod ends	7%	6	6
2,3,4	2,4,5	Cranks and Crank shafts	7%	6	7
2,3	4,5	strength and proportions of over hung and center cranks– Crank pins,	7%	6	8
3,4	2,5	Crank shafts	8%	6	9
1,2,5	1,2,5	Pistons, Forces acting on piston – Construction. Examles	8%	6	10
2,3,5	2,5	Design and proportions of piston,	8%	6	11
2,5	2,3,5	Cylinder and Cylinder liners	8%	6	12
3,5	2,5	Valve gear mechanism	8%	6	13
2,3,5	2,3,5	Examples	7%	6	14
2	1,2,5	Introduction : Power Transmissions Systems	5%	6	15

12-Infrastructure	
The Motor Vehicle Thirteenth Edition T.K. GARRETT CEng, FIMechE, MRAeS	-Required readings: Basic Texts Course Books Other
Machine Design. A Textbook for the Students of B.E. / B.Tech	**Main references (sources)**
Special requirements (including, for example, workshops, periodicals, software and websites	Recommended books and references (.(scientific journals, reports, etc
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	CAE I
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First / 2024- 2025
7. Number of hours of study (total)	60 Hours
8. The date of preparing this description-	2024-9-5
9. Course objectives	
1. Educating and training students to obtain a Bachelor of Science in Engineering degree in	

Automotive Engineering

2. Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3. applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4. Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

5-Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational program.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyse the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
4) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
5) Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies
5- - Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
,3,4,5	1,2,3,6	- Introduction to CAE I	5%	3	1
,3,4,5	4,5,6	-why we use CAE I	5%	3	2
, 3,4,5	4,5,6	-Difference between experimental and theoretical work	5%	3	3
1,2,3,4,	1,2,3	-Error percentage	5%	3	4
3,4,5	1,2,3,6	-how to convert mathematical issues to programming (numerical) issues	7%	3	5
1,,4,5	1,2,5,6	-Static structural analysis	7%	3	6
1,2,3,4,5	1,2,3,4,5,6	-How to apply boundary conditions	7%	3	7
,3,4,5	1,2,6	-Types of applied stress and its applications	7%	3	8
1,4,5	1,2,3	-Import the issue geometry or draw it in the design modeler	8%	3	9
1,2,5	1,2,3	-Solve the problem and find all required results	8%	3	10
1,2,3,4,5	1,5,6	- Buckling analysis simulation	8%	3	11
1,2,3,4,5	1 ,6	-Draw the required geometry	8%	3	12
1,2,3,4,5	3,4,5,6	-Apply boundary conditions	8%	3	13
1,2,5	1,2,5,6	- - Find critical buckling load, load multiplier, and safety factor	7%	3	14
1,2,3	1,2,3,4	- Transient Thermal analysis simulation	5%	3	15

12-Infrastructure

Introduction to ansys workbench ,MAE 656, Advancedcomputer aided design Dr. Xavier Martinez, 2012	-Required readings: Basic Texts

Various Internet Resources& New Head way plus serial	Main references (sources)
Ansys, Theory Reference, release 5.6, by peter kohnke	Recommended books and (.references
	Electronic references, ...websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Industrial Engineering
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	First 2024- 2025
7. Number of hours of study (total	30 Hours
8. The date of preparing this - description	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering. 2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders. 3- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.	

4. Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational program.

10- Learning outcomes and methods of teaching, learning and assessment

1) The ability to understand and deal with most of the terms of industrial engineering and industrial management, its objectives and applications, get acquainted with production management and planning, cost accounting, production control, second and variable cost calculation, break-even blister calculation, gross sales, gross and net profit calculation, identification of fixed and current assets, cash assets, and how to do, plan and design production lines And calculate the number of machines required.
2) The ability to understand and manage industrial projects and service projects, the method of managing and operating companies, government institutions and the private sector by using modern methods of management such as using linear programming in managing state projects and identifying modern ways and means in calculating the costs of transporting products and planning to reduce these costs and knowing how to do detection and determination Quality control tasks on products, how to manage time and deal with it, and how to perform maintenance on used machines.
3) The ability to produce engineering designs that meet the required needs represented by the requirements of international specifications for the management of production operations for cars, the requirements of the labor market and stakeholders within the restrictions of the type of use and other determinants through the processes of analysis and installation in the design, manufacturing and production process.

4- The ability to realize ethical and professional responsibilities in engineering issues and issue sound judgments that take into account the consequences in the financial, environmental and societal fields at the global level.

Subject-specific skills

Learn how to study the design, manufacture, assembly and determine the number of production lines required for the production of cars and calculate the estimated and estimated costs in the light of market data and the desire of the consumer and in light of the amount of sales for previous years and how to calculate the time through which the wages of manpower, skilled hands, wages of advanced staff and experts and the cost of raw materials can be calculated Determining their quantities, which in turn helps to give estimated and estimated values for the main production costs in order to ensure that companies and factories obtain profits and avoid losses that may eventually lead to the halting of the production process.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.

5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
1, 3,4,5	1,2,3,6	Some basic definitions of industrial engineering	5%	3	1
,3,4,5	2, 3,4,5	Depreciation and methods of calculating depreciation	5%	3	2
, 3,4,5	4,5,6	Calculating the number of machines required	5%	3	3
1,2,3,4,	1,2,3	break-even analysis	5%	3	4
3,4,5	1,2,3,6	General Notes on Break-Even Point	7%	3	5
1,,4,5	1,2,5,6	Annual profit and volume chart	6%	3	6
1,2,3,4,5	1,2,3,4,5,6	New design economics	7%	3	7
,3,4,5	1,2,6	Sales forecasts and guesswork	7%	3	8
1,4,5	1,2,3	linear programming	8%	3	9
1,2,3,6	1,2,3,6	Network analysis of projects	7%	3	10
,3,4,5	1,2,3,6	Trnsport problems	8%	3	11
, 3,4,5	4,5,6	Business Personalization Forms	7%	3	12
1,2,3,4,	1,2,3	Movement study	8%	3	13
3,4,5	1,2,3,6	Study of time	7%	3	14
1,4,5	1,2,5,6	Quality control	8%	3	15

12-Infrastructure

Introduction to industrial managementFundamentals of industrial engineering	-Required readings: Basic Texts
Papers from the network	**Main references (sources)**
Special requirements (including, for example, workshops, (periodicals, software and websites	Recommended books and references (scientific (.journals, reports, etc
	Electronic references,

Four year
2nd semester

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Mechanical vibration II
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second/ 2024- 2025
7. Number of hours of study (total	75 Hours
8. The date of preparing this description-	5-9-2024

9. Course objectives

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.
5- Participation in promoting engineering awareness, conducting scientific courses and site visits to

manufacturing facilities, and recognizing the need for ongoing self-development of professional knowledge and how to locate, evaluate, compile, and correctly apply it.

6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational programmer.

10-Learning outcomes and methods of teaching, learning and assessment

1- The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.

2- The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.

3- The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.

4-The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.

5-Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.

6-Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.

Teaching and learning methods

1- The method of giving lectures.

2- Student groups

3- Workshops

4- Scientific trips to follow up the practical reality of the relevant companies.

5- E-learning inside and outside the university campus

6- Experiential learning

Evaluation methods

1- exams

2- Continuous evaluation

3- Reports

4- stimulation

5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
3,4,5,	1,2,3,6	Two degree of freedom - Coordinate couplings - Semi definite system - Study and analyze the equation of motion for 2-Degree system. Estimating the natural frequencies and their mode shapes, Also studying the coordinal coupling and semi definite system with some examples	5%	3	1
,3,4,5	1,2,3,6	Mode shapes - Study the mode shapes fore different system of two Degree of freedom with examples	5%	3	2
, 3,4,5	4,5,6	Lagrange equation - Examples - Study Lagrange ,eq. for damped & undamped system free and forced Vib . and applying it for several times according to the coordinate under consideration with examples	5%	3	3
1,2,3,4,	1,2,3	Dynamic absorber (undamped) - Study and formulate the eq. of dynamic absorber and its caracterstic w ithout damping in addition to some examples	5%	3	4
3,4,5	1,2,3,6	- Study and formulate the eq. of dynamic absorber and its caracterstic with damping in addition to some examples	8%	3	5
1,,4,5	1,2,5,6	Multiple degree of freedom - Studying and formulating the eq, of motion for multiple degree of freedom and finding the natural freq and their mode shapes	8%	3	6
1,2,3,4,5	1,2,3,4,5,6	Influence coefficient matrix and stiffness matrix - Studying and finding the eigen values and hence the natural frequencies and the eigen vector (mode shape) for multiple degree of freedom system with some examples	7%	3	7
,3,4,5	1,2,6	Eigen values and eigen vectors - Example - Studying and finding the eigen values and hence the natural frequencies and the eigen vector (mode shape) for multiple degree of freedom system with some examples	7%	3	8
1,4,5	1,2,3	Torsional vibration -Single degree,Two degree and Multiple degree - Studying	8%	3	9

		the Tordsional Vib. for Single,Two ,and multiple degree of freedom system using holzer method and finding the equivallent of stepped shaft and Gear shaft			
1,2,5	1,2,3	Torsional vibration -Single degree,Two degree and Multiple degree - Studying the Tordsional Vib. for Single,Two ,and multiple degree of freedom system using holzer method and finding the equivallent of stepped shaft and Gear shaft	7%	3	10
1,2,3,4,5	1,5,6	Torsional vibration for stepped shaft - Torsional vibration for shaft with gears - Studying the Tordsional Vib. for Single,Two ,and multiple degree of freedom system using holzer method and finding the equiva of stepped shaft and Gear shaft	8%	3	11
1,2,3,4,5	1 ,6	Vibration of continuous system - Studying and formulating the eq. for continuous system for different end Boundary condition and constrains with. - examples	7%	3	12
1,2,3,4,5	3,4,5,6	Vibration of continuous system - Studying and formulating the eq. for continuous system for different end Boundary condition and constrains with. - examples	6%	3	13
1,2,5	1,2,5,6	Rayleigh method for estimation the fundamental natural frequency - Studying Ruyliegh eq. to estimate the fundamental natural freq . of a system with examples	7%	3	14
1,2,3	1,2,3,4	Dunkerley method to find 1st natural frequency - Studying Ruyliegh eq. to estimate the fundamental natural freq . of a system with examples	7%	3	15

12-Infrastructure	
	-Required readings: Basic Texts
	Main references (sources)
Special requirements (including, for example, workshops, (periodicals, software and websites	Recommended books and references (.(scientific journals, reports, etc
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	.University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Design-and-Materials-Selection
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second /2024-2025
7. Number of hours of study (total	30 Hours
8. The date of preparing this description-	5-9-2024

9. Course objectives

1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering

2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.

3- Contribute effectively to the growth of the engineering management system and scientificcapabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labor market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
4) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
5) Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty. Different types of vehicles,Material properties, mechanical properties, design calculations, and transmission system components for different types of vehicles

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
و23	و2و3و15	Introduction: The Families of Engineering Materials	5%	2	1
و3و24	و12	Materials Information for Design	5%	2	2
و2و13	3,5	Materials in Design, The Evolution of Engineering Materials	5%	2	3
و2و14	و2و15	The Design Process: Types of Design, Design Tools and Materials Data Case Study;	5%	2	4
و23	2,3,5	Case Study; Engineering Materials and Their Properties.	7%	2	5
و3و24	1,2,5	Design and selection for Static Strength, Design and selection for Fatigue Strength	7%	2	6
و3و4و25	2,4,5	Design and selection for Creep Strength,	7%	2	7
و23	و2و13	Design and selection for Hardness and Wear Strength,	7%	2	8
و34	2,5	Design and Materials Selection using Ashby Method: The materials property Charts, Materials Indices	8%	2	9
و2و15	1,2,5	The selection Procedure; Case Studies: Multiple Constraints and	8%	2	10
و3و25	و2,5	Conflicting Objective	8%	2	11
و25	2,3,5	Selection with Multiple Constraints Conflicting Objective;	8%	2	12
و2و3و15	2,5	Design and Materials Selection with Shape: Shape Factors Limits to Shape Efficiency,	8%	2	13
و23	2,3,5	Exploring Materials-Shape Combinations,	7%	2	14
و3و24	1,2,5	Materials Indices Including Shape, Graphical	5%	2	15

12-Infrastructure	
Text Book: Materials Selection in Mechanical Design / MichaelF. Ashby. 4th ed., 2011.	-Required readings: Basic Texts
Machine Design. A Textbook for the Students of B.E. / B.Tech	**Main references (sources)**
Special requirements (including, for example, workshops, (periodicals, software and websites	Recommended books and references (.(scientific journals, reports, etc
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Control Systems
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second 2024- 2025
7. Number of hours of study (total	45 Hours
8. The date of preparing this description-	5-9-2024
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering	
2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.	
3- applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)	
4- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.	
5- Participation in promoting engineering awareness, conducting scientific courses and site visits to manufacturing facilities, and recognizing the need for ongoing self-development of	

professional knowledge and how to locate, evaluate, compile, and correctly apply it.
6- Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational program.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyze the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) The ability to evaluate control systems and their efficiency in all car systems, evaluate the automobile's operating system, exhaust emission rates, and their impact on environmental pollution by creating and implementing appropriate measurements and tests to ensure quality requirements are met, analyzing the results, and using engineering judgment to draw conclusions.
4) The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes.
5) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
6) Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimulation
5- Feedback from students

11- Course Structure					
Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
4,5,1	1,2	Introduction: Definitions and concept of automatic controls, classification of control system	5%	3	1
,3,4,5	3,4	Open and closed loop systems, concepts of feedback, requirements of an ideal control system.	5%	3	2
, 3,4,5	5,6	Mathematical Modeling: Transfer function, modeling of mechanical systems, electrical systems, elctromechanical systems, thermal systems, hydraulic and pneumatic systems, and Analogous systems: Force voltage, Force current.	5%	3	3
1,2,3,4,	3,4	Block Diagrams and Signal Flow Graphs: Block diagram representation, functional block, block diagram reduction, Signal flow graphs, and Mason's gain formula.	5%	3	4
3,4,5	5,6	Transient and Steady State Response Analysis: Introduction, Standard test inputs, concept of time constant and its importance in speed of response, analysis of first order and second order systems, Transient response specifications, System stability analysis - Routh-Hurwitz Criterion.	7%	3	5
1,,4,5	5,6	Frequency Response Analysis using Nyquist Plots: Polar plots	8%	3	6
1,2,3,4,5	5,6	Nyquist Stability Criterion, Stability Analysis, Relative stability concepts	8%	3	7
,3,4,5	5,6	Phase and gain margin, M & N circles.	8%	3	8
1,4,5	5,6	Frequency Response Analysis using Bode Plots: Bode attenuation diagrams, Stability Analysis using Bode plots, and Simplified Bode Diagrams, phase and gain margin.	7%	3	9
1,2,3	5,6	Root locus plots: Definition of root loci, general rules for constructing root loci, Analysis using root locus plots.	7%	3	10
,3,4,5	5,6	Control Action and System	7%	3	11

		Compensation: Types of controllers – Proportional, Integral, Proportional Integral, Proportional Derivative			
, 3,4,5	5,6	Proportional Integral Derivative controllers (Basic concept only), Series and feedback compensation, Physical devices for system compensation.	7%	3	12
1,2,3,4,	5,6	Introduction and Mathematical Representation of Robots History of Robots, Types of Robots, Notation, Position and Orientation of a Rigid Body.	7%	3	13
3,4,5	5,6	Some Properties of Rotation Matrices, Successive Rotations, Euler Angles For fixed frames X-Y-Z and	7%	3	14
1,,4,5	5,6	Moving frame ZYZ. Transformation between coordinate system, Homogeneous coordinates.	7%	3	15

12-Infrastructure	
1- Control Engineering, Uday A. Bakshi and Varsha U. Bakshi. 2- Control Engineering, D. Ganesh Rao and K. Channa Venkatesh.	Required readings:- Basic Texts Course Books Other
Feedback and Control Systems, Joseph J. Distefano, Allen R. Stubberud and Ivan J. Williams,	**Main references (sources)**
. Modern Control Engineering, Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., New Delhi	Recommended books and references (scientific journals, reports, etc(.
2. Control Systems Principles and Design, M. Gopal, Tata McGraw Hill Publishing Co. Ltd., New Delhi	Electronic references, websites...
13- Course development plan	
improvement plans Realistic improvement plans derived from consideration of available evidence and assessments. It may be applied for more than one year, but it is prepared and reviewed every year at the level of courses, academic programs and the educational institution.	

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	.University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Vehicles Design II
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second / 2024-2025
7. Number of hours of study (total	30 Hours
8. The date of preparing this description-	5-9-2024

9. Course objectives

1. Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering

2. Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders
3. Providing the student to be able to study the technology of metals and alloys, as well as a basis for the engineer through which he can work on employing what he has studied in practical life
4. Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty

10-Learning outcomes and methods of teaching, learning and assessment

1. The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2. The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3. Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide
4. Definitions and general concepts in vehicle design and manufacturing process of each part of the engine in different types of vehicles. Material properties, mechanical properties, design calculations, and transmission system components for different types of vehicle.
5. Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- Scientific trips to follow up the practical reality of the relevant companies.
5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimuli
5- Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
و23	و2و3و15	Design, Construction, of Flywheel		2	1
و3و24	و12	1. Introduction. 2. Coefficient of Fluctuation of Speed. 3. Fluctuation of Energy. 4. Maximum Fluctuation of Energy. 5. Coefficient of Fluctuation of Energy.		2	2
و2و13	3,5	6. Energy Stored in a Flywheel. 7. Stresses in a Flywheel		2	3
و2و14	و2و15	Rim. 8. Stresses in Flywheel Arms. 9. Design of Flywheel Arms. 10. Design of Shaft, Hub and Key. 11. Construction of Flywheels		2	4
و23	2,3,5	1. Introduction. 2. Types of Clutches. 3. Positive		2	5
و3و24	1,2,5	Clutches. 4. Friction Clutches. 5. Material for Friction		2	6
و3و4و25	2,4,5	Surfaces. 6. Considerations in Designing a Friction		2	7
و23	و2و13	Clutch. 7. Types of Friction Clutches		2	8
و34	2,5	8. Single Disc or Plate Clutch. 9. Design of a Disc or Plate Clutch. 10. Multiple Disc Clutch. 11. Cone Clutch. 12. Design of a Cone Clutch. 13. Centrifugal Clutch. 14. Design of a Centrifugal Clutch.		2	9
و2و15	1,2,5	1. Introduction. 2. Friction Wheels. 3. Advantages and		2	10
و3و25	و2,5	Disadvantages of Gear Drives. 4. Classification of		2	11
و25	2,3,5	Gears.5. Terms used in Gears. 6. Condition for Constant		2	12
و2و3و15	2,5	Velocity Ratio of Gears–Law of Gearing.		2	13
و2و15	2,3,5	examples		2	14
2	1,2,5	GEARS, Classification of Gears		2	15

12-Infrastructure

The Motor Vehicle Thirteenth Edition T.K. GARRETT ▪ CEng, FIMechE, MRAeS	-Required readings: Basic Texts Course Books Other
Machine Design. A Textbook for the Students of B.E. / B.Tech	**Main references (sources)**
Special requirements (including, for example, workshops, (periodicals, software and websites	Recommended books and references (.(scientific journals, reports, etc
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	Automotive Air-Conditioning System II
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	second/ 2024- 2025
7. Number of hours of study (total)	60 Hours
8. The date of preparing this description-	5-9-2024
9. Course objectives	
1. Educating and training students to obtain a Bachelor of Science in Engineering degree	

in Automotive Engineering

2. Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3. applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4. Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyses the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and installation processes in the design process.
3) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
4) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
5) Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.

2- Student groups

3- Workshops

4- Scientific trips to follow up the practical reality of the relevant companies.

5- E-learning inside and outside the university campus
6- Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
,3,4,5	2,3,5	unit 1 : automotive air-conditioning fundamentals	5%	6	1
, 3,4,5	3,4,5	Basic Air conditioning system- Location of Air conditioning components in a car – schematic layout of a Refrigeration system. Compressor	5%	6	2
1,2,3,4,	3,5	Thermostatic expansion valve and Orific tube – expansion valve calibration – evaporator temperature controls for TXV and CCOT systems.	5%	6	3
3,4,5	2,4,5	UNIT 2 : AIRCONDITIONER – HEATING SYSTEM	5%	6	4
1,,4,5	2,3,5	Manually controlled air conditioner- Heater system- ford automatically controlled air conditioner- Heater systems- Chrysler automatically controlled air conditioner-	8%	6	5
1,2,3,4,5	1,2,5	heater system, general motors automatically controlled Air conditioner- heater system- Flushing and evacuating	8%	6	6
,3,4,5	2,4,5	UNIT 3 : REFRIGERANT	7%	6	7
1,4,5	4,5	Containers- handling refrigerant – discharging, charging and leak detection – refrigeration system	7%	6	8
1,2,5	2,5	Diagnosis – Diagnostic procedure – Ambient conditions affecting system pressures.	8%	6	9
1,2,3,4,5	1,2,5	AIR ROUTING AND TEMPERATURE CONTROL	7%	6	10
1,2,3,4,5	2,5	Objectives – Evaporators case air flow through the Dash recalculating unit – Automatic Temperature control	8%	6	11
1,2,3,4,5	2,3,5	– Duct system- Controlling flow – vacuum reserve – testing the air control and handling systems	7%	6	12

1,2,5	2,5	UNIT 5 : HEATER- AIR CONDITIONER TROUBLE SHOOTING& SERVICE	6%	6	13
1,2,3	2,3,5	Air conditioner maintenance and service- servicing heater system. removing and replacing components. trouble shooting of air conditioner- heating system- compressor service.	7%	6	14
1,2,5	1,2,5	Effect of Pressure and Temperature on the Rankine Cycle, The Reheat Cycle, the Regenerative Cycle,	7%	6	15

12-Infrastructure	
1 Mitchell information services, Inc., Mitchell Automotive Heating and Air conditioning systems, prentice Hall Inc, 1989.	-Required readings: Basic Texts
2. Paul Weisler, Automotive Air conditioning, Reston Publishing Co. Inc., 1990.	**Main references (sources)**
3. McDonald K.L., Automotive Air conditioning., Theodore Audel series., 1978.	Recommended books and references
https://www.amazon.com/Heating-Ventilating-Conditioning-Analysis-Design/dp/0471470154	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	University of Babylon
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	CAE II

4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly
6. Semester/year	Second / 2024- 2025
7. Number of hours of study (total)	60 Hours
8. The date of preparing this description-	5-9-2024

9. Course objectives

1. Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering
2. Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.
3. applying national standards for engineering accreditation, specialized international standards, standards of good educational laboratory (GLP), and national standards for laboratories to the development of curricula and the other requirements of the other educational process to ensure the quality of education and Knowledge and understanding of occupational standards (ISO 45001 Occupational Health and Safety Management System, ISO 14001 Environmental Management System, and ISO 50001 Energy Management System)
4. Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.

5-Applying the principle of self-evaluation and benefiting from feedback enables the department to achieve continuous improvement in all aspects of its educational program.

10-Learning outcomes and methods of teaching, learning and assessment

1) The ability to analyse the performance of engines and determine car malfunctions and maintenance costs by distinguishing, identifying, defining, formulating, and solving engineering problems by employing engineering, science, and mathematics principles.
2) The ability to produce engineering designs that meet the required needs is represented by the requirements of international specifications for automobile production, the needs of the labour market and stakeholders within the constraints of the type of use, and other determinants through the analysis and

installation processes in the design process.

3) Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide.
4) Knowledge and familiarity with the work and design of automobiles, as well as the use of the most important technologies in the design and manufacture of automobiles, through the ability to recognize the need for ongoing self-development of professional knowledge and how to locate, evaluate, collect, and correctly implement it.
5) Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.

Teaching and learning methods

1- The method of giving lectures.
2- Student groups
3- Workshops
4- E-learning inside and outside the university campus
5- Experiential learning

Evaluation methods

1) exams
2) Continuous evaluation
3) Homework
4) Stimuli
5) Feedback from students

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
	1,2,3,6	Introduction to CAE	5%	2	1
,3,4,5		Static Structure	5%	2	2
, 3,4,5	4,5,6	Buckling	5%	2	3
1,2,3,4,	1,2,3	Transient Thermal	5%	2	4
3,4,5	1,2,3,6	Steady State Thermal	8%	2	5
1,,4,5	1,2,5,6	Explicit Dynamic	8%	2	6
1,2,3,4,5	1,2,3,4,5,6	Static structure &Steady state interaction	7%	2	7
,3,4,5	1,2,6	Static structure & Transient thermal interaction	7%	2	8

1,4,5	1,2,3	Fluid flow (fluent)	8%	2	9
1,2,5	1,2,3	Fluid CFX	7%	2	10
1,2,3,4,5	1,5,6	optimization	8%	2	11
1,2,3,4,5	1 ,6	Modal	7%	2	12
1,2,3,4,5	3,4,5,6	Harmonic response	6%	2	13
1,2,5	1,2,5,6	EXAM.1	7%	2	14
1,2,3	1,2,3,4	EXAM.2	7%	2	15

12-Infrastructure	
Introduction to ansys workbench ,MAE 656, Advanced computer aided design Dr. Xavier Martinez, 2012	-Required readings: Basic Texts
Ansys, Theory Reference, release 5.6, by peter kohnke	**Main references (sources)**
	Recommended books and references (.(scientific journals, reports, etc
	...Electronic references, websites

Course description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities. It must be linked to the description of the program.

1. Educational Institution	Babylon University
2. University Department / Center Scientific Department	Automobiles Engineering Department
3. Course name/code	English Language, IIII
4. Programs in which it enters	Bachelor
5. Forms of attendance available	Weekly

6. Semester/year	Second 2024/2025
7. Number of hours of study (total	30 Hours
8. The date of preparing this - description	2025/5/9
9. Course objectives	
1- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering **2- Preparing qualified automotive engineers that meet both the local specialized standards (the national standards for engineering accreditation) and the international standards (ABET standards), as well as the requirements of stakeholders.** **3- Contribute effectively to the growth of the engineering management system and scientific capabilities in the fields of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's area of specialty.**	

10-Learning outcomes and methods of teaching, learning and assessment
1- The ability to communicate effectively orally with a variety of individuals and in writing with various management levels and purposes. 2- Ability to understand ethical and professional responsibilities in engineering issues and make ethical choices that take into account the effects on the financial, environmental, and societal fields worldwide. 3- Ability to effectively lead and manage work teams, set objectives based on capabilities, plan to achieve them correctly, meet deadlines, and manage risk and uncertainty.
Teaching and learning methods
1- The method of giving lectures. 2- Student groups 3- Workshops 4- Scientific trips to follow up the practical reality of the relevant companies. 5- E-learning inside and outside the university campus 6- Experiential learning
Evaluation methods

1- exams
2- Continuous evaluation
3- Reports
4- stimuli
5- Feedback from students

12-Infrastructure	
▪ New Headway Plus by John & Liz Soars for Beginners ▪ Various Internet Resources& New Head way plus serial	-Required readings: Basic Texts Course Books
The Cambridge Encyclopedia of the English Language by David Crystal	Main references (sources)
	Recommended books and references (scientific journals, (.reports, etc
	...Electronic references, websites

11- Course Structure

Evaluation method	education method	Unit name/course or topic	Required learning outcomes	Theoretical hours	Week
2و3	1و2و3و5	Introduction – Giving a general information about English Language	5%	2	1
2و3و4	1و2	Greetings	5%	2	2
1و2و3	3,5	Listening & speaking	5%	2	3
1و2و4	1و2و5	Possessives adjectives	5%	2	4
2و3	2,3,5	Present simple tense	7%	2	5
2و3و4	1,2,5	Present continuous tense	7%	2	6
2و3و4و5	2,4,5	Mid-term Exam	7%	2	7
2و3	1و2و3	Past & past continuous tense	7%	2	8
3و4	2,5	Making question	8%	2	9
1و2و5	1,2,5	Future tense	8%	2	10
2و3و5	2,5و	Pronouns	8%	2	11
2و5	2,3,5	Practice language	8%	2	12
1و2و3	2,5	Correcting English mistakes	8%	2	13
1وو5	2,3,5	Countable & un countable nouns	7%	2	14
2	1,2,5	Adjectives	5%	2	15