



University of Babylon



Faculty of Engineering – Al-Musayab

Automobile Engineering Department

*First Cycle – Bachelor's Degree (B.Sc.) – Automobile Engineering*

بكالوريوس - هندسة السيارات



مصادقة السيد عميد الكلية

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15/10/2023

**Appendix (2)**  
**Program Catalogue**  
**دليل البرنامج الدراسي**  
**2023-2024**



**University of Babylon**



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## 1. Mission & Vision

### *Vision*

The vision of an Automobiles Engineering Department is to drive innovation, excellence, and sustainability in the automotive industry. It encompasses the development, design, manufacturing, and maintenance of automobiles while considering various factors such as performance, safety, efficiency, and environmental impact.

**1.1 Innovation:** The department aims to be at the forefront of technological advancements in the automotive sector. This includes researching and implementing cutting-edge technologies like electric and autonomous vehicles, advanced materials, intelligent systems, and connectivity solutions. The vision is to create breakthroughs that redefine the way we travel and revolutionize the driving experience.

**1.2 Excellence:** The department strives for excellence in every aspect of automobile engineering. This involves designing and producing high-quality vehicles that meet and exceed customer expectations. It also emphasizes continuous improvement in manufacturing processes, ensuring efficiency, reliability, and durability of automobiles. The vision is to set industry benchmarks for performance, safety, and overall customer satisfaction.

**1.3 Sustainability:** With the growing concern for the environment, the department's vision includes a strong commitment to sustainability. This entails developing



environmentally friendly and energy-efficient vehicles, reducing emissions, and promoting the use of renewable resources. The aim is to contribute to a cleaner and greener future by adopting eco-friendly practices throughout the entire lifecycle of an automobile, from production to disposal.

**1.4 .Safety: Safety** is a paramount consideration for the department's vision. It involves integrating advanced safety features, conducting rigorous testing and analysis, and adhering to international safety standards. The goal is to create vehicles that provide optimal protection to occupants, pedestrians, and other road users, thereby minimizing the risk of accidents and injuries.

**1.5 .Collaboration:** The vision of the Automobiles Engineering Department includes fostering collaboration and partnerships with other research institutions, industry leaders, and regulatory bodies. This collaboration enables the sharing of knowledge, expertise, and resources to tackle complex challenges collectively. By working together, the department aims to drive advancements in automobile engineering, shape industry standards, and contribute to the overall development of the automotive sector.

## ***Mission***

The mission of an Automobile Engineering Department is to provide comprehensive education, research, and practical training in the field of automotive engineering. The department aims to develop skilled engineers who are equipped with the knowledge, skills, and ethical values necessary to excel in the automotive industry. The mission encompasses the following key elements:

**1.1. Education:** The department's mission involves offering high-quality education and training programs that cover the fundamentals of automobile engineering. It focuses on providing students with a strong foundation in areas such as vehicle design, manufacturing processes, powertrain systems, vehicle dynamics, and safety engineering. The mission is to prepare students to meet the evolving needs of the automotive industry and equip them with the skills required for successful careers in various roles within the field.

**1.2. Research and Innovation:** The mission also includes conducting cutting-edge research in automotive engineering. This involves exploring new technologies, materials, and design concepts to improve vehicle performance, safety, efficiency, and sustainability. The department encourages faculty and students to engage in research projects that address industry challenges and contribute to advancements in the field. The mission is to be a hub of innovation, generating knowledge and driving technological breakthroughs in the automotive sector.

**1.3. Industry Collaboration:** The department recognizes the importance of collaboration with industry partners. It aims to establish strong relationships with automotive manufacturers, suppliers, and other industry stakeholders. Through partnerships and collaborations, the department can stay abreast of industry trends, gain practical insights, and provide students with exposure to real-world projects and internships. The mission is to

bridge the gap between academia and industry, fostering a mutually beneficial exchange of knowledge and expertise.

**1.4. Professional Development:** The department's mission includes facilitating the professional development of students by nurturing their technical, analytical, and problem-solving skills. It provides opportunities for students to engage in hands-on learning experiences through practical workshops, laboratory experiments, and design projects. The department also encourages students to participate in industry events, conferences, and competitions to enhance their professional networking and showcase their talents. The mission is to produce well-rounded graduates who are ready to contribute effectively in the professional realm.

**1.5. Social Responsibility:** The department recognizes its responsibility towards society and the environment. It promotes ethical engineering practices and instills in students a sense of social responsibility. The mission includes encouraging students to consider the societal impact of automotive engineering, such as promoting sustainable transportation solutions, reducing emissions, and improving road safety. The department also engages in outreach activities to create awareness and educate the community about the importance of responsible automobile usage.

## 2. Program Specification

<b>Programme code:</b>	<b>BSc-Automobile Engineering</b>	<b>ECTS</b>	<b>240</b>
<b>Duration:</b>	<b>4 levels, 8 Semesters</b>	<b>Method of Attendance:</b>	<b>Full Time</b>

Automobile Engineering Department was established in the University of Babylon College of Engineering / Al-Musayab during the year 2014. The program specializes in graduation of applied engineers after four years of study in the jurisdiction of Automobile Engineering where graduated, students have familiarity and knowledge of humanities, basic sciences and management principles in the automobile industry. The Bachelor of Engineering is a professional degree that allows graduates of the program to register in the Iraqi Engineers Association and practice the profession directly after graduation. The four-year program included one- and two-years' study common to the major, covering basic science and engineering topics courses besides the general education topics, and then last 2 years of specialization in field of automobile engineering for the development of sustainable society. The curriculum was also developed to satisfy the Iraqi requirements for licensure. The program prepares students for successful careers in the automotive industry or further academic pursuits

### 3. Program Goals

The program goals of an Automobile Engineering Department typically align with the overarching mission and vision of the department. These goals reflect the desired outcomes and objectives that the department aims to achieve. Here are some common program goals for an Automobile Engineering Department:

**3.1 Academic Excellence:** To provide a rigorous academic curriculum that meets or exceeds industry standards and prepares students for successful careers in the automotive engineering field.

**3.2 Technical Knowledge and Skills:** To equip students with a comprehensive understanding of automobile engineering principles, concepts, and practices. This includes knowledge of vehicle dynamics, powertrain systems, safety engineering, manufacturing processes, and automotive design.

**3.3 Practical Experience:** To provide students with hands-on practical training, laboratory work, and industry exposure to develop their skills in applying theoretical knowledge to real-world automotive engineering problems. This may include internships, cooperative education programs, or industry collaborations.

**3.4 Critical Thinking and Problem Solving:** To foster students' abilities to analyze complex problems, think critically, and apply innovative approaches to solve challenges in the automotive engineering field. This includes promoting analytical reasoning, creativity, and the ability to make informed decisions.

**3.5 Communication and Collaboration:** To develop students' communication, teamwork, and interpersonal skills. This includes the ability to effectively communicate technical concepts, work collaboratively in multidisciplinary teams, and engage in professional interactions with stakeholders in the automotive industry.

**3.6 Ethical and Professional Responsibility:** To instill in students a strong sense of ethical conduct, professional responsibility, and awareness of the societal and environmental impacts of automotive engineering. This includes promoting responsible engineering practices, adherence to industry standards and regulations, and consideration of sustainability and social implications.

**3.7 Research and Innovation:** To encourage and support research activities that contribute to advancements in the field of automobile engineering. This includes fostering a culture of innovation, supporting faculty and student research projects, and promoting knowledge dissemination through conferences, publications, and presentations.

**3.8 Industry Relevance:** To align the program with industry needs and trends. This includes keeping the curriculum updated with the latest technological advancements, industry practices, and emerging trends in areas such as electric vehicles, autonomous driving, connectivity, and alternative energy sources.

**3.9 Continuous Improvement:** To regularly evaluate and improve the program based on feedback from industry professionals, alumni, students, and faculty. This includes

conducting regular program assessments, curriculum reviews, and incorporating feedback to ensure the program remains relevant and responsive to industry demands.

**3.10 Student Success and Career Development:** To support students in their personal and professional development, facilitating their successful transition into the automotive engineering industry. This includes providing career guidance, networking opportunities, and resources for professional growth, as well as monitoring and tracking the success of program graduates in their careers.

*These program goals* collectively aim to provide a comprehensive education and prepare students to become competent, responsible, and innovative automobile engineers who can contribute effectively to the automotive industry.

#### **4. Student Learning Outcomes**

Student Learning Outcomes (SLOs) are specific statements that describe what students should know, understand, and be able to do upon completing a program of study. In the context of an Automobile Engineering Department, here are some examples of student learning outcomes:

**4.1 Technical Knowledge:** Students will demonstrate a solid understanding of fundamental principles and concepts in automobile engineering, including vehicle dynamics, powertrain systems, safety engineering, manufacturing processes, and automotive design.

**4.2 Problem Solving:** Students will be able to analyze complex automotive engineering problems, apply critical thinking skills, and develop innovative solutions using appropriate engineering tools, techniques, and methodologies.

**4.3 Design Skills:** Students will be able to design and develop automotive systems, components, and subsystems, considering performance, safety, efficiency, and environmental impact. They will apply engineering principles, computer-aided design (CAD) software, and simulation tools to create effective and feasible designs.

**4.5 Experimental and Laboratory Skills:** Students will be proficient in conducting experiments, collecting, and analyzing data, and interpreting results in automotive engineering laboratories. They will demonstrate competence in using specialized equipment and measurement techniques relevant to the field.

**4.6 Communication Skills:** Students will possess effective communication skills and the ability to convey technical information related to automotive engineering both orally and in writing. They will be able to present technical reports, design documentation, and research findings to diverse audiences.

**4.7 Teamwork and Collaboration:** Students will demonstrate the ability to work effectively as part of multidisciplinary teams, engaging in collaborative projects, discussions, and problem-solving activities. They will exhibit strong interpersonal skills, respect diverse perspectives, and contribute constructively to team dynamics.

**4.8 Ethical and Professional Responsibility:** Students will understand the ethical and professional responsibilities associated with automobile engineering. They will



demonstrate knowledge of relevant laws, regulations, and industry standards. They will exhibit a commitment to safety, sustainability, and social responsibility in their engineering practices.

4.9 **Research and Innovation:** Students will demonstrate the ability to conduct research, investigate emerging trends, and contribute to advancements in the field of automobile engineering. They will be able to analyze existing literature, design experiments, collect and interpret data, and draw valid conclusions.

4.10 **Lifelong Learning:** Students will recognize the importance of continuous learning and professional development in the rapidly evolving field of automobile engineering. They will demonstrate the ability to engage in self-directed learning, adapt to new technologies and methodologies, and stay updated with current industry trends.

4.11 **Professionalism and Career Readiness:** Students will be prepared for successful careers in the automotive engineering industry or further academic pursuits. They will exhibit professionalism, including time management, ethical conduct, and a commitment to ongoing professional growth.

These student learning outcomes provide a framework for assessing student progress, designing curriculum, and evaluating the effectiveness of the educational program in the Automobile Engineering Department.

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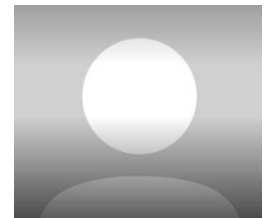
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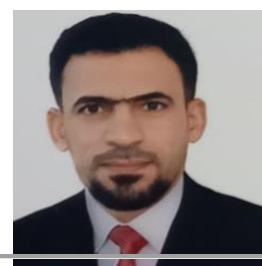
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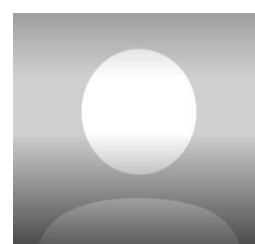
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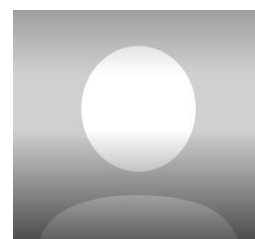
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## 6. Credits, Grading and GPA

### *Credits*

Babylon University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs. student workload, including structured and unstructured workload.

### *Grading*

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

### **Calculation of the Cumulative Grade Point Average (CGPA)**

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.
2. CGPA of a 4-year B.Sc. degree:

$$\text{CGPA} = [ (\text{1st module score} \times \text{ECTS}) + (\text{2nd module score} \times \text{ECTS}) + \dots ] / 240$$

## 7. Curriculum/Modules

**Semester 1 = 30 ECTS / 1 ECTS = 25 hrs.**

Module Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UOBAB0302011	English Language	44	56	4.00	B	
UOBAB0302012	Human rights & Democracy	30	20	2.00	B	
UOBAB0302013	Physics	74	76	6.00	B	
UOBAB0302014	Engineering Drawing with AutoCAD I	90	85	7.00	C	
UOBAB0302015	Electrical Engineering	74	76	6.00	B	
UOBAB0302016	Manufacturing Processes and Engineering Workshops	59	66	5.00	C	

**Semester 2 = 30 ECTS / 1 ECTS = 25 hrs.**

Module Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UOBAB0302021	Arabic language	30	20	2.00	B	
UOBAB0302022	computer science	46	29	3.00	B	
UOBAB0302023	Mathematics	89	86	7.00	B	
UOBAB0302024	Engineering Mechanics (Statics)	89	61	6.00	C	
UOBAB0302025	Engineering Drawing with AutoCAD II	90	85	7.00	C	
UOBAB0302026	Metallurgy & Automobile Materials	75	50	5.00	C	

**Semester 3 = 30 ECTS / 1 ECTS = 25 hrs.**

Module Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UOBAB0302031	English Language	44	56	4.00	B	
UOBAB0302032	Engineering Mathematics I	47	53	4.00	B	
UOBAB0302033	Strength of Materials	103	72	6.00	C	



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UOBAB0302034	Fluid Mechanics	89	61	6.00	C	
UOBAB0302035	Mechanical Drawing, I with Solid Works	76	74	6.00	C	
UOBAB0302036	Automobiles Technology	45	30	3.00	C	

**Semester 4 = 30 ECTS / 1 ECTS = 25 hrs.**

Module Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UOBAB0302041	Computer Programming	44	31	3.00	B	
UOBAB0302042	Modern Vehicle Technology	59	41	4.00	C	
UOBAB0302043	Engineering Mathematics II	47	53	4.00	B	
UOBAB0302044	Engineering Mechanics (Dynamics)	89	86	7.00	C	
UOBAB0302045	Thermodynamics	117	58	7.00	C	
UOBAB0302046	Mechanical Drawing II	62	63	5.00	C	

**Semester 5 = 30 ECTS / 1 ECTS = 25 hrs.**

Module Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UOBAB0302051	Tribology and Automobiles lubricants	45	30	3.00	B	
UOBAB0302052	Engineering Analyses	60	65	5.00	B	
UOBAB0302053	Internal Combustion Engines	103	47	6.00	C	
UOBAB0302054	Machine Elements Design I (with CAD)	88	62	6.00	S	
UOBAB0302055	Theory of Machines	88	62	6.00	S	
UOBAB0302056	Automotive Hydraulics and Pneumatics Systems	59	41	4.00	S	

**Semester 6 = 30 ECTS / 1 ECTS = 25 hrs.**

Module Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UOBAB0302061	Numerical Analysis (with computer applications)	75	75	6.00	B	
UOBAB0302062	Heat Transfer	88	62	6.00	S	
UOBAB0302063	Aerodynamics	45	30	3.00	C	

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UOBAB0302064	Theory of Automobiles	88	62	6.00	S	
UOBAB0302065	Design of Mechanical Systems (with Solid - Works)	75	75	6.00	S	
UOBAB0302066	Industrial Engineering	45	30	3.00	C	

**Semester 7 = 30 ECTS / 1 ECTS = 25 hrs.**

Module Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UOBAB0302071	Automobile Air-Conditioning	88	62	6.00	S	
UOBAB0302072	Mechanical Vibrations	88	62	6.00	S	
UOBAB0302073	Automobile Design	60	65	5.00	S	
UOBAB0302074	Measurement Systems	88	62	6.00	S	
UOBAB0302075	Computer Applications (ANSYS)	60	40	4.00	B	
UOBAB0302076	Graduation Project I (Related to Automobiles)	30	45	3.00	C	

**Semester 8= 30 ECTS / 1 ECTS = 25 hrs.**

Module Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
UOBAB0302081	Automobile Electrical, Electronics	89	61	6.00	C	
UOBAB0302082	Automobiles Control Systems	89	61	6.00	S	
UOBAB0302083	Vehicle Dynamics	89	61	6.00	S	
UOBAB0302084	Electrical and Hybrid Vehicle	75	75	6.00	S	
UOBAB0302085	Ethics in Engineering Profession	30	45	3.00	B	
UOBAB0302086	Graduation Project (Related to Automobiles)	44	31	3.00	C	

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**Program Coordinator:**

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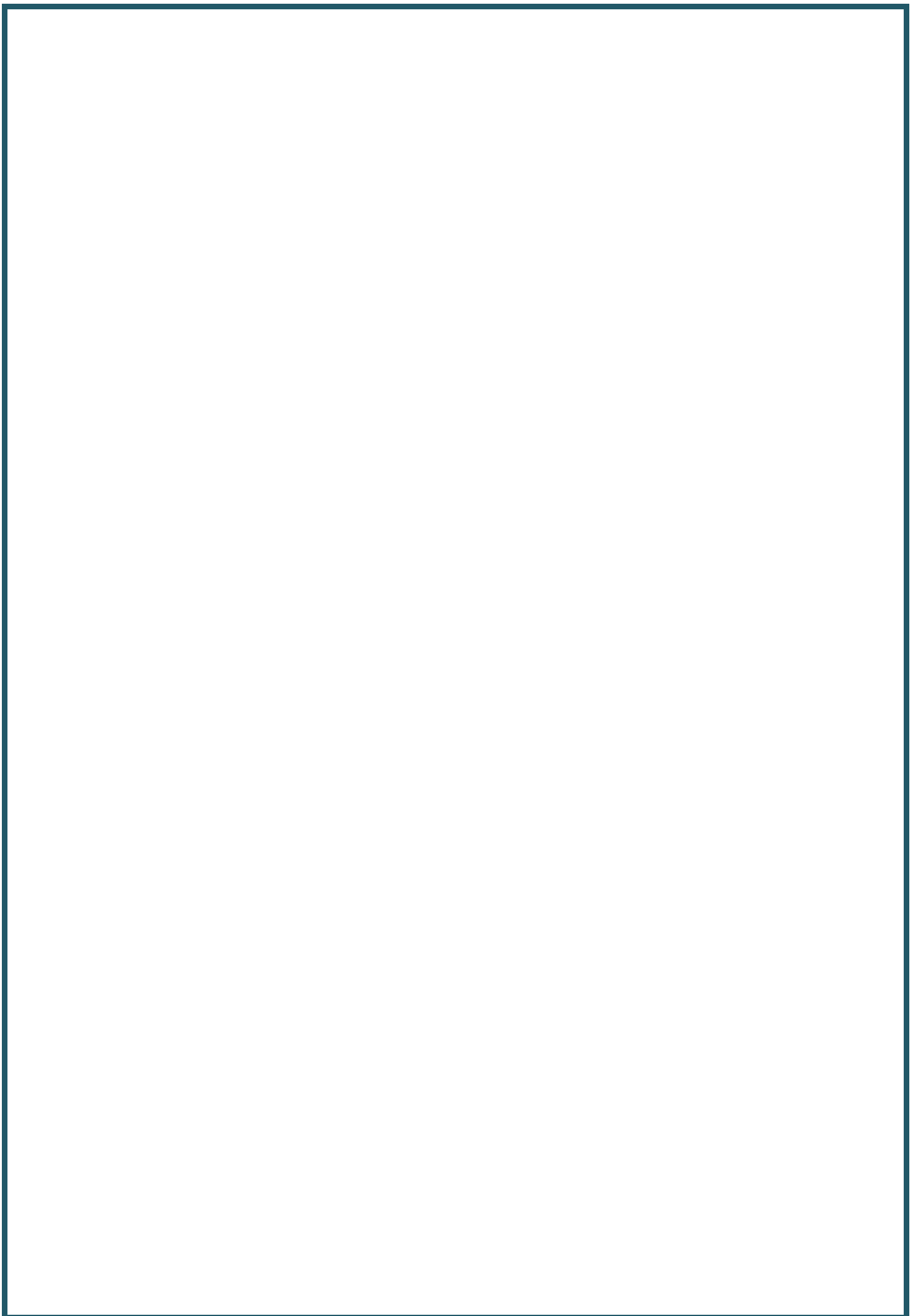
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## Appendix (3)

# Modules Catalogue

# دليل المواد الدراسية

2023-2024





## University of Babylon

جامعة بابل

### ***First Cycle – bachelor's degree (B.Sc.) – Automobile Engineering***

بكالوريوس - هندسة السيارات



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### 1. Overview

This catalogue is about the courses (modules) given by the program of Automobile Engineering to gain the Bachelor of Science degree. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

١. نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة السيارات للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٨) مادة دراسية مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على مسار بولونيا.

# **Level – UGI**

## **Semester – One**

## 2. Undergraduate Courses 2023-2024

### Module 1

Code	Course/Module Title	ECTS	Semester
UOBAB0302011	English Language	4	1
Class (hr/w)	Pr / semi	SSWL (hr/sem)	USWL (hr/w)
2	1	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 2

Code	Course/Module Title	ECTS	Semester
UOBAB0302012	Human Rights & 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 being human. They are universal, inalienable, and indivisible. Human rights include civil, political, economic, social, and cultural rights. Some examples of human rights include the right to 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 protection from abuse and discrimination. International human rights instruments, such as the Universal

Declaration of Human Rights (UDHR) and various treaties and conventions, provide a framework for the promotion and protection of human rights worldwide.

Democracy: Democracy is a system of government in which power is vested in the people, who exercise it directly or through elected representatives. It is characterized by political participation, equality, and the protection of individual freedoms. In a democratic society, citizens have the right to participate in decision-making processes, choose their leaders through free and fair elections, and enjoy civil liberties and human rights. Key principles of democracy include the rule of law, accountability, transparency, and respect for minority rights. Democracy provides a platform for diverse voices and opinions, promotes civic engagement, and ensures checks and balances to prevent the concentration of power. It allows for peaceful transitions of power, fosters social stability, and encourages the protection of human rights.

The Relationship between Human Rights and Democracy: Human rights and democracy are closely interconnected and mutually reinforcing. Democracy provides the institutional framework and mechanisms to protect and promote human rights. It enables citizens to exercise their rights and freedoms, participate in decision-making processes, and hold their governments accountable. Human rights, in turn, serve as the foundation for democratic principles by safeguarding individual freedoms, equality, and dignity.

Democracy without respect for human rights can lead to authoritarianism, oppression, and the marginalization of certain groups. On the other hand, the absence of democracy can hinder the full realization of human rights and limit the ability of individuals to voice their concerns and shape the policies that affect their lives.

### Module 3

Code	Course/Module Title	ECTS	Semester
UOBAB0302013	Physics	6	1
Class (hr/w)	Lab/ tur	SSWL (hr/sem)	USWL (hr/w)
2	3	76	76

#### Description

Classical Mechanics: Classical mechanics deals with the motion of objects under the influence of forces. It includes the study of concepts such as motion, forces, energy, momentum, and gravitation.

Thermodynamics: Thermodynamics focuses on the study of heat, temperature, and energy transfer. It explores the behavior of systems in terms of concepts like entropy, work, and the laws of thermodynamics.

Electromagnetism: Electromagnetism is concerned with the study of electric and magnetic fields and their interactions. It encompasses topics like electrostatics, magnetism, electromagnetic waves, and electromagnetic induction.

Optics: Optics examines the behavior and properties of light. It covers the study of reflection, refraction, diffraction, interference, and polarization of light.

Quantum Mechanics: Quantum mechanics is a branch of physics that describes the behavior of particles at the atomic and subatomic levels. It introduces the concept of wave-particle duality, quantization of energy, and probabilistic nature of quantum systems.

Relativity: Relativity theory, both special and general relativity, explores the behavior of objects at high



speeds or in strong gravitational fields. It revolutionized our understanding of space, time, and gravity.  
 Particle Physics: Particle physics focuses on the study of elementary particles and their interactions. It involves investigating the fundamental building blocks of matter and the forces that govern their behavior.

Astrophysics and Cosmology: Astrophysics deals with the physics of celestial objects, such as stars, galaxies, and black holes. Cosmology, on the other hand, studies the origins, evolution, and large-scale structure of the universe.

#### Module 4

Code	Course/Module Title	ECTS	Semester
UOBAB0302014	Engineering Drawing with 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 missing views. Learn how to draw sectional views. Study types of sectional views, learning about Parts 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. It is ideal for anyone looking for professional training to AutoCAD 3D with an interest in using the software to produce 3D drawings for architectural, engineering or design purposes.

This course is made for students who want to learn all about AutoCAD 3D in an easy to follow self-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.

#### Module 5

Code	Course/Module Title	ECTS	Semester
UOBAB0302015	Electrical Engineering	6	1
Class (hr/w)	Lab./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	74	76

#### Description

Power Systems: Power systems engineering focuses on the generation, transmission, and distribution of electrical power. It involves designing and optimizing electrical grids, power plants, renewable energy systems, and power distribution networks.

Electronics: Electronics deals with the design and application of electronic circuits and devices. It includes areas such as analog and digital circuit design, integrated circuits, microelectronics, and electronic components.

Control Systems: Control systems engineering involves the design and analysis of systems that regulate

and control the behavior of other systems. It includes topics such as feedback control, automation, robotics, and industrial process control.

**Signal Processing:** Signal processing involves the analysis, manipulation, and interpretation of signals. It includes areas such as digital signal processing (DSP), image and video processing, audio processing, and data compression.

**Communications:** Communications engineering focuses on the design and optimization of communication systems and networks. It includes areas such as wireless communication, digital communication, network protocols, and information theory.

**Computer Engineering:** Computer engineering combines electrical engineering and computer science to design and develop computer systems and hardware components. It involves areas such as computer architecture, digital logic design, microprocessors, and embedded systems.

**Electronics and Power Electronics:** Electronics engineering encompasses the design and development of electronic circuits, devices, and systems. Power electronics specifically focuses on the conversion and control of electrical power, such as in power supplies, motor drives, and renewable energy systems.

**Electromagnetics:** Electromagnetics deals with the study of electromagnetic fields and their interactions with matter. It includes topics such as electromagnetic theory, antenna design, electromagnetic compatibility (EMC), and electromagnetic wave propagation.

### Module 6

Code	Course/Module Title	ECTS	Semester
UOBAB0302016	Manufacturing Processes and Engineering Workshops	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	59	66

#### Description

The course aims to identify the different methods of manufacturing engineering materials, such as welding and its various types, how to obtain the necessary heat to accomplish welding, and the difference between the different methods.

# Level – UGI

## Semester – Two

### Module 7

Code	Course/Module Title	ECTS	Semester
UOBAB0302021	Arabic language	2	2
Class (hr/w)	Lect	SSWL (hr/sem)	USWL (hr/w)
1	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..

تعدّ اللغة العربية من أكثر اللغات المحكية والأكثر انتشارًا في العالم، إذ يتحدّث بها ما يقارب ٤٧٦ مليون نسمة، يتوزعون في أماكن متفاوتة في العالم، وعليه تحتل اللغة العربية المركز الرابع أو الخامس من العالم من حيث الانتشار، تعدّ اللغة العربية لغة مهمة بالنسبة للمسلمين خاصة إذ هي لغة كتابهم المقدس ألا وهو القرآن بالإضافة إلى أنها لغة الصلاة والكثير من العبادات والشعائر الدينية الأخرى، ولم يقتصر دورها هنا بل هي أيضا لغة شعائرية لدى العديد من الكنائس المسيحية في الوطن العربي. وعند الحديث عن اللغة العربيّة لا بدّ من ذكر أنّ لهذه اللغة محيّن ودارسين يدرسونها كتخصص جامعيّ، وتتنوع مواد تخصص اللغة العربية ما بين الأدب والنحو وغيرها

### Module 8

Code	Course/Module Title	ECTS	Semester
UOBAB0302022	computer science	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 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
UOBAB0302023	Mathematics	7	2
Class (hr/w)	Tutor	SSWL (hr/sem)	USWL (hr/w)
4	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 10**

Code	Course/Module Title	ECTS	Semester
UOBAB0302024	Engineering Mechanics (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. In statics, forces are represented as vectors and described by their magnitude, direction,

and point of application. Common types of forces include gravitational forces, applied forces, and reaction forces.

**Equilibrium:** Equilibrium is a state in which the forces acting on an object or system are balanced, resulting in zero net force and zero net torque. Understanding equilibrium conditions is essential in analyzing the stability and balance of structures and objects.

**Free Body Diagrams:** Free body diagrams are graphical representations that show the isolated object or system under consideration and the forces acting on it. They help visualize and analyze the forces involved and are valuable tools in solving statics problems.

**Moments and Torques:** Moments and torques are rotational forces that can cause objects to rotate around a point or axis. They are related to the force and the distance from the point of rotation. Understanding moments and torques is crucial in analyzing the balance and stability of objects and structures.

**Trusses and Frames:** Trusses and frames are structures composed of interconnected members that carry loads and forces. Analyzing the internal forces and reactions in trusses and frames is a fundamental application of statics.

**Friction:** Friction is the resistance to relative motion between two surfaces in contact. Static friction prevents motion between surfaces that are not sliding, while kinetic friction acts when surfaces are in motion. Analyzing friction forces is important in understanding the stability and equilibrium of objects on inclined surfaces or in contact with other surfaces.

**Center of Gravity:** The center of gravity is the point at which the entire weight of an object can be considered to act. It is the point where the gravitational forces acting on all the particles of an object can be balanced. Analyzing the center of gravity is crucial for understanding the stability and balance of objects.

**Structural Analysis:** Structural analysis involves determining the internal forces and deformations in structures under the action of external loads. Statics provides the foundation for structural analysis and plays a critical role in designing safe and stable structures.

### Module 11

Code	Course/Module Title	ECTS	Semester
UOBAB0302025	Engineering Drawing with AutoCAD II	7	2
Class (hr/w)	Lab./Prac.	SSWL (hr/sem)	USWL (hr/w)
1	5	90	85
Description			
<p>This course focuses on definition of the Methods of Isometric drawing. Study the Methods of finding missing views. Learn how to draw sectional views. Study types of sectional views, learning about Parts that cannot be sectioned. Studying of Exercises in sectional views.</p> <p>This course offers you an advance learning skill of the operation of Computer Aided Design (CAD) software. It is ideal for anyone looking for professional training to AutoCAD 3D with an interest in using</p>			

the software to produce 3D drawings for architectural, engineering or design purposes. This course is made for students who want to learn all about AutoCAD 3D in an easy-to-follow self-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.

**Module 12**

Code	Course/Module Title	ECTS	Semester
UOBAB0302026	Metallurgy & Automobile Materials	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. 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.



# Level – UGII

## Semester – Three

**Module 13**

Code	Course/Module Title	ECTS	Semester
UOBAB0302031	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
UOBAB0302032	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 15**

Code	Course/Module Title	ECTS	Semester
UOBAB0302033	Strength of Materials	7	3
Class (hr/w)	Lab/ Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	103	72

**Description**

Stress and Strain: Understand the concepts of stress and strain, which are fundamental parameters used to describe the internal behavior of materials under loading. Study different types of stresses, such as axial, shear, and bending, and their corresponding strains.

Mechanical Properties of Materials: Gain knowledge of the mechanical properties of materials, including elasticity, plasticity, yield strength, ultimate strength, modulus of elasticity, and ductility. Learn how these properties influence the material's response to applied loads.

Axial Loading: Study the behavior of materials subjected to axial loads, such as tension and compression. Analyze the stress and strain distribution, deformation, and failure mechanisms in simple structural members, such as rods, columns, and cables.

Bending and Flexural Analysis: Learn about the behavior of materials under bending loads, such as beams and shafts. Analyze the stress and strain distribution, deflection, and failure modes in beams of different cross-sectional shapes and support conditions.

Torsion: Study the behavior of materials subjected to torsional loads, such as shafts and twist rods. Analyze the stress and strain distribution, deformation, and failure mechanisms in torsion ally loaded members.

Shear and Bearing Stress: Understand the behavior of materials under shear and bearing loads. Analyze the stress and strain distribution, shear flow, and failure modes in various structural elements, such as rivets, bolts, and welds.

Buckling and Stability: Explore the stability of structural members and the phenomenon of buckling. Understand the critical load at which a member may buckle and the different modes of buckling, such as Euler buckling and column buckling.

Stress Transformation and Mohr's Circle: Learn about stress transformation in two and three dimensions and the graphical representation of stress states using Mohr's circle. Understand how to determine principal stresses, maximum shear stress, and stress invariants.

Failure Theories: Study different failure theories used to predict the failure of materials under specific loading conditions. Explore theories such as maximum normal stress theory, maximum shear stress theory, and the von Mises yield criterion.

Strain Energy and Deflection: Analyze the energy absorbed by a material and the deflection of structural members under load. Understand the concept of strain energy and its relationship to the material's behavior and the work done on the structure.

**Module 16**

Code	Course/Module Title	ECTS	Semester
UOBAB0302034	Fluid Mechanics	6	3
Class (hr/w)	Lab/ Tutor	SSWL (hr/sem)	USWL (hr/w)

3	3	89	61
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**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
UOBAB0302034	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
UOBAB0302036	Automobiles Technology I	3	3
Class (hr/w)	Prac	SSWL (hr/sem)	USWL (hr/w)
1	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.



# Level – UGII

## Semester – Four

**Module 19**

Code	Course/Module Title	ECTS	Semester
UOBAB0302041	Computer Programming	3	4
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
1	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
UOBAB0302042	Modern Vehicle Technology	4	4
Class (hr/w)	Prac.	SSWL (hr/sem)	USWL (hr/w)
2	2	59	41

#### Description

- 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.
- 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.
- 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.
- Lightweight Materials:** Automobile technology strives to reduce the weight of vehicles to enhance fuel efficiency and reduce emissions. Lightweight materials such as high-strength steel, aluminum, carbon fiber composites, and polymer composites are used in vehicle construction. These materials offer a balance between strength, safety, and weight reduction.
- Energy Efficiency and Alternative Propulsion:** With a growing focus on sustainability, automobile technology explores alternative propulsion systems. Electric vehicles (EVs) use electric motors powered by batteries or fuel cells to achieve zero-emission mobility. Hybrid vehicles combine internal combustion engines with electric motors to enhance fuel efficiency. Additionally, advancements in regenerative braking and energy management systems contribute to energy conservation.
- Autonomous Driving:** The development of autonomous vehicles aims to enable self-driving cars capable of operating without human intervention. Autonomous driving technology involves a combination of sensors, cameras, lidar, radar, GPS, and advanced algorithms to perceive the environment, make decisions, and control the vehicle. Autonomous vehicles have the potential to enhance road safety, traffic flow, and mobility services.
- Manufacturing and Automation:** Automobile technology extends to the manufacturing process itself. Automated assembly lines and robotics play a significant role in efficient and precise vehicle production.

Robotics and automation help improve manufacturing quality, reduce costs, and increase productivity

**Module 21**

Code	Course/Module Title	ECTS	Semester
UOBAB0302043	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
UOBAB0302044	Engineering Mechanics (Dynamics)	7	4
Class (hr/w)	Tutor	SSWL (hr/sem)	USWL (hr/w)
4	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
UOBAB0302045	Thermodynamics	7	4
Class (hr/w)	Lect/Tutor	SSWL (hr/sem)	USWL (hr/w)
4	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
UOBAB0302046	Mechanical Drawing II	5	4
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
1	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.

# **Level – UGIII**

## **Semester – Five**

**Module 25**

Code	Course/Module Title	ECTS	Semester
UOBAB0302051	Tribology and Automobiles lubricants	3	5
Class (hr/w)	Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	45	30

**Description**

**Friction and Wear:** Friction is the resistance encountered when two surfaces slide or attempt to slide against each other. Wear refers to the progressive loss of material from the surfaces in contact. Tribology studies the mechanisms of friction and wear, aiming to minimize their detrimental effects on automotive components. Understanding the factors influencing friction and wear allows engineers to design and select appropriate materials and lubrication systems.

**Lubrication:** Lubrication is the process of introducing a lubricant between two surfaces to reduce friction and wear. In the automotive context, lubrication is crucial for various components, including engines, transmissions, differentials, wheel bearings, and other moving parts. Lubricants form a thin film between surfaces, providing a protective barrier and allowing smooth sliding or rolling motion. They also help dissipate heat and carry away contaminants.

**Types of Lubricants:** Automobile lubricants come in various forms, such as oils, greases, and solid lubricants. Oil-based lubricants, including engine oils, transmission fluids, and hydraulic oils, are commonly used in automobiles. Greases, which are semi-solid lubricants consisting of a base oil thickened with a soap or other additives, find applications in wheel bearings, chassis components, and other areas requiring higher viscosity and extended lubrication intervals. Solid lubricants, such as graphite and molybdenum disulfide, are used in specialized applications or in combination with other lubricants to enhance performance.

**Lubricant Properties:** Lubricants possess specific properties that are critical for their performance. These properties include viscosity, which determines the lubricant's resistance to flow; viscosity index, indicating its resistance to viscosity changes with temperature; pour point, the lowest temperature at which the lubricant can flow; flash point, the temperature at which it emits vapors to form a flammable mixture; and oxidation resistance, which affects the lubricant's lifespan and degradation under high temperatures.

**Lubricant Additives:** Lubricants often contain additives to enhance their performance and provide additional benefits. Additives can improve lubricant stability, oxidation resistance, viscosity-temperature characteristics, anti-wear properties, corrosion protection, detergency, and dispersancy. They are carefully formulated to meet the specific requirements of automotive applications and optimize the lubrication performance of the lubricants.

**Tribological Challenges in Automobiles:** Automobiles face various tribological challenges due to the complex and dynamic nature of their components. For example, engine components, such as pistons, cylinders, and valves, experience high temperatures, pressures, and sliding speeds, requiring lubricants with exceptional heat resistance and anti-wear properties. Transmission systems require lubricants that offer good shear stability and protect against wear and pitting. Wheel bearings need greases with high load-carrying capacity and water resistance.

**Advancements in Tribology:** Ongoing research and advancements in tribology aim to improve automotive lubricants and reduce friction and wear in automobile components. This includes developing new lubricant formulations, exploring nano-scale lubrication techniques, studying surface coatings, and optimizing surface textures to enhance tribological performance and efficiency.

**Module 26**

Code	Course/Module Title	ECTS	Semester
UOBAB0302052	Engineering Analyses	5	5
Class (hr/w)	Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	60	65

**Description**

**Problem Formulation:** Engineering analysis begins with clearly defining the problem or objective. This involves understanding the system or component under investigation, identifying the key variables and parameters, and determining the desired outcomes or performance criteria. Proper problem formulation sets the foundation for the subsequent analysis.

**Mathematical Modeling:** Engineering analysis often involves creating mathematical models that describe the behavior and characteristics of the system or component. Models may be based on physical laws, empirical relationships, statistical data, or a combination of these. Mathematical modeling enables engineers to represent the system in a quantifiable form, allowing for analysis and prediction of its performance.

**Analytical Methods:** Analytical methods involve solving mathematical equations or applying analytical techniques to derive solutions or insights. These methods can include calculus, differential equations, linear algebra, probability theory, and statistics. Analytical approaches are particularly useful for solving well-defined problems with known mathematical relationships.

**Computational Methods:** Computational methods use computer algorithms and numerical techniques to solve complex engineering problems that may not have analytical solutions. These methods involve approximating the problem using numerical methods, such as finite element analysis (FEA), computational fluid dynamics (CFD), and optimization algorithms. Computational methods allow engineers to simulate and analyze the behavior of complex systems, perform parametric studies, and optimize designs.

**Experimental Validation:** Engineering analysis often involves validating the results obtained through mathematical or computational methods with experimental data. This includes conducting physical experiments, measurements, or testing on prototypes or real-world systems. Experimental validation helps ensure the accuracy and reliability of the analysis and provides valuable insights into the real-world behavior of the system.

**Sensitivity Analysis:** Sensitivity analysis assesses the impact of variations or uncertainties in the input parameters on the output or performance of the system. It helps identify the most influential parameters, evaluate the robustness of the design or solution, and make informed decisions based on the sensitivity of the system to different factors.

**Optimization:** Optimization techniques aim to find the best possible solution or design that meets specified objectives or constraints. It involves systematically exploring the design space, varying the parameters, and evaluating the performance to identify the optimal combination. Optimization methods can be used to improve efficiency, minimize cost, maximize performance, or meet specific design requirements.

**Decision Making:** Engineering analysis provides valuable information and insights that support decision making in engineering design and operations. By analyzing different alternatives, evaluating trade-offs, and considering performance, cost, and other factors, engineers can make informed decisions to achieve desired outcomes.

**Module 27**

Code	Course/Module Title	ECTS	Semester
UOBAB0302053	Internal Combustion Engines	6	5
Class (hr/w)	Lab./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	103	47

**Description**

**Basic Operation:** Internal combustion engines operate by burning a mixture of fuel and air inside a combustion chamber. The combustion process releases energy in the form of high-pressure gases, which expand and drive a piston within a cylinder. This motion is then converted into rotary motion through a crankshaft, generating mechanical work.

**Types of Internal Combustion Engines:** There are two primary types of internal combustion engines: a. **Spark-Ignition Engines (SI):** In SI engines, commonly known as gasoline engines, the fuel-air mixture is ignited by an electric spark from a spark plug. The fuel is typically gasoline, but alternative fuels such as ethanol and compressed natural gas (CNG) can also be used.

b. **Compression-Ignition Engines (CI):** CI engines, also called diesel engines, compress the air in the combustion chamber to a high pressure and temperature. Fuel is injected into the hot, compressed air, causing spontaneous ignition due to the heat of compression.

**Engine Components:** a. **Cylinder:** The cylinder is a cylindrical chamber where combustion occurs. It houses the piston, valves, and spark plug or fuel injector.

b. **Piston:** The piston is a cylindrical component that moves up and down inside the cylinder. It is connected to the crankshaft via a connecting rod and converts the pressure from combustion into reciprocating motion.

c. **Valves:** Valves control the flow of air and fuel into the cylinder and the exhaust gases out of the cylinder. They include intake valves for air and fuel mixture intake and exhaust valves for expelling combustion byproducts.

d. **Crankshaft:** The crankshaft is a rotating shaft that converts the reciprocating motion of the piston into rotary motion. It transfers the rotational energy to the transmission or other external devices.

e. **Fuel System:** The fuel system supplies the engine with the appropriate amount of fuel. It includes components such as fuel pumps, injectors (for direct injection engines), carburetors (for older gasoline engines), and fuel tanks.

f. **Ignition System:** The ignition system generates the spark required to ignite the air-fuel mixture in SI engines. It consists of components such as spark plugs, ignition coils, and control modules.

**Combustion Process:** In SI engines, the fuel-air mixture is ignited by a spark from the spark plug, leading to a flame front that propagates across the combustion chamber. In CI engines, fuel is injected into the hot, compressed air, leading to autoignition. The combustion process releases energy, resulting in an increase in pressure and temperature, which forces the piston downward and drives the crankshaft.

**Engine Efficiency and Emissions:** Internal combustion engines are continually being optimized to improve their efficiency and reduce emissions. Efficiency improvements are achieved through technologies like direct fuel injection, turbocharging, variable valve timing, and downsizing. Emission control technologies, such as catalytic converters and exhaust gas recirculation (EGR), help reduce harmful pollutants like nitrogen oxides (NOx) and carbon monoxide (CO).

**Alternative Powertrains:** The rise of environmental concerns has led to the development of alternative powertrains for transportation. These include hybrid vehicles, electric vehicles, and hydrogen fuel cell

vehicles, which offer reduced emissions and improved fuel efficiency compared to conventional internal combustion engines.

**Module 28**

Code	Course/Module Title	ECTS	Semester
UOBAB0302054	Machine Elements Design I (with CAD)	6	5
Class (hr/w)	Lab./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	88	62

**Description**

**Design Methodology:** The course introduces the fundamental principles and methodologies for designing machine elements. This includes understanding design requirements, functional specifications, material selection, safety factors, and design constraints. The design process involves identifying the loads and forces acting on the components, analyzing stress and deflection, and ensuring the component meets performance criteria.

**Design of Mechanical Components:** The course covers the design of various machine elements commonly found in mechanical systems, such as shafts, bearings, gears, belts, chains, springs, fasteners, and couplings. Students learn about the selection criteria, design considerations, and sizing calculations for these components. The focus is on designing components that can withstand the applied loads and provide the desired functionality and reliability.

**Strength and Failure Analysis:** Machine Elements Design I includes the analysis of stresses, strains, and deformations in machine components. Students learn to calculate stresses under different loading conditions and apply appropriate failure theories, such as the maximum shear stress theory or the von Mises criterion, to assess the structural integrity of the components. The goal is to ensure that the components can handle the expected loads without failure or excessive deformation.

**Finite Element Analysis (FEA):** The course may introduce the use of FEA software to analyze and validate the design of machine elements. FEA allows for more detailed stress and deformation analysis by dividing the component into smaller elements and solving the governing equations numerically. Students learn how to create finite element models, apply boundary conditions, and interpret the results obtained from the analysis.

**Computer-Aided Design (CAD):** The integration of CAD software is a significant component of the course. Students learn to use CAD tools to create 3D models of machine elements and assemble them into complete systems. They learn techniques for creating parametric models, applying appropriate geometric and dimensional constraints, generating engineering drawings, and performing virtual simulations to evaluate component performance.

**Design Documentation and Communication:** Machine Elements Design I emphasizes the importance of effective documentation and communication in engineering design. Students learn how to create clear and accurate engineering drawings, including dimensioning, tolerancing, and detailing. They also develop skills in presenting and communicating their design ideas and solutions effectively to technical audiences.

**Design Considerations and Constraints:** The course covers various design considerations and constraints, including manufacturability, cost-effectiveness, serviceability, sustainability, and safety. Students learn to incorporate these factors into their design decisions to create practical and viable solutions.

**Module 29**

Code	Course/Module Title	ECTS	Semester
UOBAB0302055	Theory of Machines	6	5
Class (hr/w)	Lab/Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	88	62

**Description**

**Kinematics:** Kinematics is concerned with the study of motion, without considering the forces or torques that cause it. In the Theory of Machines, kinematics deals with the analysis of the relative motion between machine components, such as linkages, gears, cams, and mechanisms. It involves studying concepts such as displacement, velocity, acceleration, and the relationship between these parameters for different machine elements.

**Dynamics:** Dynamics focuses on the study of forces and torques that cause motion. In the Theory of Machines, dynamics involves the analysis of the forces and moments acting on machine components during their operation. It includes the study of balancing, vibrations, impact, and power transmission. Understanding dynamics is crucial for ensuring the proper functioning and stability of machines.

**Mechanisms:** Mechanisms are fundamental building blocks in machine design. They are combinations of rigid bodies (links) connected by joints (kinematic pairs) that enable desired motion. The Theory of Machines studies various types of mechanisms, such as four-bar linkages, gears, cam and follower systems, and slider-crank mechanisms. Students learn about their configurations, kinematic analysis, and applications in practical machine design.

**Analysis and Design:** The Theory of Machines provides tools and techniques for the analysis and design of mechanical systems. Students learn methods to analyze and predict the motion, forces, and torques within machines. This includes graphical techniques, such as velocity and acceleration diagrams, as well as analytical methods, including the use of equations and mathematical models. The aim is to design machines that operate efficiently, reliably, and safely.

**Power Transmission:** Power transmission is a critical aspect of machine design, and the Theory of Machines explores various methods of transferring power from a source to the desired output. This includes the study of gears, belt and pulley systems, chain drives, and other mechanisms used to transmit motion and torque. Students learn about the selection, sizing, and design considerations for these power transmission elements.

**Machine Dynamics and Vibrations:** The Theory of Machines covers the analysis and control of machine dynamics and vibrations. This involves studying the effects of unbalanced forces, harmonic motion, resonance, and damping. Students learn techniques to minimize vibrations, enhance system stability, and reduce the potential for failure due to dynamic forces.

**Machine Performance and Optimization:** The Theory of Machines also considers the performance and optimization of machines. Students learn how to analyze machine efficiency, evaluate power losses, and optimize designs for improved performance. This includes studying factors such as mechanical advantage, gear ratios, energy conservation, and overall system efficiency.

**Practical Applications:** The Theory of Machines finds practical applications in various mechanical systems, such as engines, vehicles, robotics, manufacturing equipment, and automation systems. Understanding the principles and concepts of the Theory of Machines enables engineers to design, analyze, and optimize these systems to meet specific requirements and achieve desired performance objectives.



**Module 30**

Code	Course/Module Title	ECTS	Semester
UOBAB0302056	Automotive Hydraulics and Pneumatics Systems	4	5
Class (hr/w)	Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	59	41

**Description**

**Hydraulics Systems:** Hydraulics systems use fluids, typically oil or hydraulic fluid, to transmit and control power. They rely on the incompressibility of fluids to generate and transmit forces. In automotive applications, hydraulics systems are commonly used in braking systems, power steering systems, and suspension systems.

a. **Braking Systems:** Hydraulic braking systems are widely used in automobiles. They use hydraulic pressure to transfer force from the driver's input to the brakes, resulting in deceleration or stopping of the vehicle. The system includes components such as master cylinders, brake lines, brake calipers, and wheel cylinders.

b. **Power Steering Systems:** Hydraulic power steering systems assist the driver in turning the wheels by using hydraulic pressure. These systems employ a hydraulic pump driven by the engine to supply pressurized fluid to a steering gear or rack, which helps reduce the effort required to turn the wheels.

c. **Suspension Systems:** Some automotive suspension systems, such as hydraulic suspension systems, use hydraulic fluid to control the damping and provide a comfortable ride. These systems include hydraulic shock absorbers or dampers that regulate the movement of the suspension components in response to road conditions.

**Pneumatics Systems:** Pneumatics systems use compressed air as the working fluid to transmit power and control mechanical operations. Although less commonly used in automotive applications compared to hydraulics systems, they are found in some specific functions.

a. **Pneumatic Braking Systems:** Pneumatic braking systems, also known as air brakes, are primarily used in heavy-duty vehicles such as trucks and buses. Compressed air is used to actuate the braking system, providing reliable and efficient braking performance.

b. **Pneumatic Suspension Systems:** Pneumatic suspension systems utilize compressed air to control the ride height and stiffness of the vehicle's suspension. These systems can adjust the vehicle's height based on load conditions and provide a smoother ride.

**Components and Control:** Both hydraulics and pneumatics systems in automotive applications consist of various components to facilitate fluid power transmission and control.

a. **Fluid Reservoirs:** Reservoirs store the hydraulic fluid or compressed air used in the system.

b. **Pumps or Compressors:** Pumps or compressors generate the required fluid pressure or air pressure.

c. **Valves:** Valves control the flow and direction of fluid or air within the system. They can be used to activate or deactivate specific functions.

d. **Actuators:** Actuators convert the fluid or air pressure into mechanical motion to perform desired tasks. In automotive applications, actuators can be hydraulic cylinders or pneumatic cylinders that provide the required force or movement.

e. **Control Systems:** Control systems, including sensors, electronic controllers, and human interfaces, are used to monitor and regulate the operation of hydraulic and pneumatic systems in vehicles.

**Level – UGIII**  
**Semester – Six**

**Module 31**

Code	Course/Module Title	ECTS	Semester
UOBAB0302061	Numerical Analysis (with computer applications)	6	6
Class (hr/w)	Lab./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	75	75

**Description**

**Numerical Methods:** Numerical Analysis explores various numerical methods for solving mathematical problems that are difficult or impossible to solve analytically. These methods include techniques for solving linear and nonlinear equations, interpolation and approximation, numerical integration, numerical differentiation, and solving ordinary and partial differential equations. Students learn the underlying principles, algorithms, and implementation strategies for these methods.

**Approximation and Interpolation:** Numerical Analysis focuses on approximating functions or data sets using interpolation techniques. Students learn methods such as polynomial interpolation, spline interpolation, and least squares approximation. These techniques are used to estimate values between known data points or to represent functions with simpler mathematical expressions.

**Numerical Integration and Differentiation:** The course covers numerical methods for approximating definite integrals and derivatives of functions. Students learn techniques such as numerical quadrature (e.g., Simpson's rule, Trapezoidal rule) and numerical differentiation schemes (e.g., finite difference approximations) to estimate these mathematical operations.

**Solving Systems of Equations:** Numerical Analysis explores methods for solving systems of linear and nonlinear equations. Students learn techniques such as Gaussian elimination, LU decomposition, iterative methods (e.g., Jacobi, Gauss-Seidel), and Newton-Raphson method for finding roots of equations. These methods are used to solve complex mathematical models or engineering problems.

**Ordinary and Partial Differential Equations:** The course covers numerical techniques for solving ordinary differential equations (ODEs) and partial differential equations (PDEs). Students learn methods such as Euler's method, Runge-Kutta methods, finite difference methods, and finite element methods to approximate solutions of differential equations that arise in various scientific and engineering fields.

**Error Analysis:** Numerical Analysis includes the study of error analysis and the evaluation of numerical methods. Students learn about sources of error in numerical computations, such as truncation error and rounding error. They understand techniques for assessing the accuracy and stability of numerical algorithms and how to quantify and control errors in numerical solutions.

**Computer Programming and Implementation:** Numerical Analysis with computer applications emphasizes the implementation of numerical methods using computer programming languages. Students learn to write computer programs to apply numerical algorithms and solve mathematical problems. Common programming languages used include MATLAB, Python, or C/C++. They gain hands-on experience in implementing numerical methods, analyzing results, and visualizing data.

**Application Areas:** Numerical Analysis finds applications in various scientific and engineering fields. It is used to solve complex mathematical models, simulate physical phenomena, optimize designs, perform data analysis, and make predictions. The course may include examples and exercises from areas such as physics, engineering, finance, and computer graphics.

**Module 32**

Code	Course/Module Title	ECTS	Semester
UOBAB0302062	Heat Transfer	5	1
Class (hr/w)	Lab./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	88	62

**Description**

**Conduction:** Conduction is the transfer of heat through direct molecular collisions within a solid or between solids in contact. In a solid material, heat flows from higher temperature regions to lower temperature regions. The rate of heat conduction depends on the thermal conductivity of the material, the temperature gradient, and the cross-sectional area. For example, a metal rod heated at one end will conduct heat along its length, gradually raising the temperature throughout the rod.

**Convection:** Convection involves the transfer of heat through the movement of a fluid (liquid or gas). Convection can be natural or forced. In natural convection, heat transfer occurs due to density differences caused by temperature variations, leading to fluid movement. Forced convection, on the other hand, involves the use of external means such as fans or pumps to circulate the fluid and enhance heat transfer. Convection plays a significant role in applications such as cooling of electronic components, air conditioning systems, and fluid flow in pipes.

**Radiation:** Radiation is the transfer of heat through electromagnetic waves. Unlike conduction and convection, radiation does not require a medium and can occur in a vacuum. All objects with a temperature above absolute zero emit thermal radiation. The rate of heat transfer by radiation depends on the temperature, surface area, and emissivity of the objects involved. Examples of radiation heat transfer include the sun radiating heat to the Earth, heat transfer between two objects separated by space, and thermal radiation emitted by heated surfaces.

**Module 33**

Code	Course/Module Title	ECTS	Semester
UOBAB0302063	Aerodynamics	3	6
Class (hr/w)	Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	45	30

**Description**

**Fluid Mechanics:** Aerodynamics is a branch of fluid mechanics that specifically focuses on the behavior of air. It involves studying the properties of air, such as density, pressure, temperature, and velocity, and their interactions with solid objects. Fluid mechanics principles, such as conservation of mass, momentum, and energy, are applied to analyze the flow of air around objects.

**Drag and Lift:** Two fundamental forces in aerodynamics are drag and lift. Drag is the force that opposes the motion of an object through the air, while lift is the force that acts perpendicular to the direction of motion and supports the object against gravity. Understanding the factors that affect drag and lift is crucial for optimizing the performance of vehicles and aircraft.

**Bernoulli's Principle:** Bernoulli's principle is a fundamental concept in aerodynamics. It states that as the speed of a fluid (such as air) increases, its pressure decreases, and vice versa. This principle is often used

to explain the generation of lift on aircraft wings. The curved shape of the wing, known as an airfoil, creates a pressure difference between the upper and lower surfaces, resulting in upward lift forces.

**Boundary Layer:** The boundary layer is the thin layer of air adjacent to a solid surface where the airflow is affected by viscous effects. It plays a significant role in determining the drag experienced by objects. Engineers study the boundary layer to optimize the surface design and minimize the drag.

**Flow Characteristics:** Aerodynamics involves the analysis of different flow regimes around objects, including laminar flow, turbulent flow, and transitional flow. Laminar flow is smooth and organized, while turbulent flow is characterized by chaotic motion and mixing. The transition between these flow regimes can significantly affect the drag and lift forces experienced by objects.

**Wind Tunnel Testing and Computational Fluid Dynamics (CFD):** To study and analyze aerodynamic behavior, engineers use wind tunnels and computational fluid dynamics simulations. Wind tunnels provide controlled conditions to measure the forces and flow characteristics on scaled models. CFD involves using numerical methods and computer simulations to solve the governing equations of fluid flow, allowing for detailed analysis of complex aerodynamic phenomena.

**Applications:** Aerodynamics has broad applications in various fields, including aerospace engineering, automotive design, wind turbine design, sports equipment design (such as cycling helmets and racing cars), and building design (to optimize energy efficiency and airflow around structures). Understanding aerodynamics is crucial for designing efficient, stable, and safe vehicles, aircraft, and structures.

**Module 34**

Code	Course/Module Title	ECTS	Semester
UOBAB0302064	Theory of Automobiles	6	6
Class (hr/w)	Lab/Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	88	62

**Description**

**Vehicle Dynamics:** Vehicle dynamics focuses on the behavior and motion of automobiles. It involves studying the forces and moments acting on a vehicle during acceleration, braking, and cornering. Concepts such as weight transfer, traction, stability, and handling characteristics are analyzed to optimize the performance and safety of the vehicle.

**Powertrain Systems:** The powertrain of an automobile includes the engine, transmission, and drivetrain components responsible for generating and transmitting power to the wheels. Understanding the principles of internal combustion engines, hybrid systems, or electric motors, as well as various types of transmissions (e.g., manual, automatic, continuously variable), is crucial in the theory of automobiles.

**Suspension and Chassis Design:** The suspension system and chassis of an automobile play a significant role in providing comfort, stability, and handling characteristics. Topics such as suspension geometry, spring and damper characteristics, anti-roll bars, and chassis stiffness are studied to optimize ride quality, handling, and vehicle stability.

**Braking Systems:** Brakes are vital for the safety and control of automobiles. The theory of automobiles covers the principles and components of braking systems, such as hydraulic systems, brake pads, discs, and drum brakes. Topics include brake performance, braking distance, and technologies like anti-lock braking systems (ABS) and electronic stability control (ESC).

**Steering Systems:** Steering systems allow the driver to control the direction of the vehicle. The theory of automobiles explores different types of steering systems, such as rack and pinion, recirculating ball, or electronic power steering (EPS). Concepts related to steering geometry, steering effort, and

maneuverability are studied to ensure precise and responsive steering.

**Safety Systems:** The theory of automobiles emphasizes the importance of safety systems to protect occupants in the event of accidents. Topics include seat belt systems, airbags, crashworthiness, and vehicle crash simulations. Understanding safety regulations and design principles is crucial for engineers involved in vehicle safety.

**Vehicle Aerodynamics:** Aerodynamics plays a significant role in the efficiency, performance, and stability of automobiles. Concepts such as drag reduction, lift optimization, and airflow management around the vehicle are studied. Streamlining the vehicle's shape, optimizing airflow around components, and minimizing aerodynamic drag are crucial considerations in automobile design.

**Vehicle Electronics and Control Systems:** Modern automobiles incorporate a wide range of electronic systems and control modules for various functions, including engine management, vehicle stability control, infotainment, and driver-assistance systems. The theory of automobiles covers topics such as electronic control units (ECUs), sensors, actuators, and communication networks.

### Module 35

Code	Course/Module Title	ECTS	Semester
UOBAB0302065	Design of Mechanical Systems (with Solid - Works)	6	6
Class (hr/w)	Lab/Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	75	75

#### Description

**Design Methodology:** The course emphasizes the systematic design process, which includes problem definition, conceptual design, detailed design, analysis, and validation. Students learn to identify design requirements, generate design concepts, and evaluate them based on factors such as functionality, performance, safety, and cost.

**Machine Components:** The course covers the design and selection of various machine elements that are commonly used in mechanical systems. These elements include gears, bearings, shafts, couplings, springs, fasteners, belts, chains, brakes, clutches, and other components. Students learn about the design principles, material selection, and manufacturing considerations for these elements.

**Stress Analysis:** Stress analysis is an integral part of machine element design. Students learn how to analyze and calculate the stresses, deformations, and failure modes in machine components subjected to different loads, such as static, dynamic, and impact loads. They use tools like finite element analysis (FEA) to assess the structural integrity and optimize the designs for strength and durability.

**Fatigue and Fracture:** Fatigue and fracture considerations are crucial in the design of mechanical systems. Students learn about fatigue life estimation, fatigue failure modes, and factors that influence fatigue strength, such as stress concentration, surface finish, and material properties. Fracture mechanics principles are also covered to analyze crack propagation and predict the failure of machine elements.

**Tolerance and Fits:** Tolerance analysis and fit selection play a significant role in ensuring proper assembly and functionality of machine components. Students learn about geometric dimensioning and tolerancing (GD&T) standards and techniques for specifying tolerances. They also study different types of fits, such as clearance fits, interference fits, and transition fits, and their implications on assembly and

performance.

**Design for Manufacturing and Assembly (DFMA):** The course emphasizes designing machine elements considering manufacturing and assembly processes. Students learn to optimize designs for efficient and cost-effective production, including considerations for material selection, machining, casting, forming, and assembly techniques. They explore strategies for reducing part count, simplifying assembly, and minimizing manufacturing tolerances.

**Computer-Aided Design (CAD):** The use of CAD software, such as SolidWorks, is an integral part of the course. Students gain hands-on experience in creating 3D models, performing simulations, conducting virtual testing, and generating engineering drawings. They learn how to integrate CAD tools with design analysis and optimization techniques.

**Design Projects:** Machine Elements Design courses often involve design projects where students apply the concepts and skills learned throughout the course to solve real-world design challenges. These projects may include designing complete mechanical systems or focusing on specific machine elements, allowing students to gain practical experience and enhance their problem-solving abilities.

### Module 36

Code	Course/Module Title	ECTS	Semester
UOBAB0302066	Industrial Engineering	3	6
Class (hr/w)	Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	45	30

#### Description

**Systems Analysis and Optimization:** Industrial engineers analyze and optimize systems as a whole. They study and understand the components, interactions, and relationships within a system, whether it's a manufacturing plant, supply chain, healthcare facility, or service organization. By analyzing data, conducting simulations, and applying mathematical models, they identify bottlenecks, inefficiencies, and areas for improvement.

**Work Methods and Ergonomics:** Industrial engineers focus on designing efficient work methods and ensuring ergonomic considerations in the workplace. They analyze tasks, workflows, and human factors to enhance productivity, reduce fatigue, prevent injuries, and improve worker satisfaction. This may involve optimizing workstations, tools, equipment, and job rotations to create safe and efficient work environments.

**Operations Management:** Industrial engineers are involved in managing and optimizing operational processes. They study production systems, inventory management, supply chain logistics, scheduling, and capacity planning to minimize lead times, reduce costs, and increase throughput. They use techniques like lean manufacturing, Six Sigma, and operations research to improve process efficiency and quality.

**Quality Control and Assurance:** Industrial engineers play a role in quality control and assurance by implementing quality management systems, statistical process control, and quality improvement methodologies. They develop and analyze metrics, conduct audits, and implement corrective and preventive actions to ensure consistent product or service quality.

**Industrial Automation and Robotics:** Industrial engineers explore the integration of automation technologies, such as robotics, artificial intelligence, and machine learning, into industrial processes. They design and optimize automated systems to increase productivity, improve safety, and reduce human error. They may also focus on human-robot collaboration and the design of efficient man-

machine interfaces.

**Supply Chain and Logistics:** Industrial engineers contribute to the design and optimization of supply chain networks and logistics operations. They analyze transportation, warehousing, inventory management, and distribution strategies to improve efficiency, reduce costs, and enhance customer satisfaction. They use techniques like network optimization, inventory modeling, and demand forecasting to streamline supply chain operations.

**Simulation and Modeling:** Industrial engineers employ computer-based simulation and modeling techniques to analyze and optimize systems. They create mathematical models and simulations to study different scenarios, test hypotheses, and make informed decisions. These tools allow them to evaluate system performance, identify improvement opportunities, and predict the impact of changes before implementation.

**Project Management:** Industrial engineers often lead or contribute to project management efforts. They apply project management principles to plan, execute, and control projects, ensuring they are delivered on time, within budget, and according to specifications. They manage resources, assess risks, and employ project management tools and methodologies to drive successful project outcomes.



# Level – UGIV

## Semester – Seven

**Module 37**

Code	Course/Module Title	ECTS	Semester
UOBAB0302071	Automobile Air-Conditioning	6	7
Class (hr/w)	Lab./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	88	62

**Description**

**Components:** The air-conditioning system in vehicles consists of several key components. These include a compressor, condenser, evaporator, expansion valve, refrigerant, blower fan, and control system. Each component plays a specific role in the cooling process and airflow distribution.

**Refrigeration Cycle:** The air-conditioning system operates based on the principles of the refrigeration cycle. A refrigerant, typically a gas or liquid with specific thermodynamic properties, circulates through the system. The refrigeration cycle involves the compression, condensation, expansion, and evaporation of the refrigerant to transfer heat from the inside of the vehicle to the outside.

**Compressor:** The compressor is a key component that pressurizes and circulates the refrigerant through the system. It increases the temperature and pressure of the refrigerant, converting it into a high-pressure gas.

**Condenser:** The condenser is located at the front of the vehicle and acts as a heat exchanger. It receives the high-pressure, high-temperature refrigerant from the compressor and cools it down by dissipating heat to the ambient air. This process transforms the refrigerant into a high-pressure liquid.

**Evaporator:** The evaporator is located inside the passenger compartment and is responsible for cooling the air. The high-pressure liquid refrigerant enters the evaporator, where it undergoes a phase change from a liquid to a gas, absorbing heat from the surrounding air in the process. The cooled air is then blown into the cabin through the vents.

**Expansion Valve:** The expansion valve regulates the flow of the refrigerant into the evaporator. It creates a pressure drop, allowing the refrigerant to expand and vaporize rapidly, which further lowers its temperature.

**Blower Fan:** The blower fan circulates the cooled air from the evaporator throughout the passenger compartment. It helps distribute the conditioned air evenly and allows occupants to adjust the airflow speed and direction.

**Control System:** The control system includes various sensors, switches, and electronic components that monitor and regulate the operation of the air-conditioning system. It enables the driver and passengers to adjust the temperature, fan speed, and other settings for personalized comfort.

**Maintenance and Service:** Regular maintenance and servicing are necessary to ensure optimal performance and longevity of the automobile air-conditioning system. This includes refrigerant recharge, inspection of components, cleaning or replacement of filters, and checking for leaks or other issues.

**Module 38**

Code	Course/Module Title	ECTS	Semester
UOBAB0302072	Mechanical Vibrations	6	7
Class (hr/w)	Lab/Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	88	62

**Description**

**Types of Vibrations:** Mechanical vibrations can be classified into different types based on their characteristics. The three primary types of vibrations are:

**Free Vibrations:** Free vibrations occur when a system oscillates without any external forces or disturbances acting on it after an initial displacement or disturbance. The system vibrates at its natural frequency, which depends on its mass, stiffness, and damping characteristics.

**Forced Vibrations:** Forced vibrations occur when a system is subjected to external forces or excitations at a specific frequency or frequencies. These external forces can be periodic or random in nature, and they can significantly influence the system's response.

**Resonance:** Resonance happens when a forced vibration occurs at the natural frequency of the system, leading to amplified response. Resonance can cause excessive vibrations, leading to potential damage or failure of the system.

**Degrees of Freedom:** The degrees of freedom of a mechanical system refer to the number of independent coordinates required to describe the system's motion. A simple mechanical system, such as a mass-spring system, may have one degree of freedom, while more complex systems, like multi-body systems or structures, can have multiple degrees of freedom.

**Mass, Stiffness, and Damping:** The behavior of a vibrating mechanical system depends on its mass, stiffness, and damping characteristics. Mass represents the inertia of the system, stiffness refers to the resistance to deformation or displacement, and damping accounts for energy dissipation. Proper design and selection of these parameters are crucial for controlling vibrations and ensuring system stability.

**Vibration Analysis and Measurement:** Vibration analysis involves the study of mechanical vibrations to understand their characteristics, behavior, and effects on the system. It includes techniques such as mathematical modeling, analytical methods, numerical simulations, and experimental measurements. Vibration measurement tools, such as accelerometers, are used to quantify and analyze vibrations in real-world systems.

**Mitigation and Control:** In many cases, it is necessary to mitigate or control vibrations to ensure system performance, safety, and comfort. Various techniques are employed for vibration control, including the use of vibration isolators, dampers, absorbers, and active control systems. These methods aim to reduce vibration amplitudes, shift natural frequencies, and dissipate energy to minimize the adverse effects of vibrations.

**Applications:** Mechanical vibrations have implications in numerous engineering fields. They are crucial in the design and analysis of machinery, vehicles, aerospace structures, bridges, buildings, and many other mechanical systems. Understanding and managing vibrations are essential for optimizing system performance, preventing fatigue and failure, and ensuring a safe and comfortable environment for users.

**Module 39**

Code	Course/Module Title	ECTS	Semester
UOBAB0302073	Automobile Design	5	7
Class (hr/w)	Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	60	65
Description			

**Concept Development:** The design process begins with conceptualization, where designers explore various ideas, themes, and inspirations to develop a design concept. This involves sketching, rendering, and creating digital or physical models to visualize the overall shape, proportions, and styling of the vehicle.

**Exterior Design:** Exterior design focuses on the visual appearance of the vehicle's outer body. Designers work on creating distinctive shapes, contours, and lines that define the vehicle's character and brand identity. Factors such as aerodynamics, aesthetics, safety regulations, and functionality are considered during the design process.

**Interior Design:** Interior design focuses on creating a comfortable, functional, and visually appealing cabin space for the vehicle occupants. Designers consider ergonomics, seating arrangements, controls placement, materials, textures, and finishes to enhance the user experience. They also incorporate features such as infotainment systems, connectivity, and storage options to meet modern consumer expectations.

**Human-Machine Interface (HMI):** HMI design involves the integration of controls, displays, and interfaces that allow users to interact with the vehicle's systems and functions. Designers work on creating intuitive layouts, user-friendly controls, and informative displays to enhance usability and safety while driving.

**Safety Considerations:** Safety is a critical aspect of automobile design. Designers integrate safety features such as crumple zones, seat belts, airbags, anti-lock braking systems, and electronic stability control into the vehicle's structure. They also consider visibility, lighting, and driver-assistance systems to enhance overall safety.

**Material Selection:** Designers choose appropriate materials for the vehicle's exterior and interior components. Factors such as weight, strength, durability, aesthetics, and environmental impact are considered when selecting materials like steel, aluminum, plastics, composites, and upholstery fabrics.

**Sustainability and Environmental Considerations:** In recent years, automobile design has increasingly focused on sustainability and reducing environmental impact. Designers incorporate lightweight materials, improve fuel efficiency, explore alternative powertrain technologies (such as electric or hybrid systems), and consider recyclability and life-cycle assessment during the design process.

**Manufacturing Feasibility:** Automobile designers collaborate with engineers and manufacturing experts to ensure that the design can be translated into a feasible and cost-effective production process. Design for manufacturability, assembly considerations, tooling requirements, and production efficiency are taken into account.

**Prototype Development and Testing:** After the design is finalized, prototypes are built and subjected to rigorous testing to validate the design's performance, functionality, and safety. Testing may include wind tunnel testing, crash testing, durability testing, and user feedback assessments.

#### Module 40

Code	Course/Module Title	ECTS	Semester
UOBAB0302074	Measurement Systems	6	7
Class (hr/w)	Lab./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	88	62
<b>Description</b>			

**Units of Measurement:** Units of measurement provide a standardized and consistent way to express quantities. The International System of Units (SI) is the most widely used system and defines base units (e.g., meter, kilogram, second) for different physical quantities. SI units are based on fundamental constants of nature and provide a universal framework for measurements.

**Measurement Standards:** Measurement standards ensure uniformity and traceability in measurements. National and international organizations, such as the National Institute of Standards and Technology (NIST), establish and maintain standards for various physical quantities. These standards serve as references against which measurements are compared and calibrated.

**Instruments and Equipment:** Measurement instruments and equipment are used to acquire and process data for measurement purposes. They can range from simple tools such as rulers and thermometers to sophisticated devices like oscilloscopes, balances, spectrometers, and pressure gauges. These instruments are designed to accurately capture and quantify the desired physical quantity.

**Calibration:** Calibration is the process of comparing the measurement instrument or system with a known standard to ensure its accuracy and reliability. During calibration, any deviations or errors in the measurement system are identified and corrected, thus establishing traceability to a reference standard.

**Measurement Techniques:** Various techniques are employed to measure different physical quantities. These techniques can include direct measurement, indirect measurement using mathematical relationships, and non-contact methods such as optical or electronic sensing. The selection of the appropriate technique depends on the nature of the quantity being measured and the desired level of accuracy.

**Uncertainty and Error Analysis:** Measurements are subject to uncertainties and errors due to various factors such as instrument limitations, environmental conditions, human factors, and inherent variability. Error analysis helps quantify and understand the uncertainties associated with measurements, providing information on the confidence level and reliability of the results.

**Data Acquisition and Processing:** Measurement systems often involve the collection, storage, and analysis of measurement data. Data acquisition systems capture the measurements from the instruments, while data processing techniques such as statistical analysis, signal processing, and data visualization are applied to interpret and derive meaningful information from the collected data.

**Metrology:** Metrology is the science of measurement, including its principles, methods, and theory. It encompasses the study of measurement systems, standards, calibration, measurement uncertainty, and traceability. Metrologists work to develop and improve measurement techniques, ensuring accuracy, comparability, and consistency in measurements across different fields and industries.

#### Module 41

Code	Course/Module Title	ECTS	Semester
UOBAB0302075	Computer Applications (ANSYS)	4	7
Class (hr/w)	Lab.	SSWL (hr/sem)	USWL (hr/w)
2	2	60	40
Description			
Simulation Capabilities: ANSYS offers a range of simulation capabilities for various engineering disciplines, including structural analysis, fluid dynamics, electromagnetics, thermal analysis, and Multiphysics simulations. These capabilities allow engineers to virtually model and analyze the behavior			

of real-world systems, components, and processes.

**Finite Element Analysis (FEA):** ANSYS is renowned for its powerful finite element analysis capabilities. FEA allows engineers to break down complex structures into smaller finite elements and simulate their behavior under different loading and boundary conditions. It helps analyze stress, strain, deformation, and other mechanical properties of structures to ensure their integrity and optimize their performance.

**Computational Fluid Dynamics (CFD):** ANSYS provides computational fluid dynamics capabilities to simulate fluid flow, heat transfer, and other related phenomena. CFD is utilized to study the behavior of fluids, such as air and liquids, in various applications like aerodynamics, HVAC systems, combustion, and multiphase flows. It helps engineers optimize designs for better efficiency, performance, and safety.

**Electromagnetics:** ANSYS offers electromagnetic simulation capabilities for analyzing electromagnetic fields, radiation, and interactions. It is used in the design and analysis of antennas, electromagnetic compatibility (EMC), motors, transformers, and other electromagnetic devices. ANSYS can predict electromagnetic performance, evaluate potential interference, and optimize designs for better performance and reliability.

**Multiphysics Simulations:** ANSYS allows for the coupling of multiple physical phenomena in a single simulation, enabling engineers to study complex interactions and solve problems involving multiple disciplines. Multiphysics simulations can involve the coupling of structural, fluid, thermal, electromagnetic, and other physical domains to provide a comprehensive understanding of the system's behavior.

**Pre-processing and Post-processing:** ANSYS provides tools for pre-processing and post-processing of simulation data. Pre-processing involves defining the geometry, meshing, applying boundary conditions, and setting up the simulation. Post-processing involves analyzing and visualizing the simulation results, extracting relevant data, and generating reports or presentations.

**Optimization and Design Exploration:** ANSYS offers optimization tools that help engineers find optimal designs based on specific objectives and constraints. These tools use algorithms and techniques such as parameterization, design of experiments, and response surface modeling to explore design spaces, evaluate design alternatives, and identify optimal solutions.

**Integration with CAD and other Software:** ANSYS software can be integrated with computer-aided design (CAD) software, allowing for seamless transfer of geometry and data between the two systems. This integration facilitates the iterative design process, where engineers can quickly modify and analyze designs using ANSYS based on CAD models.

#### Module 42

Code	Course/Module Title	ECTS	Semester
UOBAB0302076	Graduation Project I (Related to Automobiles)	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		30	45
Description			
Design and development of a prototype for a new product or technology. Optimization of a manufacturing process to improve efficiency or reduce costs. Analysis and improvement of a mechanical or electrical system. Development of a software application or mobile app to solve a specific problem. Design and implementation of a renewable energy system. Computer Science and Information Technology:			

Development of a web-based platform or application for a specific purpose. Implementation of a machine learning algorithm for data analysis or prediction. Creation of a computer program or software tool to automate a task or process. Design and development of a database management system.

Investigation and implementation of cybersecurity measures for a network or system. Business and Management:

Development of a comprehensive business plan for a new venture or startup. Market analysis and feasibility study for a specific product or service. Creation of a marketing campaign and strategy for a company or organization. Optimization of business processes to improve efficiency and productivity. Analysis of financial data and formulation of investment strategies.

# Level – UGIV

## Semester – Eight



**Module 43**

Code	Course/Module Title	ECTS	Semester
UOBAB0302081	Automobile Electrical& Electronics	6	8
Class (hr/w)	Lab./ Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	89	61

**Description**

**Electrical System Architecture:** Study the overall electrical system architecture of automobiles, including the distribution of power, wiring harnesses, and electrical components. Understand the different subsystems such as the battery, alternator, starter motor, and their interconnections.

**Vehicle Communication Networks:** Explore the communication protocols and networks used in automobiles, such as CAN (Controller Area Network) and LIN (Local Interconnect Network). Learn about data exchange between various electronic modules, sensors, and actuators within the vehicle.

**Vehicle Electronics:** Study the electronic components used in vehicles, such as sensors, actuators, and control units. Understand their functionality and integration within the vehicle's electrical system. Topics may include engine management systems, braking systems, and advanced driver assistance systems (ADAS).

**Automotive Power Electronics:** Gain knowledge of power electronic systems used in vehicles, such as inverters for electric and hybrid vehicles, DC-DC converters, and battery management systems. Explore their design, control, and efficiency optimization for electric powertrain applications.

**Automotive Lighting Systems:** Learn about the design and operation of automotive lighting systems, including headlights, taillights, turn signals, and interior lighting. Understand different lighting technologies, such as halogen, xenon, and LED, and their integration with vehicle control systems.

**Vehicle Electrical Safety:** Study electrical safety measures in automobiles, including grounding, circuit protection, and insulation. Understand the safety standards and regulations applicable to vehicle electrical systems, such as ISO 26262 for functional safety.

**Diagnostic and Troubleshooting:** Develop skills in diagnosing and troubleshooting electrical and electronic issues in vehicles using diagnostic tools and techniques. Learn about onboard diagnostics (OBD) systems and scan tools used for fault code reading and analysis.

**Electrification and Hybridization:** Explore the concepts and technologies associated with vehicle electrification and hybridization. Study the integration of electric motors, batteries, and power electronics in hybrid and electric vehicles. Understand the control strategies and energy management systems involved.

**Infotainment and Connectivity:** Study the integration of infotainment systems, including audio systems, navigation systems, and communication interfaces, within vehicles. Learn about connectivity features such as Bluetooth, Wi-Fi, and smartphone integration.

**Emerging Technologies:** Stay updated on the latest advancements in automotive electrical and electronic systems, such as autonomous driving technology, connected vehicles, and electric vehicle charging infrastructure.

**Module 44**

Code	Course/Module Title	ECTS	Semester
UOBAB0302082	Automobiles Control Systems	6	8

Class (hr/w)	Lab./ Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	89	61

**Description**

**Engine Control Systems:** Study the control systems used to manage and optimize the performance of internal combustion engines. Explore topics such as fuel injection systems, ignition timing control, air-fuel ratio control, and exhaust gas recirculation (EGR). Understand the use of sensors, actuators, and engine management algorithms to regulate engine parameters.

**Transmission Control Systems:** Learn about the control systems that manage the operation of automatic and manual transmissions. Study topics such as gear shifting algorithms, clutch control, torque converter lock-up control, and shift quality optimization. Understand the role of sensors, solenoids, and electronic control units (ECUs) in transmission control.

**Braking Systems:** Explore the control systems used in vehicle braking systems, including anti-lock braking systems (ABS), electronic stability control (ESC), and traction control systems (TCS). Learn about the sensors, hydraulic actuators, and algorithms used to regulate braking forces and prevent wheel lock-up.

**Suspension and Ride Control Systems:** Study the control systems that manage vehicle suspension and ride characteristics. Explore topics such as adaptive suspension systems, active damping control, and electronic level control. Understand the use of sensors, actuators, and control algorithms to adjust suspension parameters for improved comfort and handling.

**Steering Systems:** Learn about the control systems used in vehicle steering systems, such as power steering and electric power-assisted steering (EPAS). Study topics such as steering torque sensors, motor control algorithms, and stability-enhancing steering systems.

**Advanced Driver Assistance Systems (ADAS):** Explore the control systems involved in ADAS technologies, including adaptive cruise control, lane keeping assist, collision avoidance systems, and automated parking systems. Understand the sensor fusion, decision-making algorithms, and actuator control mechanisms used in these systems.

**Vehicle Stability Control:** Study the control systems that manage vehicle stability and handling, such as electronic stability control (ESC) and dynamic stability control (DSC). Learn about the use of sensors, algorithms, and brake actuation to monitor vehicle dynamics and apply corrective actions to prevent skidding or loss of control.

**Hybrid and Electric Vehicle Control:** Gain knowledge of control systems used in hybrid and electric vehicles. Study topics such as powertrain control algorithms, regenerative braking control, battery management systems, and energy management strategies for optimizing the use of electric power.

**Human-Machine Interface (HMI):** Explore the design and implementation of control interfaces that allow drivers to interact with vehicle systems. Study topics such as instrument clusters, touchscreens, voice control, and steering wheel controls.

**Fault Diagnosis and Diagnostics:** Learn about control system diagnostics and fault detection techniques used in vehicles. Understand the use of onboard diagnostic systems (OBD) and diagnostic trouble codes (DTCs) for identifying and troubleshooting control system malfunctions.

**Module 45**

Code	Course/Module Title	ECTS	Semester
UOBAB0302083	Vehicle Dynamics	6	8
Class (hr/w)	Lab./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	89	61

**Description**

Vehicle Suspension Systems: Study the design and behavior of vehicle suspension systems, including the springs, dampers, and anti-roll bars. Understand their role in providing ride comfort, handling, and stability. Explore suspension geometry, tuning, and optimization techniques.

Tire Dynamics: Learn about the interaction between tires and the road surface, including tire modeling, contact mechanics, and tire-road friction. Understand the impact of tire characteristics on vehicle handling, stability, and road noise. Explore tire testing and analysis techniques.

Vehicle Handling and Stability: Study the dynamics of vehicle motion, including yaw, roll, and pitch. Explore topics such as vehicle stability control, cornering behavior, understeer/oversteer characteristics, and the impact of vehicle parameters on handling performance. Learn about vehicle stability control systems.

Steering System Dynamics: Understand the dynamics of the vehicle's steering system, including steering geometry, steering effort, and steering response. Study topics such as steering system design, power steering systems, and steer-by-wire technologies.

Vehicle Ride Comfort: Explore the factors influencing vehicle ride comfort, including vibration isolation, seat design, and suspension tuning. Study human perception of vehicle vibrations, analyze ride comfort metrics, and investigate techniques for improving passenger comfort.

Vehicle Braking Dynamics: Learn about the dynamics of vehicle braking systems, including brake performance, stability during braking, and the impact of braking forces on vehicle behavior. Study topics such as brake system design, ABS operation, and brake force distribution algorithms.

Vehicle Crash Dynamics: Study the dynamics of vehicle collisions and their effects on occupant safety. Explore crash test analysis, energy absorption mechanisms, and crashworthiness design principles. Understand the role of vehicle structure and safety systems in protecting occupants during collisions.

Vehicle Dynamics Simulation: Gain proficiency in using computer simulation tools to model and analyze vehicle dynamics. Learn about multi-body dynamics simulations, finite element analysis (FEA), and computational fluid dynamics (CFD) for studying vehicle behavior under different operating conditions.

Vibration Analysis and Control: Explore techniques for analyzing and mitigating vehicle vibrations. Study topics such as modal analysis, vibration measurement, and vibration isolation strategies. Understand the use of active vibration control systems for reducing unwanted vibrations.

Noise, Vibration, and Harshness (NVH): Study the overall noise and vibration characteristics of vehicles, including sources of noise and vibration, measurement techniques, and NVH optimization strategies. Understand the impact of NVH on vehicle comfort and refinement.

**Module 46**

Code	Course/Module Title	ECTS	Semester
UOBAB0302084	Electrical and Hybrid Vehicles	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4		75	75

**Description**

Hybrid Powertrain Configuration: Study the different configurations of hybrid powertrains, such as parallel hybrids, series hybrids, and series-parallel hybrids. Understand how the internal combustion engine, electric motor, and battery work together to provide power and propulsion.

Hybrid Vehicle Components: Learn about the components of a hybrid vehicle, including the internal combustion engine, electric motor, battery pack, power electronics, and control systems. Understand

the functionality and integration of these components within the vehicle.

**Energy Management Strategies:** Explore the algorithms and strategies used to manage energy flow and optimize power distribution between the internal combustion engine and the electric motor. Study techniques such as regenerative braking, engine start-stop, and power blending to maximize energy efficiency.

**Battery Technology:** Gain knowledge of the battery technologies used in hybrid vehicles, such as nickel-metal hydride (NiMH) and lithium-ion (Li-ion) batteries. Understand battery management systems, including charging, discharging, thermal management, and battery life considerations.

**Power Electronics and Motor Control:** Study the power electronics components used in hybrid vehicles, including inverters, DC-DC converters, and motor controllers. Explore motor control algorithms for efficient operation and seamless integration between the internal combustion engine and the electric motor.

**Regenerative Braking:** Learn about the regenerative braking system used in hybrid vehicles, which converts the kinetic energy during braking into electrical energy to charge the battery. Understand the principles, components, and control strategies involved in regenerative braking.

**Hybrid Vehicle Performance:** Explore the impact of hybrid technology on vehicle performance, including acceleration, power delivery, and overall driving experience. Study factors such as power-to-weight ratio, torque characteristics, and powertrain calibration for optimal performance.

**Hybrid Vehicle Emissions:** Understand how hybrid vehicles contribute to reduced emissions compared to conventional vehicles. Study the emission control systems, such as catalytic converters and exhaust gas recirculation (EGR), and how they work in conjunction with the hybrid powertrain to minimize pollutant emissions.

**Plug-in Hybrid Electric Vehicles (PHEVs):** Explore the concept of PHEVs, which allow external charging of the battery from the electric grid. Understand the benefits, charging infrastructure requirements, and energy management strategies specific to PHEVs.

#### Module 47

Code	Course/Module Title	ECTS	Semester
UOBAB0302085	Ethics in Engineering Profession	3	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		30	45
Description			

**Professional Responsibility:** Understand the responsibility of engineers to safeguard public health, safety, and welfare. Engineers are expected to prioritize the well-being of the public and consider the potential impacts of their work on society.

**Code of Ethics:** Familiarize yourself with the code of ethics specific to the engineering profession. Many engineering organizations have established codes of ethics that outline the professional obligations and ethical principles that engineers should adhere to.

**Integrity and Honesty:** Uphold the highest standards of integrity and honesty in engineering practice. Engineers should be truthful, accurate, and transparent in their professional activities, including communication, reporting, and decision-making processes.

**Conflict of Interest:** Recognize and address conflicts of interest that may compromise professional judgment and impartiality. Engineers should prioritize the interests of their clients, employers, and the public over personal or financial gains.

**Confidentiality and Privacy:** Respect the confidentiality of information obtained during engineering work, particularly when it involves sensitive or proprietary data. Engineers should protect the privacy rights of individuals and ensure the secure handling of confidential information.

**Professional Competence:** Strive to maintain and enhance professional competence through continuous learning, skill development, and staying updated with advancements in the field. Engineers should only undertake tasks for which they have the necessary qualifications and expertise.

**Environmental Sustainability:** Consider the environmental impact of engineering activities and strive to minimize adverse effects on the environment.

**Ethical Decision Making:** Develop skills in ethical decision making, including the ability to recognize and evaluate ethical dilemmas, consider alternative courses of action, and make choices that align with ethical principles and professional obligations.

**Social and Cultural Considerations:** Recognize and respect the diversity of cultures, beliefs, and societal norms in engineering practice. Engineers should consider social, cultural, and ethical factors that may influence the acceptance, usability, and impact of their work within different communities.

**Professional Accountability:** Take responsibility for one's professional actions and decisions. Engineers should be accountable for the outcomes of their work and be willing to address any errors, omissions, or unintended consequences that may arise.

#### Module 48

Code	Course/Module Title	ECTS	Semester
UOBAB0302088	Graduation Project (Related to Automobiles)	3	8
Class (hr/w)	Prac.	SSWL (hr/sem)	USWL (hr/w)
2	1	44	31
Description			
Students will be exposed to lecture modules on project and thesis work followed by assignment of individual projects involving manufacturing/design an Automobile component. An industrial project may also be undertaken by the student to be supervised jointly by industry personnel and the teacher			

## Contact

Program Manager:

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*University of Babylon*  
*Faculty of Engineering – Al-Musayab*  
*Automobile Engineering Department*



# **Appendix (4)**

## ***MODULE DESCRIPTION***

### ***FORM***

**الملحق 4**

**وصف المادة الدراسية**





**Level – UGI**  
**Semester – One**

MODULE DESCRIPTION FORM

Module Information

معلومات المادة الدراسية

Module Title	English language		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302011			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	1 UGI	Semester of Delivery	one	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Rusul Dawood Salman	e-mail	<a href="mailto:met.rusul.dawood@uobabylon.edu.iq">met.rusul.dawood@uobabylon.edu.iq</a>	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.A.	
Module Tutor	-	e-mail	-	
Peer Reviewer Name	-	e-mail	-	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>1. Developing skills of reading, writing, speaking and listening.</li> <li>2. Providing a survey of theoretical perspectives concerning the student's learning and development.</li> <li>3. Providing an overview of a variety of important issues in English language that help the students to communicate easily with others.</li> <li>4. Applying the theoretical issues in order to give the student the opportunity to practice language and encourage him to speak with foreign people.</li> <li>5. Giving the students the ability to express their opinions and participating in discussion.</li> <li>6. Using variety of digital devices and tools in order to interpret and create meaning.</li> </ol>
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## MODULE DESCRIPTION FORM

<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.
	<ol style="list-style-type: none"> <li>1. The ability to understand the uses of language in the light of purposes.</li> <li>2. Identifying the most important daily phrases to be applicable in life.</li> <li>3. Development of evidence-based arguments.</li> <li>4. Making the students aware of the correct usages of English grammar in writing and speaking.</li> <li>5. Improving the students' ability in English in terms of fluency and comprehensibility.</li> <li>6. Students will give oral presentation and receive feedback on their performance.</li> <li>7. Improving the students' reading skills through the extensive reading.</li> <li>8. Providing the students with a large repertoire of vocabulary.</li> <li>9. Applying the grammatical forms in communicative contexts such as: class activities, reading &amp; writing, and homework.</li> <li>10. Strengthening the students' ability to write essays and academic papers.</li> <li>11. Enhancing the students' competence in four important elements: Writing, speaking, reading and listening.</li> </ol>

<b>Indicative Contents</b> المحتويات الإرشادية	<p><b>Indicative content includes the following.</b></p> <ul style="list-style-type: none"> <li>• Correcting English mistakes, question forms, daily conversation, present simple tense. [15 hrs]</li> <li>• Present continuous tense, making statements, making negatives, linking words, past simple tense. [15 hrs]</li> <li>• Past continuous, past perfect tense, countable and uncountable nouns. [10 hrs]</li> <li>• Expression of quantity, Articles, adjectives, [15 hrs]</li> <li>• Future tense [6 hrs]</li> </ul> <p><u>Part B - Analogue Electronics</u>                  Fundamentals</p> <ul style="list-style-type: none"> <li>• Recognizing tenses choosing the correct form, arranging the sentences in the correct order, [15 hrs]</li> <li>• Covering aspects such as phonetics, semantics and pragmatics. [7 hrs]</li> <li>• Exploring the building blocks of the language, understanding language in deeper level, learning how to structure words and sentences so that other people can understand them. [15 hrs]</li> </ul>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Student is an essential part of the process thus we should take into consideration the levels of student's' comprehension whence providing him with better and easies planning, improved ability to monitor student's goals ,teaching language skills across all curriculum topics, Speaking slowly and allowing extra time for students to respond, using a variety of methods to engage learning,.
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### Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	٣٣	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	٢
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	٦٧	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	٤
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	١٠٠		

MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	20% (20)	5 and 13	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	hr١	10% (10)	7	LO #1 - #7
	Final Exam	hr٣	50% (50)	16	All
<b>Total assessment</b>			100%		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Giving a general information about English Language
Week 2	Greetings
Week 3	Listening & speaking
Week 4	Possessives adjectives
Week 5	Present simple tense
Week 6	Present continuous tense
Week 7	<b>Mid-term Exam</b>
Week 8	Past & past continuous tense
Week 9	Making question
Week 10	Future tense
Week 11	Pronouns
Week 12	Practice language
Week 13	Correcting English mistakes
Week 14	Countable & un countable nouns
Week 15	Adjectives
Week 16	<b>Preparatory week before the final Exam</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	New Headway Plus by John & Liz Soars for Beginners	No
Recommended Texts	The Cambridge Encyclopedia of the English Language By David Crystal	No
Websites	<a href="https://www.cambridge.org/">https://www.cambridge.org/</a>	

MODULE DESCRIPTION FORM

**Grading Scheme**

مخطط الدرجات

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

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

**Module Information**

معلومات المادة الدراسية

Module Title	حقوق الانسان والديمقراطية			Module Delivery
Module Type	B			<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	UOBAB0302012			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	UGx1 1	Semester of Delivery	1	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Abd Alkhaliq Mahdi		e-mail	E-mail
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D	
Module Tutor			e-mail	abdkhaliqmahdi@uobabylon.edu.iq
Peer Reviewer Name	None		e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

MODULE DESCRIPTION FORM

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1-زيادة معرفة الطالب بالجانب المفاهيمي النظري والتطور التاريخي لمادة حقوق الانسان والديمقراطية
	2-تنمية مهارات الطالب التحليلية والنقدية فيما يتعلق بواقع ومستقبل حقوق الانسان والديمقراطية
	3-تدريب الطالب على اهمية المشاركة الفاعلة في جوانب الحياة العامة كتعزيز احترام مبادئ حقوق الانسان العامة والمشاركة الفاعلة في الحياة السياسية والثقافية.
	4-تمكين الطلاب من فهم اهمية التعليم ودوره في نشر ثقافة حقوق الإنسان والديمقراطية في بناء مجتمع حضاري يقوم على أساس الحكم الصالح الذي من اهم مقوماته الإيمان بحقوق الإنسان والتربية عليها والمشاركة الفاعلة في الحكم عبر الانتخابات الحرة والعادلة

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.
	<p>١. يتعلم الطالب خلال السنة الدراسية قوانين ومبادئ حقوق الانسان.1</p> <p>٢. اعداد جيل واع بموضوع حقوق الانسان.</p> <p>٣. ترسيخ مفهوم الحقوق والديمقراطية عند الطلبة وأشاعتها في المجتمع</p> <p>٤. مواكبة الطالب على تجارب الامم والاطلاع على اهم القرارات والمواثيق والصكوك الدولية في مجال حقوق الانسان والديمقراطية.</p>
Indicative Contents المحتويات الإرشادية	تكمّن اهمية مادة حقوق الانسان والديمقراطية من خلال دراسة الطالب لاهم الحقوق التي جاءت في الاعراف والقوانين الدولية فضلا عما جاء في الشريعة الاسلامية والساتير العراقية لا سيما الدستور النافذ لسنة 2005 فضلا عن معرفة الطالب للمواثيق الدولية التي صدرت بخصوص حقوق الانسان , هذا من جهة ومن جهة اخرى اطلاع الطالب على التجارب الديمقراطية التي سبقتنا للاستفادة منها .

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

Strategies	1 مناقشة يومية لمعرفة مدى استيعاب الطلبة للمادة ووضع تقييم للمشاركات اليومية.
	2 امتحانات يومية باسئلة علمية متنوعة وقصيرة لفهم مدى استيعابهم للمادة.
	3 اعطاء جزء من درجة كل فصل للواجبات البيتية.
	4 امتحانات يومية (كوزات) و امتحانات شهرية للمنهج الدراسي والامتحان النهائي

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
Total SWL (h/sem)	50		

MODULE DESCRIPTION FORM

الحمل الدراسي الكلي للطالب خلال الفصل

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	All
	Assignments	2	10% (10)	2 and 12	All
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

		Material Covered
Week 1		مفهوم حقوق الانسان وخصائصها ومميزاتها
Week 2		حقوق الانسان في التاريخ القديم
Week 3		الشخصية القانونية تعريفها ومميزاتها
Week 4		موقف الشرائع السماوية والحضارات الغربية من حقوق الانسان
Week 5		مصادر حقوق الانسان المصادر الدولية لحقوق الانسان -
Week 6		المصادر الوطنية لحقوق الانسان , ضمانات حقوق الانسان الضمانات الدولية والإقليمية
Week 7		امتحان نصف الفصل
Week 8		الضمانات الوطنية ضمانات حقوق الانسان في الإسلام -
Week 9		التطور التاريخي لحقوق الأطفال وحق الأطفال في الاتفاقات الدولية
Week 10		الديمقراطية مفهومها والتطور التاريخي للديمقراطية
Week 11		اركان الديمقراطية
Week 12		الانتخابات الديمقراطية
Week 13		أنواع أنظمة الحكم الديمقراطية
Week 14		مبدأ سيادة القانون ومبدأ الفصل بين السلطات
Week 15		أثر الاعلام والعولمة في مجال حقوق الانسان
Week 16		امتحان نهاية الفصل

Learning and Teaching Resources

مصادر التعلم والتدريس

		Text	Available in the Library?
Required Texts		د. حميد حنون خالد ، حقوق الانسان	Yes
Recommended Texts		د. فخري رشيد المهنة ود. صلاح ياسين داود ، المنظمات الدولية ، كلية القانون ، جامعة الموصل.	No
Websites			

Grading Scheme

MODULE DESCRIPTION FORM

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

Module Information

معلومات المادة الدراسية

Module Title	<b>Physics</b>		Module Delivery	
Module Type	B		<input type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302013			
ECTS Credits	6			
SWL (hr/sem)	100			
Module Level	UGx1 1	Semester of Delivery	1	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Ali Mohammed Ijam		e-mail	ali.ijam@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	Ph.D.
Module Tutor			e-mail	
Peer Reviewer Name	None		e-mail	E-mail
Scientific Committee Approval Date	01/06/2023		Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	



## MODULE DESCRIPTION FORM

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

#### Module Objectives

أهداف المادة الدراسية

1. Analyze the atomic structure of matter at its most fundamental.
2. Recognize the state of matter and its properties.
3. Understand the forms of energy.
4. Solve problems that call for the application of conservation of energy.
5. Know the classification of the semiconductors and the mechanism behind them.
6. Explain the basic properties of light and describe some of its applications in engineering.

#### Module Learning Outcomes

مخرجات التعلم للمادة الدراسية

Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.

1. Understanding the basic concepts and definitions is important in any field of study.
2. Learning the properties of individual atoms and molecules, as well as how they interact with each other.
3. knowing the physical and chemical properties of each state, such as gas, liquid, and solid, as well as understanding how the atoms and molecules interact with each other in the various states.
4. Be familiar with how the forms of energy interact with one another and how they are used.
5. Understanding how energy can be converted from one form to another as well as familiarity with the equations involved.
6. Learning how semiconductors are classified and what the mechanisms are behind each type of semiconductor.
7. Applying the light fundamental principles and how engineers are able to create complex technological solutions.

#### Indicative Contents

المحتويات الإرشادية

**Indicative content includes the following.**

- Some basic concepts and definitions, how atomic structure is formed and interatomic bonding energy and classification, properties of matter, state of matter, energy sources, kinetic energy, and work. [ 23 hr]
- Potential energy, thermal properties of matter, how heat and law of thermodynamics applied, what are the fluid characteristics, electric field, and potential. [22 hr]
- Classifications of Conductor and insulator materials, semiconductors, propagation of light and optics characteristics, and elements of solid-state physics. [ 15 hr]

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

#### Strategies

This module will be taught in such a way that students will be compelled to participate in the exercises and their critical thought skills will be refined and expanded through participation. Classes and interactive tutorials will be used in order to reach this goal, as well as considering the types of simple experiments involving sampling activities

MODULE DESCRIPTION FORM

that the learners might find interesting as well. The module will also include group activities, which will encourage collaboration and the exchange of ideas. This will help to create an engaging learning experience for the students and will also help them to develop their communication skills.

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب لـ 15 اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	63	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	37	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>100</b>		

**Module Evaluation**

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	<b>Assignments</b>	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100%		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Some basic concepts and definitions
<b>Week 2</b>	Atomic structure and interatomic bonding
<b>Week 3</b>	Properties of matter
<b>Week 4</b>	State of matter
<b>Week 5</b>	Energy sources
<b>Week 6</b>	Kinetic Energy and work
<b>Week 7</b>	Maid exam
<b>Week 8</b>	Potential energy Thermal properties of matter
<b>Week 9</b>	Heat and law of thermodynamics
<b>Week 10</b>	Fluids
<b>Week 11</b>	Electric field and potential
<b>Week 12</b>	Conductor and insulator materials
<b>Week 13</b>	Semiconductors
<b>Week 14</b>	Lights and optics
<b>Week 15</b>	Elements of solid-state physics
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

## MODULE DESCRIPTION FORM

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Photon energy
Week 2	Lab 2: Data analysis for calculating Plank's constant
Week 3	Lab 3: Energy distribution
Week 4	Lab 4: Electrical properties of insulated materials
Week 5	Lab 4: Light interaction with matter

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Halliday, D., Resnick, R., & Walker, J. (2013). Fundamentals of physics. John Wiley & Sons.	Yes
Recommended Texts	Radi, H., & Rasmussen, J. O. (2013). Principles of physics. Springer.	Yes
Websites		

### Grading Scheme

مخطط الدرجات

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

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

### Module Information

معلومات المادة الدراسية

Module Title	<b>Engineering Drawing with AutoCAD I</b>	Module Delivery
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MODULE DESCRIPTION FORM

Module Type	Core		<input checked="" type="checkbox"/> Theory	
Module Code	UOBAB0302014		<input checked="" type="checkbox"/> Lecture	
ECTS Credits	7		<input type="checkbox"/> Lab	
SWL (hr/sem)	200		<input type="checkbox"/> Tutorial	
			<input checked="" type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGx	Semester of Delivery	1	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Name	e-mail	E-mail	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>1. Definition of the concept of engineering drawing and what engineering tools are used.</li> <li>2. Knowing the types of lines used in engineering drawing.</li> <li>3. Study the various engineering geometrical constructions.</li> <li>4. Learn how to write in geometric calligraphy in Arabic and English.</li> <li>5. Study of projection theories.</li> <li>6. Study of dimensioning methods.</li> <li>7. Study of Exercises in drawing projections with dimensions.</li> </ol>
Module Learning	8. Learn how to use engineering drawing tools

## MODULE DESCRIPTION FORM

<b>Outcomes</b> مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> <li>9. Learn how to use engineering drawing tools</li> <li>10. Learns types of engineering lines</li> <li>11. Learns types of engineering lines</li> <li>12. Learns types of letters in engineering drawing</li> <li>13. Learn Geometrical constructions and how to use them to draw engineering parts.</li> <li>14. Learn Geometrical constructions and how to use them to draw engineering parts.</li> <li>15. Learn Geometrical constructions and how to use them to draw engineering parts.</li> <li>16. Learn Projection theories and how to use them to draw engineering parts views.</li> <li>17. Learn dimensioning rules and how to use them in engineering drawing.</li> <li>18. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li> <li>19. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li> <li>20. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li> <li>21. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li> <li>22. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li> </ol>
<b>Indicative Contents</b> المحتويات الإرشادية	

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving drawing some exercises on boards using A3 paper sheets and also using AutoCAD programme to draw similar exercises using computers that are essential to the students for developing engineering drawings skills.</p>
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MODULE DESCRIPTION FORM

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	109	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	7
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	200		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	<b>Assignments</b>	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO # 5, 8 and 10
<b>Summative assessment</b>	<b>Midterm Exam</b>	3 hr	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	3 hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to engineering drawing tools and their use
Week 2	Introduction to engineering drawing tools and their use
Week 3	Types of engineering lines
Week 4	Types of engineering lines
Week 5	Letters in engineering drawing
Week 6	Geometrical constructions
Week 7	Maid exam

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Week 8	Geometrical constructions Tutorials Geometrical constructions
Week 9	Projection theories
Week 10	Dimensioning methods
Week 11	Exercises in drawing projections with Dimensions
Week 12	Exercises in drawing projections with Dimensions
Week 13	Exercises in drawing projections with Dimensions
Week 14	Exercises in drawing projections with Dimensions
Week 15	Exercises in drawing projections with Dimensions
Week 16	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Introduction to engineering drawing tools and their use
Week 2	Lab 2: Introduction to engineering drawing tools and their use
Week 3	Lab 3: Types of engineering lines
Week 4	Lab 4: Types of engineering lines
Week 5	Lab 5: Letters in engineering drawing
Week 6	Lab 6: Geometrical constructions
Week 7	Lab 7: Geometrical constructions
Week 8	Lab 8: Tutorials Geometrical constructions
Week 9	Lab 9: Projection theories
Week 10	Lab 10: Dimensioning methods
Week 11	Lab 11: Exercises in drawing projections with Dimensions
Week 12	Lab 12: Exercises in drawing projections with Dimensions
Week 13	Lab 13: Exercises in drawing projections with Dimensions
Week 14	Lab 14: Exercises in drawing projections with Dimensions
Week 15	Lab 15: Exercises in drawing projections with Dimensions

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Drawing - Abdul Rasul Al-Khafaf	Yes

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<b>Recommended Texts</b>	Engineering Drawing Student's Guide, Sonaversity, Salem, First Edition, October 2000.	No
<b>Websites</b>	https://www.forgottenbooks.com/en/books/ATextBookofEngineeringDrawingandDesig n_10037738	

**Grading Scheme**

مخطط الدرجات

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

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**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Electrical Circuits</b>		<b>Module Delivery</b>	
<b>Module Type</b>	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	UOBAB0302015			
<b>ECTS Credits</b>	6			
<b>SWL (hr/sem)</b>	150			
<b>Module Level</b>	UGI	<b>Semester of Delivery</b>		1
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code	
<b>Module Leader</b>	Mohammed Ali Al-Shuraifi		<b>e-mail</b>	Msb.Mohammed.Ali@uoba bylon.edu.iq
<b>Module Leader's Acad. Title</b>	Lecturer		<b>Module Leader's Qualification</b>	Ph.D.
<b>Module Tutor</b>	Name (if available)		<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name		<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>	01/06/2023		<b>Version Number</b>	1.0



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**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>7. To study Ohm's law</li> <li>8. To study electrical circuits; series, parallel, and series-parallel in d.c.</li> <li>9. To apply a methods of analysis on d.c. circuits</li> <li>10. To apply electrical theorems on d.c. circuits</li> <li>11. To understand the sinusoidal waveforms in electrical circuits.</li> <li>12. To understand the response of Capacitor, Inductor, and resistor.</li> <li>13. To understand the complex numbers.</li> <li>14. To perform conversion between time domain and phasor domain and vice versa.</li> <li>15. To apply the methods of analysis in ac circuits</li> <li>16. To apply the circuit theorems in ac circuits</li> <li>17. To understand power in ac circuits</li> </ol>
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<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.
	<ol style="list-style-type: none"> <li>12. Studying ohm's law</li> <li>13. Studying types of circuits in d.c. and methods to analyze them.</li> <li>14. Recognize ac components and their response; capacitor, inductor, and resistor.</li> <li>15. List the various terms associated with ac electrical circuits.</li> <li>16. Understand complex numbers in order to apply them in ac circuits</li> <li>17. Discuss the average and the rms values.</li> <li>18. Apply Kirchhoff's laws on ac circuits</li> <li>19. Understand methods of analysis in ac circuits</li> <li>20. Apply electrical theorems in ac circuits.</li> </ol>

<b>Indicative Contents</b> المحتويات الإرشادية	<p style="text-align: right;"><b>Indicative content includes the following.</b></p> <p style="text-align: right;"><u>Part A - Circuit Theory</u></p> <ul style="list-style-type: none"> <li>• studying d.c. electrical circuits. [12 hrs]</li> <li>• analyzing d.c. electrical circuits.[13 hrs]</li> <li>• Sinusoidal waveforms, average (dc) value, effective (rms) value [8 hrs]</li> <li>• Time domain and phasor domain. [8 hrs]</li> <li>• Complex numbers: rectangular and polar phorm [8 hrs]</li> <li>• Methods of circuit analysis and their applications on ac circuits; mesh and nodal methods. [12 hrs]</li> <li>• Electrical circuit theorems and their application on ac circuits: Superposition , Thevenin, And Norton. [12 hrs]</li> <li>• Power in ac circuits: power triangle, real power, reactive power, and apparent power; impedance triangle. [12 hrs]</li> </ul>
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**Learning and Teaching Strategies**

MODULE DESCRIPTION FORM

استراتيجيات التعلم والتعليم

Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	93	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	5
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	57	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>150</b>		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	<b>Assignments</b>	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #10
<b>Summative assessment</b>	<b>Midterm Exam</b>	hr١	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	hr٢	50% (50)	16	All
<b>Total assessment</b>			100%		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Dc circuits; series , parallel , series-parallel
<b>Week 2</b>	Methods of analyzing d.c. circuits
<b>Week 3</b>	Electrical theorems
<b>Week 4</b>	Review of Kirchhoff's Laws on ac circuits
<b>Week 5</b>	Star delta and delta star conversion in ac circuits
<b>Week 6</b>	RLC circuits
<b>Week 7</b>	Mid-term Exam
<b>Week 8</b>	Series and parallel circuits
<b>Week 9</b>	Series – parallel circuits in ac circuits
<b>Week 10</b>	Methods of analysis in ac circuits I
<b>Week 11</b>	Methods of analysis in ac circuits II
<b>Week 12</b>	Electrical theorems in ac circuits I
<b>Week 13</b>	Electrical theorems in ac circuits II

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<b>Week 14</b>	Power and power triangle
<b>Week 15</b>	Power , apparent power , reactive and real power
<b>Week 16</b>	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Lab 1: series-parallel dc circuits
<b>Week 2</b>	Lab 2: Norton's theorem
<b>Week 3</b>	Lab 3: RLC circuits
<b>Week 4</b>	Lab 4: Kirchhoff's laws
<b>Week 5</b>	Lab 5: mesh method
<b>Week 6</b>	Lab 6: superposition theorem
<b>Week 7</b>	Lab 7: Thevenin theorem

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Introductory circuit analysis by Boylestad	Yes
<b>Recommended Texts</b>	Introductory circuit analysis by Boylestad	Yes
<b>Websites</b>	<a href="https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering</a>	

**Grading Scheme**

مخطط الدرجات

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

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MODULE DESCRIPTION FORM

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Manufacturing process</b>		<b>Module Delivery</b>	
<b>Module Type</b>	<b>Core</b>		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	<b>UOBAB0302016</b>			
<b>ECTS Credits</b>	٥			
<b>SWL (hr/sem)</b>	١٢٥			
<b>Module Level</b>	UGI	<b>Semester of Delivery</b>	1	
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code	
<b>Module Leader</b>	Dr. Salam Hadi Hussain		<b>e-mail</b>	met.salam.hadi@uobabylon.edu.iq
<b>Module Leader's Acad. Title</b>	Professor	<b>Module Leader's Qualification</b>	Ph.D.	
<b>Module Tutor</b>	Workshop staff		<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail	
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	✓
<b>Co-requisites module</b>	None	<b>Semester</b>	✓

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

**MODULE DESCRIPTION FORM**

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<p>The course aims to identify the different methods of manufacturing engineering materials, such as welding and its various types, how to obtain the necessary heat to accomplish welding, and the difference between the different methods.</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Recognize the classification of welding processes.</li> <li>2. List the various terms associated with the fusion welding and solid state welding, shielding metal arc welding (SMAW).</li> <li>3. Summarize what is meant by gas metal arc welding (GMAW), gas tungsten arc welding (GTAW).</li> <li>4. Discuss the reaction and involvement of plasma arc welding (PAW), Electro gas welding (EGW), Electroslag welding (ESW).</li> <li>5. Describe Electron beam welding (EBW) and Laser beam welding (LBW), Spot welding and friction welding.</li> <li>6. Define and fundamentals of the Weldability, Defects, and stresses.</li> <li>7. Identify the basic casting and drilling with their applications.</li> <li>8. Discuss the operations of solidification of metal and heat flow.</li> <li>9. Discuss the various properties of turning.</li> <li>10. Explain the Power density, electrode, heat flow, and fluxes.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><b>Iron and steel making</b></p> <ul style="list-style-type: none"> <li>- Iron ores</li> <li>- Pig iron making</li> <li>- Blast furnace</li> </ul> <p><b>Casting fundamentals</b></p> <ul style="list-style-type: none"> <li>- Casting processes characteristics</li> <li>- Casting techniques</li> </ul> <p><b>Sand casting</b></p> <ul style="list-style-type: none"> <li>- Molding sand</li> <li>- Sand testing</li> <li>- Patterns</li> </ul>

## MODULE DESCRIPTION FORM

- Molding machines
- Foundry furnaces
- Cleaning and inspection of casting

### **Metal forming**

- Hot working of metal
- Cold working of metal

#### Hammering / Forging

- Types of forging processes
- Hand forging tools
- Automatic hammer forging
- Die forging machines

#### Rolling

- Types of Rolling machines
- Calculation the angle of contact
- Hot and cold Rolling

#### Extrusion

- Methods of Extrusion
- Tube Extrusion
- Impact Extrusion

### **Drawing**

- Wire drawing machines
- Tube drawing machines
- Metal preparation for drawing

#### Metal cutting

- Chiseling steel metal
- Filing steel metal
- Sawing steel metal

### **Turning operations**

MODULE DESCRIPTION FORM

	<ul style="list-style-type: none"> <li>- Types of turning machines</li> <li>- Parts of turning machines</li> <li>- The lathe as a general purpose machine</li> </ul> <p><b>Drilling operations</b></p> <ul style="list-style-type: none"> <li>- Drills</li> <li>- Reamers</li> <li>- Drilling machines</li> <li>- Boring machines</li> </ul> <p>Grinding operations</p> <ul style="list-style-type: none"> <li>- Types of grinding machines</li> <li>- Grinding tools</li> </ul>
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**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b>	١٢٥	<b>Structured SWL (h/w)</b>	٥
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
<b>Unstructured SWL (h/sem)</b>	٥٢	<b>Unstructured SWL (h/w)</b>	١٨
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
<b>Total SWL (h/sem)</b>	<b>200</b>		
الحمل الدراسي الكلي للطالب خلال الفصل			

MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Classification of welding Processes Fusion welding and solid state welding
Week 2	Power density, electrode, heat flow, and fluxes
Week 3	Shielded metal arc welding (SMAW) Gas Metal Arc Welding and Gas Tungsten Arc Welding
Week 4	Plasma arc welding, Electroslag welding, and Electroslag welding
Week 5	Oxyfuel welding, Oxyacetylene gas welding, Electron and laser beam welding
Week 6	welding, stresses, and microstructure of the welded zone Defects of
Week 7	Casting technology, sand casting, sand characterization, grain size effect
Week 8	Fluidity, fluidity tests
Week 9	Design of gating system
Week 10	Type of furnaces, blast furnace, electric furnace, induction furnace



MODULE DESCRIPTION FORM

Week 11	Injection molding, Die casting, pressure casting
Week 12	Type of molds, ceramic mold, metallic molds, wax mold
Week 13	Solidification of casting and heat flow
Week 14	Defects in casting, reasons and remedy
Week 15	Case study in casting
Week 16	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to the workshop departments
Week 2	Lab 2: Workshop tools and instrumentations
Week 3	Lab3 : Arc welding exercises and drills
Week 4	Lab 4: Solidification of casting and heat flow
Week 5	Lab 5: Hammering / Forging
Week 6	Lab 6: Turning operations
Week 7	Lab 7: Drilling operations

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Modern, Manufacturing by Mikell P. Groover	Yes
Recommended Texts	Ismaila S. O. , "Manufacturing Science and Technology" , Department of Mechanical Engineering , College of Engineering , University of Agriculture , Abeokuta , (2012)	No

## MODULE DESCRIPTION FORM

<b>Websites</b>	<a href="https://www.coursera.org/browse/physical-science-and-engineering/">https://www.coursera.org/browse/physical-science-and-engineering/</a>
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**Grading Scheme**

مخطط الدرجات

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

**Level –UGI**  
**Semester – Two**

MODULE DESCRIPTION FORM

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	Arabic Language		<b>Module Delivery</b>		
<b>Module Type</b>	Basic learning activities		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar		
<b>Module Code</b>	UOBAB0302021				
<b>ECTS Credits</b>	2				
<b>SWL (hr/sem)</b>	50				
<b>Module Level</b>	UGI	<b>Semester of Delivery</b>			2
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code		
<b>Module Leader</b>	Noor Mohammed Jasim		<b>e-mail</b>	msb.noor.mohammed@uobabylon.edu.iq	
<b>Module Leader's Acad. Title</b>	Assist lecturer		<b>Module Leader's Qualification</b>	M.Sc.	
<b>Module Tutor</b>	Name (if available)		<b>e-mail</b>	E-mail	
<b>Peer Reviewer Name</b>	Name		<b>e-mail</b>	E-mail	
<b>Scientific Committee Approval Date</b>	01/06/2023		<b>Version Number</b>	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None		<b>Semester</b>	
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MODULE DESCRIPTION FORM

Co-requisites module	None	Semester	
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**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>١. إتقان اللغة: الهدف الرئيسي من أهداف الوحدة في اللغة العربية هو مساعدة المتعلمين على تطوير الكفاءة في القراءة والكتابة والتحدث والاستماع إلى اللغة العربية. وهذا يشمل تحسين المفردات والقواعد والنطق ومهارات الفهم.</li> <li>٢. مهارات الاتصال: هدف آخر هو تعزيز قدرة المتعلمين على التواصل الفعال باللغة العربية. يتضمن ذلك التركيز على الاستخدام العملي للغة ، مثل الانخراط في المحادثات والتعبير عن الآراء وطرح الأسئلة والإجابة عليها والمشاركة في أنشطة التواصل المختلفة.</li> <li>٣. التفاهم الثقافي: قد تهدف أهداف الوحدة أيضًا إلى تعزيز التفاهم الثقافي والوعي بالعالم العربي. ويشمل ذلك تعريف المتعلمين بالعادات والتقاليد والأدب والتاريخ والجوانب الاجتماعية المرتبطة بالدول الناطقة باللغة العربية.</li> <li>٤. استخدام اللغة الوظيفية: يمكن أن يكون الهدف من أهداف الوحدة هو تزويد المتعلمين بالمهارات اللغوية اللازمة لأداء مهام أو وظائف محددة باللغة العربية. قد يتضمن ذلك تعلم المفردات والعبارات المتعلقة بموضوعات مثل السفر والتسوق وتناول الطعام والرعاية الصحية والتفاعلات التجارية.</li> <li>٥. الدقة اللغوية: قد تؤكد أهداف الوحدة على تطوير الدقة النحوية والاستخدام السليم للغة. يتضمن ذلك تعلم قواعد وهياكل قواعد اللغة العربية ، وبناء الجملة ، والصرف لإنتاج جمل متماسكة وخالية من الأخطاء.</li> <li>٦. التعلم المستقل: هدف آخر هو تعزيز قدرة المتعلمين على دراسة واستكشاف اللغة العربية بشكل مستقل خارج الفصل الدراسي. يمكن أن يشمل ذلك تشجيع التعلم الذاتي ، وتوفير الموارد لمزيد من الممارسة ، وتطوير استراتيجيات لاكتساب اللغة بشكل فعال.</li> <li>٧. التقييم والتقدم: قد تهدف أهداف الوحدة أيضًا إلى تقييم تقدم المتعلمين وتقديم ملاحظات حول مهاراتهم في اللغة العربية. يسمح هذا لكل من المتعلمين والمدرسين بتقييم إنجازاتهم وتحديد مجالات التحسين</li> </ol>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>١. الفهم السمعي: إظهار القدرة على فهم وفهم اللغة العربية المنطوقة عبر مجموعة من الموضوعات والسياقات ، بما في ذلك المحادثات والعروض التقديمية والتسجيلات الصوتية.</li> <li>٢. الفهم القرائي: إظهار القدرة على قراءة وفهم النصوص العربية المكتوبة بمستويات مختلفة من الصعوبة ، مثل المقالات والقصص والمواد الأصلية ، واستخراج المعلومات ذات الصلة.</li> <li>٣. إتقان التحدث: التواصل الفعال باللغة العربية من خلال التعبير عن الأفكار والآراء والمعلومات في شكل منطوق. الانخراط في المحادثات والمشاركة في المناقشات وتقديم العروض باستخدام المفردات والقواعد والنطق المناسب.</li> <li>٤. إتقان الكتابة: إنتاج نصوص مكتوبة باللغة العربية ، مثل المقالات والتقارير ورسائل البريد الإلكتروني والرسائل ، بوضوح وتماسك ودقة نحوية. قم بتطبيق اصطلاحات اللغة المناسبة ، بما في ذلك التهجئة وعلامات الترقيم وبنية الفقرة.</li> </ol>

## MODULE DESCRIPTION FORM

5. المفردات والقواعد: إظهار مجموعة واسعة من المفردات وفهم قواعد قواعد اللغة العربية وهياكلها. استخدم المفردات المناسبة للتعبير عن الأفكار والأفكار بدقة ، وتطبيق القواعد النحوية بشكل فعال في الاتصال الكتابي والمنطوق.
6. الوعي الثقافي: إظهار فهم للجوانب الثقافية للبلدان الناطقة باللغة العربية ، بما في ذلك العادات والتقاليد والأعراف الاجتماعية. التعرف على الاختلافات الثقافية واحترامها وتطبيق المعرفة الثقافية بشكل مناسب في استخدام اللغة.
7. الطلاقة اللغوية: تنمية الطلاقة في اللغة العربية من خلال التحدث والرد بشكل عفوي ، دون تردد مفرط. أظهر القدرة على الحفاظ على المحادثة والتفاوض بشأن المعنى والتعامل مع مواقف الاتصال المختلفة بثقة.
8. التفكير النقدي: تطبيق مهارات التفكير النقدي لتحليل وتقييم النصوص العربية ، بما في ذلك المقالات الإخبارية ، والأعمال الأدبية ، والمواد الثقافية. صياغة الآراء ودعمها ، وإقامة الروابط ، وإظهار الفهم وراء مستوى الفهم السطحي.
9. التعلم المستقل: تحمل مسؤولية التعلم الذاتي من خلال استخدام الموارد والاستراتيجيات لتطوير إتقان اللغة العربية. إظهار القدرة على الانخراط في التعلم الذاتي للغة والبحث عن فرص للتحسين المستمر.
10. التواصل بين الثقافات: الانخراط في التواصل الفعال بين الثقافات من خلال إظهار فهم الاختلافات الثقافية ، وتكييف استخدام اللغة وفقاً لذلك ، وإظهار الاحترام لوجهات النظر المتنوعة.

### Indicative Contents

المحتويات الإرشادية

- أن يكون الطالب جملة فيها مبتدأ وخبر ٢ ساعه المبتدأ والخبر
- أن يتعرف الطالب على التصويبات اللغوية التصويبات اللغوية
- أن يستعمل الطالب علامات الترقيم علامات الترقيم
- أن يتعرف الطالب موقع فتح همزة ان وكسرها وجوب فتح همزة ان وكسرها
- أن يتعرف الطالب على الادب القصصي الادب القصصي
- زيادة الثروة اللغوية للطالب الادب العربي
- أن يفرق الطالب بين الشعر العمودي والحر الشعر الحر والشعر العمودي
- أن يكتب الطالب العدد بشكل صحيح العدد
- أن يترجم الطالب لحياة الشاعر حافظ ابراهيم حافظ ابراهيم
- أن يترجم الطالب لحياة الشاعر بدر شاكر السياب بدر شاكر السياب
- أن يترجم الطالب لحياة الشاعر الجواهري الجواهري
- أن يستخرج الطالب همزة القطع همزة القطع
- أن يستعمل الطالب همزة الوصل همزة الوصل

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

MODULE DESCRIPTION FORM

<b>Strategies</b>	<p>النهج التواصلي: التأكيد على استخدام اللغة العربية للتواصل الهادف. شجع المتعلمين على الانخراط في محادثات حقيقية ولعب الأدوار وأنشطة التواصل التي تعكس مواقف الحياة الواقعية. توفير فرص للتفاعل الهادف باللغة العربية لتطوير مهارات التحدث والاستماع.</p> <p>المهارات المتكاملة: دمج المهارات اللغوية الأربع (الاستماع والتحدث والقراءة والكتابة) في عملية التدريس والتعلم. قم بإنشاء أنشطة تسمح للمتعلمين بممارسة هذه المهارات وتعزيزها في وقت واحد. على سبيل المثال ، قراءة نص بصوت عالٍ ومناقشته ثم كتابة رد.</p> <p>مواد أصلية: دمج المواد العربية الأصيلة ، مثل المقالات الإخبارية والأدب والأغاني ومقاطع الفيديو والبودكاست ، في المناهج الدراسية. تعرض هذه المواد المتعلمين لاستخدام اللغة الواقعية والجوانب الثقافية للمجتمعات الناطقة باللغة العربية ، مما يعزز كفاءتهم اللغوية وفهمهم الثقافي.</p> <p>التعلم السياقي: تعليم اللغة العربية في سياقات ذات مغزى تتعلق بحياة المتعلمين أو مجالات اهتمامهم. استخدم الموضوعات والموضوعات والمواقف ذات الصلة لجعل تجربة تعلم اللغة أكثر جاذبية ووثوقية للمتعلمين.</p> <p>مناهج متعددة الوسائط: استخدم مجموعة متنوعة من الموارد والوسائط لتلبية أنماط التعلم المختلفة. اجمع بين الأنشطة البصرية والسمعية والحركية لتعزيز تعلم اللغة. قم بدمج أدوات الوسائط المتعددة وتطبيقات تعلم اللغة والموارد عبر الإنترنت والأنشطة التفاعلية لإنشاء بيئة تعليمية جذابة.</p> <p>التعلم القائم على المهام: تنظيم تعلم اللغة حول المهام الهادفة التي تتطلب من المتعلمين استخدام اللغة العربية لتحقيق أهداف محددة. يمكن أن تشمل المهام التخطيط لرحلة أو وصف تجربة شخصية أو المشاركة في مناقشة. يعزز هذا النهج استخدام اللغة ومهارات حل المشكلات</p>
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**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b>	٣٠	<b>Structured SWL (h/w)</b>	٢
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
<b>Unstructured SWL (h/sem)</b>	٢٠	<b>Unstructured SWL (h/w)</b>	١
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
<b>Total SWL (h/sem)</b>	٥٠		
الحمل الدراسي الكلي للطالب خلال الفصل			

MODULE DESCRIPTION FORM

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	أن يكون الطالب جملة فيها مبتدأ وخبر
Week 2	أن يتعرف الطالب على التصويبات اللغوية
Week 3	أن يستعمل الطالب علامات الترتيم
Week 4	أن يتعرف الطالب موقع فتح همزة ان وكسرها
Week 5	أن يتعرف الطالب على الادب القصصي
Week 6	الامتحان الفصلي
Week 7	زيادة الثروة اللغوية للطالب
Week 8	أن يفرق الطالب بين الشعر العمودي والحر
Week 9	أن يكتب الطالب العدد بشكل صحيح
Week 10	أن يترجم الطالب لحياة الشاعر حافظ ابراهيم



MODULE DESCRIPTION FORM

Week 11	أن يترجم الطالب لحياة الشاعر بدر شاكر السياب
Week 12	أن يترجم الطالب لحياة الشاعر الجواهري
Week 13	أن يستخرج الطالب همزة القطع
Week 14	أن يستعمل الطالب همزة الوص
Week 15	أن يكون الطالب جملة فيها مبتدأ وخبر
Week 16	الامتحان النهائي

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<p>١- عليوي ، سعد حسن ، النحو الوسيط ، ط١ ، دار صفاء للنشر والتوزيع ، عمان -الاردن ، ٢٠١٥ .</p> <p>٢- النحوي ، ابن عقيل ، شرح ابن عقيل على الفية ابن مالك ، ط١ ، دار الكتب العلمية ، بيروت - لبنان ، ٢٠٠٦ .</p> <p>ضيف ، شوقي ، تاريخ الادب العربي ، ط٢ ، دار المعارف للطباعة ، القاهرة ، ٢٠٠٦ .</p>	Yes
Recommended Texts	<p>أ) الانصاري ، ابن هشام ، شرح قطر الندى وبل الصدى ، ط١ ، دار الهلال للنشر والتوزيع ، بيروت - لبنان ، ٢٠٠٩ .</p> <p>ب) السامرائي ، فاضل صالح ، معاني النحو ، دار ابن كثير للنشر والتوزيع ، بيروت - لبنان ، ٢٠١٧ .</p>	No
Websites		وكيبديا ، منتديات اللغة العربية

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
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MODULE DESCRIPTION FORM

<b>Success Group</b> <b>(50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group</b> <b>(0 - 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Fundamentals of computer science</b>		<b>Module Delivery</b>	
<b>Module Type</b>	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	UOBAB0302022			
<b>ECTS Credits</b>	3			
<b>SWL (hr/sem)</b>	75			
<b>Module Level</b>	UGI	<b>Semester of Delivery</b>		
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code	
<b>Module Leader</b>	Dr. Salam Hadi Hussain		<b>e-mail</b>	met.salam.hadi@uobabylon.edu.iq
<b>Module Leader's Acad. Title</b>	Professor		<b>Module Leader's Qualification</b>	Ph.D.
<b>Module Tutor</b>	Laboratory staff		<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name		<b>e-mail</b>	E-mail

MODULE DESCRIPTION FORM

Scientific Committee Approval Date	13/06/2023	Version Number	1.0
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<p>The course aims to identify the fundamentals of computer science, such as computer components and its various types, how to obtain the necessary information to accomplish different applications such as connection to internet with its social media, and the difference between the Microsoft word , Excel, Power point.</p> <p>Computer Science &amp; Engineering is an exciting program at many academies which incorporates logical and scientific aspects of technology and computing. While pursuing Computer Science &amp; IT Engineering, students get the opportunity to acquire knowledge about coding, programming languages, software application, algorithms, operating systems, database management systems, etc.</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Implement a solution for a problem using appropriate programming techniques.</li> <li>2. Create a design for a software system using appropriate design principles and patterns.</li> <li>3. Utilize appropriate process and collaborative tools to contribute to a software project.</li> <li>4. Evaluate and learn new technologies independently.</li> <li>5. Students will demonstrate an ability to translate the specification of a program into a working, efficient, and readable solution.</li> <li>6. Students will demonstrate an ability to write specifications for a project based on client input and to create an overall design for a project that utilizes</li> </ol>

## MODULE DESCRIPTION FORM

	<p>standard software and architecture patterns.</p> <ol style="list-style-type: none"><li>7. Students will demonstrate an ability to communicate both orally and in writing with members of a software team, including clients, other software developers, and managers.</li><li>8. Utilize appropriate process and collaborative tools to contribute to a software project.</li><li>9. Implement a solution for a problem using appropriate programming techniques.</li><li>10. students will face challenges that require them to navigate obstacles and learn to be an incredible problem solver.</li></ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Computer organization, CPU working and types , Mother Board, Battery type.</p> <p>Communication Techniques, Internet option, viruses types.</p> <p>Computer fundamentals, operating System, windows types.</p> <p>Computer's Hardware, Software, Networks and Databases to understand their working principles.</p> <p>Learning facilities and options for Microsoft Word</p> <p>Learning facilities and options for Microsoft Excel</p> <p>Learning facilities and options for Microsoft Power Point</p>

MODULE DESCRIPTION FORM

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	75	Structured SWL (h/w)	5
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	20
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)	<b>104</b>		
الحمل الدراسي الكلي للطالب خلال الفصل			

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All

MODULE DESCRIPTION FORM

	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	<b>Material Covered</b>
<b>Week 1</b>	<b>Computer Organization</b>
<b>Week 2</b>	<b>Communication Techniques</b>
<b>Week 3</b>	<b>Database &amp; File Systems</b>
<b>Week 4</b>	<b>Principles of Programming Languages</b>
<b>Week 5</b>	<b>Operating System</b>
<b>Week 6</b>	<b>Computer Networks</b>
<b>Week 7</b>	<b>Theory of Computation</b>
<b>Week 8</b>	<b>Windows applications</b>
<b>Week 9</b>	<b>Internet and e-mail</b>
<b>Week 10</b>	<b>Microsoft Word with applications</b>
<b>Week 11</b>	<b>Microsoft Word with applications</b>
<b>Week 12</b>	<b>Microsoft Excel with applications</b>
<b>Week 13</b>	<b>Microsoft Excel with applications</b>
<b>Week 14</b>	<b>Microsoft Power Point with applications</b>
<b>Week 15</b>	<b>Microsoft Power Point with applications</b>
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Lab 1: Introduction to the computer components Lap
<b>Week 2</b>	Lab 2: Computer applications Lap
<b>Week 3</b>	Lab3: Internet and network with viruses Lap
<b>Week 4</b>	Lab 4: Microsoft Word Lab
<b>Week 5</b>	Lab 5: Microsoft Word Lab
<b>Week 6</b>	Lab 6: Microsoft Excel Lab
<b>Week 7</b>	Lab 7: Microsoft Power Point Lab

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Windows 10 الكتاب الشامل في تعلم نظام التشغيل تأليف م.د. وسام علي الخزاعي	Yes
<b>Recommended Texts</b>	كتاب عتاد الحاسب تأليف سيف علي حسن الدار	No
<b>Websites</b>	<a href="https://www.coursera.org/browse/physical-science-and-engineering/">https://www.coursera.org/browse/physical-science-and-engineering/</a>	

**Grading Scheme**

مخطط الدرجات

MODULE DESCRIPTION FORM

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

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

**Module Information**

معلومات المادة الدراسية

Module Title	<b>Mathematics</b>		Module Delivery
Module Type	<b>B</b>		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	<b>UOBAB0302023</b>		
ECTS Credits	<b>6</b>		
SWL (hr/sem)	<b>150</b>		
Module Level	UGII	Semester of Delivery	
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Ahmed Hadi Hussain		e-mail Met.ahmed.hadi@uobabylon.edu.iq



MODULE DESCRIPTION FORM

<b>Module Leader's Acad. Title</b>	Lecturer	<b>Module Leader's Qualification</b>	Msc
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	√
<b>Co-requisites module</b>	None	<b>Semester</b>	√

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>To develop problem solving skills and understanding of differential equations and their solving in practical problems.</li> <li>To understand plotting of functions from a given data.</li> <li>This course deals with the basic concept of methods of integrations.</li> <li>This is the basic subject for all methods of differential forms.</li> <li>To understand matrixes and limits Laws problems.</li> <li>To perform mesh and Nodal analysis.</li> </ol>
<b>Module Learning Outcomes</b>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>Recognize the classification of functions with their solving.</li> </ol>

## MODULE DESCRIPTION FORM

مخرجات التعلم للمادة الدراسية	2. List the various terms associated with the plotting of functions. 3. Summarize what is meant by differential and integration forms in different applications. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe limits laws and its applications. 6. Define differential and integral forms. 7. Identify the basic tri-geometrics functions and their applications. 8. Discuss the operations of methods of integration.
<b>Indicative Contents</b> المحتويات الإرشادية	Indicative content includes the following.  1- System numbers 2- The functions and its kinds <u>&amp;</u> Continuous functions 3- The graph of the function 4- Limit function 5- Derivatives <u>and</u> Applications on derivatives 6- Exponential functions 7- The inverse trigonometric functions 8- Hyperbolic functions 9- Vector <u>and</u> The operations on the Vector 10- Matrices and their types 11- Solving systems of linear equations 12- Complex numbers

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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MODULE DESCRIPTION FORM

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	109	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	7
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>200</b>		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	<b>Assignments</b>	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Introduction - Type of sets, type of interval, Cartesians plain

MODULE DESCRIPTION FORM

<b>Week 2</b>	The domain and rang of functions, even and odd functions
<b>Week 3</b>	Drawing curved function, shifting the graph.
<b>Week 4</b>	limit from the left and right
<b>Week 5</b>	The concept of continuous function, Algebraic operations on continuous functions
<b>Week 6</b>	Methods of derivation, the chain rule
<b>Week 7</b>	Applications on derivatives, slope, L'hospital rule + Maid exam
<b>Week 8</b>	Kind of exponential functions
<b>Week 9</b>	Types of trigonometric functions, The inverse of the trigonometric functions and Derivative of this functions
<b>Week 10</b>	Kind of Hyperbolic functions and Derivative of this functions
<b>Week 11</b>	Meaning vector, algebraic properties of vectors
<b>Week 12</b>	vector equation, cross product, dot product
<b>Week 13</b>	Types of matrices, operations on matrices.
<b>Week 14</b>	Use matrices in solving linear systems of equations.using Grammer Role and inverse matrix
<b>Week 15</b>	properties of complex numbers, the representation of the complex number.
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	George B. Thomas Jr, Weir Joel R. Hass 'Calculus' (V.12), 2014.	Yes
<b>Recommended Texts</b>	Engineering Mathematics, stroud.	No
<b>Websites</b>	<a href="https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering</a>	

**Grading Scheme**

MODULE DESCRIPTION FORM

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Engineering Mechanics (Static)		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302024			
ECTS Credits	٦			
SWL (hr/sem)	١٥٠			
Module Level	UGx1 1	Semester of Delivery		
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Bashar Abid Hamza		e-mail	<a href="mailto:met.basher.abid@uobabylon.edu.iq">met.basher.abid@uobabylon.edu.iq</a>
Module Leader's Acad. Title	Assistant Professor		Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail

MODULE DESCRIPTION FORM

<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0
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**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	<p>After completing the course, students should be able to</p> <ol style="list-style-type: none"> <li>1. Describe the characteristics and properties of forces and moments, analyze the force system, and obtain the resultant and equivalent force systems,</li> <li>2. State the conditions of equilibrium, draw free body diagrams (FBDs), analyze and solve problems involving rigid bodies in equilibrium,</li> <li>3. Draw FBDs, analyze and solve structural and mechanical systems of rigid bodies in equilibrium,</li> <li>4. Draw FBDs, analyze and solve structural and mechanical systems with distributed loads in equilibrium,</li> <li>5. Describe the mechanism and characteristics of dry friction, draw FBDs, analyze and solve structural and mechanical systems with friction in equilibrium,</li> <li>6. Describe the physical meanings of idealized problems in Statics and approximate real-life Situations to idealized problems</li> </ol>
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<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1- To understand Principle engineering mechanics</li> <li>2- enable student to study and analyze force systems</li> <li>3- enable student to Modeling of supports and free body diagram</li> <li>4- enable student to study equilibrium of force systems applied on bodies.</li> <li>5- enable student to locate the centroid of area.</li> <li>6- enable student to determine the moment of inertia of area.</li> <li>7- enable student to analyze and solve structural and mechanical systems with friction in equilibrium.</li> </ol>
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<b>Indicative Contents</b> المحتويات الإرشادية	<p><b>Indicative content includes the following.</b></p> <ul style="list-style-type: none"> <li>• Introduction, perpendicular components of forces, moment and couple of forces and resultant of force system. [٣٥ hrs.]</li> <li>• Modeling of supports, Draw free body diagram. [١٢ hrs.]</li> <li>• Determination Centroid of lines, area, and volume using integration. [١٢ hrs.]</li> <li>• Determination Centroid of lines, area, and volume using tables. [٦ hrs.]</li> <li>• Determination moment of inertia using integration. [٦ hrs.]</li> <li>• Determination moment of inertia using tables. [٦ hrs.]</li> <li>• Evaluation of friction forces.[١٢ hrs.]</li> </ul>
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**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

MODULE DESCRIPTION FORM

<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب ل ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	٨٩	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	٦
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	٦١	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	٤
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	١٥٠		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	3 and 9	LO #1 - #4
	<b>Assignments</b>	2	10% (10)	2 and 12	LO #1 - #5
	<b>Projects / Lab.</b>				
	<b>Report</b>				
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	30% (30)	7 and 13	LO #1 - #6
	<b>Final Exam</b>	hr٣	50% (50)	16	All
<b>Total assessment</b>			100%		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	<b>Material Covered</b>
<b>Week 1</b>	Introduction
<b>Week 2</b>	Introduction
<b>Week 3</b>	Force 2D (perpendicular components)
<b>Week 4</b>	Force 2D (moment and couple)
<b>Week 5</b>	Force 2D (moment and couple)
<b>Week 6</b>	Force 2D (resultant)
<b>Week 7</b>	Equilibrium
<b>Week 8</b>	Equilibrium
<b>Week 9</b>	Centroid lines, area, and volume
<b>Week 10</b>	Centroid lines, area, and volume
<b>Week 11</b>	Centroid lines, area, and volume
<b>Week 12</b>	Moment of inertia
<b>Week 13</b>	Moment of inertia
<b>Week 14</b>	Friction
<b>Week 15</b>	Friction

MODULE DESCRIPTION FORM

Week 16

Preparatory week before the final Exam

**Learning and Teaching Resources**

مصادر التعلم والتدريس

Text

Available in the Library?

<b>Required Texts</b>	J. L. Meriam and L. G. Kraige, 'Engineering Mechanics: Statics (V.1), 7th edition, Wiley 2012.	Yes
<b>Recommended Texts</b>	R. C. Hibbeler, Engineering Mechanics: STATICS (SI Edition), 14th edition, Prentice Hall 2016.	No
<b>Websites</b>		

**Grading Scheme**

مخطط الدرجات

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

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Engineering Drawing with AutoCAD I</b>	<b>Module Delivery</b>
<b>Module Type</b>	<b>Core</b>	<input checked="" type="checkbox"/> Theory
<b>Module Code</b>	<b>UOBAB0302025</b>	<input checked="" type="checkbox"/> Lecture
<b>ECTS Credits</b>	<b>7</b>	<input type="checkbox"/> Lab
<b>SWL (hr/sem)</b>	<b>200</b>	<input type="checkbox"/> Tutorial



MODULE DESCRIPTION FORM

		<input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Level</b>	UGx	<b>Semester of Delivery</b>	1
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code
<b>Module Leader</b>	Name	<b>e-mail</b>	E-mail
<b>Module Leader's Acad. Title</b>	Professor	<b>Module Leader's Qualification</b>	Ph.D.
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b> أهداف المادة الدراسية	23. Definition of the concept of engineering drawing and what engineering tools are used. 24. Knowing the types of lines used in engineering drawing. 25. Study the various engineering geometrical constructions. 26. Learn how to write in geometric calligraphy in Arabic and English. 27. Study of projection theories. 28. Study of dimensioning methods. 29. Study of Exercises in drawing projections with dimensions.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	30. Learn how to use engineering drawing tools 31. Learn how to use engineering drawing tools 32. Learns types of engineering lines 33. Learns types of engineering lines 34. Learns types of letters in engineering drawing

## MODULE DESCRIPTION FORM

<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<ol style="list-style-type: none"><li>35. Learn Geometrical constructions and how to use them to draw engineering parts.</li><li>36. Learn Geometrical constructions and how to use them to draw engineering parts.</li><li>37. Learn Geometrical constructions and how to use them to draw engineering parts.</li><li>38. Learn Projection theories and how to use them to draw engineering parts views.</li><li>39. Learn dimensioning rules and how to use them in engineering drawing.</li><li>40. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li><li>41. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li><li>42. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li><li>43. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li><li>44. Learn Projection theories and how to use them to draw engineering parts views with dimensions.</li></ol>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving drawing some exercises on boards using A3 paper sheets and also using AutoCAD programme to draw similar exercises using computers that are essential to the students for developing engineering drawings skills.</p>
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### Student Workload (SWL)

MODULE DESCRIPTION FORM

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	109	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	7
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل			200

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	<b>Assignments</b>	2	10% (10)	2, 12	LO # 3, 04, 6 and 7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO # 5, 8 and 10
<b>Summative assessment</b>	<b>Midterm Exam</b>	3 hr	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	3 hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered0
<b>Week 1</b>	Introduction to engineering drawing tools and their use
<b>Week 2</b>	Introduction to engineering drawing tools and their use
<b>Week 3</b>	Types of engineering lines
<b>Week 4</b>	Types of engineering lines
<b>Week 5</b>	Letters in engineering drawing
<b>Week 6</b>	Geometrical constructions
<b>Week 7</b>	Maid exam
<b>Week 8</b>	Geometrical constructions Tutorials Geometrical constructions
<b>Week 9</b>	Projection theories
<b>Week 10</b>	Dimensioning methods
<b>Week 11</b>	Exercises in drawing projections with Dimensions

MODULE DESCRIPTION FORM

Week 12	Exercises in drawing projections with Dimensions
Week 13	Exercises in drawing projections with Dimensions
Week 14	Exercises in drawing projections with Dimensions
Week 15	Exercises in drawing projections with Dimensions
Week 16	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to engineering drawing tools and their use
Week 2	Lab 2: Introduction to engineering drawing tools and their use
Week 3	Lab 3: Types of engineering lines
Week 4	Lab 4: Types of engineering lines
Week 5	Lab 5: Letters in engineering drawing
Week 6	Lab 6: Geometrical constructions
Week 7	Lab 7: Geometrical constructions
Week 8	Lab 8: Tutorials Geometrical constructions
Week 9	Lab 9: Projection theories
Week 10	Lab 10: Dimensioning methods
Week 11	Lab 11: Exercises in drawing projections with Dimensions
Week 12	Lab 12: Exercises in drawing projections with Dimensions
Week 13	Lab 13: Exercises in drawing projections with Dimensions
Week 14	Lab 14: Exercises in drawing projections with Dimensions
Week 15	Lab 15: Exercises in drawing projections with Dimensions

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Engineering Drawing - Abdul Rasul Al-Khafaf	Yes
<b>Recommended Texts</b>	Engineering Drawing Student's Guide, Sonaversity, Salem, First Edition, October 2000.	No
<b>Websites</b>	<a href="https://www.forgottenbooks.com/en/books/ATextBookofEngineeringDrawingandDesi">https://www.forgottenbooks.com/en/books/ATextBookofEngineeringDrawingandDesi</a>	

MODULE DESCRIPTION FORM

gn\_10037738

Grading Scheme

مخطط الدرجات

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

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

Module Information معلومات المادة الدراسية

Module Title	Metallurgy & Automobile Materials		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
Module Code	C			
ECTS Credits	UOBAB0302026			
SWL (hr/sem)	125			
Module Level	1	Semester of Delivery		2
Administering Department		College		
Module Leader	Maithem Hussein Rasheed		e-mail	met.maithem.hussiem@uob abylon.edu.iq
Module Leader's Acad. Title	Assist .Professor		Module Leader's Qualification	M.SC
Module Tutor		e-mail		
Peer Reviewer Name	None		e-mail	E-mail

MODULE DESCRIPTION FORM

<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0
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العلاقة مع المواد الدراسية الأخرى **Relation with other Modules**

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<p>1- Study the engineering materials science. and understand classifications of Engineering Materials.</p> <p>2- Learn crystal, no crystal structures and unit cell .</p> <p>3- Study the direction of crystallography and miller indices.</p> <p>4- Study the atomic packing factors. , study the stress – strain curve , young</p> <p>5. understand testing of engineering materials , tension , compression , types of hardness methods.</p> <p>6. Learning metallurgy engineering, phase equilibrium diagram , Fe- C diagram , heat treatments composite materials</p>
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<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <p>1- explain importance of materials in materials science and engineering field.</p> <p>2- relate between material and engineering.</p> <p>7. classify materials according to their types.</p> <p>8. describe basic definition and conception of materials and physical properties of materials.</p> <p>9. follow new developments in materials application field.</p> <p>6- give information about atomic structure, atomic bonds, crystal structure, crystal geometry and crystal defects.</p> <p>11. define structure of atoms..</p> <p>12. define space lattice, unit cell, crystal systems and Bravais lattice.</p>
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MODULE DESCRIPTION FORM

	<p>13. calculate unit cells and volumetric, planar and linear density values in unit cell..</p> <p>14. describe crystal imperfections.</p> <p>11-give information about mechanical properties of materials.</p> <p>15. Stress- strain curve.</p> <p>12- Study the different hardness methods experiments and calculations.</p> <p>. 13-give information about metal, polymer, ceramic and composite materials and their properties which used in automobile industry .</p> <p>. 14. Study the metallurgy engineering , phase equilibrium diagram , Fe- C diagram , heat treatments. .</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p><b>Indicative content includes the following.</b></p> <ul style="list-style-type: none"> <li>• Introduction of engineering materials science. and why study engineering materials. and to understand classifications of Engineering Materials. Also to learn crystal and no crystal structures and unit cell . and study the direction of crystallography and miller indices. Study the atomic packing factors. [15 hr.]</li> <li>• study the stress – strain curve , young modulus .and to understand testing of engineering materials , tension , compression , types of hardness methods ( brinell , Vickers , Rockwell ). Average and standard deviation. [15 hr.]</li> <li>• study the composite materials ( matrix and reinforcement ) , ceramics materials, metal, polymer, ceramic and composite materials and their properties which used in automobile industry .</li> <li>• Study the metallurgy engineering, phase equilibrium diagram , Fe- C diagram , heat treatments. [ 15 hr. ]</li> </ul>

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the</p>
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MODULE DESCRIPTION FORM

same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

**Student Workload (SWL)** الحمل الدراسي للطلاب محسوب ل ١٥ اسبوع

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	75	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعياً	5
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	50	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعياً	3
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	125		

**Module Evaluation** تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5 and 10	LO #1, #2 and #10
	<b>Assignments</b>	2	10% (10)	2 and 10	LO #3, #4 and #6, #10
	<b>Projects / Lab.</b>	1	10% (10)	10	All
	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #14
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100%		

**Delivery Plan (Weekly Syllabus)** المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction of material science
Week 2	Classifications of engineering material
Week 3	Crystal and non crystal structures
Week 4	Unit cell and atomic packing factor
Week 5	Direction of crystallography and millier indices
Week 6	Stress - strain curve , young modulus
Week 7	Mechanical properties of engineering material .



MODULE DESCRIPTION FORM

Week 8	Tension – compression tests.
Week 9	Hardness test , types of hardness methods.
Week 10	Composite materials
Week 11	Ceramic materials
Week 12	Non destructive tests
Week 13	Metallurgy ,metals and alloys
Week 14	phase equilibrium diagram , Fe-C phase diagram
Week 15	Heat treatments
Week 16	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Microstructure Examination of some Alloys by microscope .
Week 2	Hardness test.

**Learning and Teaching Resources** مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering ,william callister, 2007	Yes
Recommended Texts	1-the science and engineering of materials , donald askeland 2005.	No
Websites	<a href="https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/TEKNOLOGI%20REKAYASA%20MATERIAL%20PERTAHANAN/Materials%20Science%20and%20Engineering%20An%20Introduction%20by%20William%20D.%20Callister,%20Jr.,%20David%20G.%20Rethwish%20(z-lib.org).pdf">https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/TEKNOLOGI%20REKAYASA%20MATERIAL%20PERTAHANAN/Materials%20Science%20and%20Engineering%20An%20Introduction%20by%20William%20D.%20Callister,%20Jr.,%20David%20G.%20Rethwish%20(z-lib.org).pdf</a>	

**Grading Scheme**

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors

MODULE DESCRIPTION FORM

<b>(50 - 100)</b>	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX - Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F - Fail</b>	راسب	(0-44)	Considerable amount of work required

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

# UGII – level

## Semester – Three

### Module Information

معلومات المادة الدراسية

Module Title	English language-II	Module Delivery
Module Type	Core	<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab
Module Code	UOBAB0302031	

MODULE DESCRIPTION FORM

ECTS Credits	٤		<input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
SWL (hr/sem)	١٠٠			
Module Level	UGII	Semester of Delivery	2	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Rusul Dawood Salman	e-mail	<a href="mailto:met.rusul.dawood@uobabylon.edu.iq">met.rusul.dawood@uobabylon.edu.iq</a>	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.A.	
Module Tutor	-	e-mail	-	
Peer Reviewer Name	-	e-mail	-	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

1. Improving reading, writing, speaking, and listening abilities.
2. presenting an overview of theoretical perspectives concerning the students' development and learning.
3. Giving the students a broad understanding of various crucial English language topics that facilitate easy communication with others.
4. Applying the theories into reality to allow the student to practice speaking with foreigners and to encourage him to do so.
5. Allowing students to participate in discussions and sharing their views.
6. Using a range of digital tools and devices to interpret and construct meaning.

<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.
	1-understanding how language is used in relation to its objectives. 2. Selecting the most essential everyday expressions that can be used in daily interactions. 3. Developing the arguments based upon realities. 4. Teaching the students how to use English grammar properly in speaking and

## MODULE DESCRIPTION FORM

	<p>writing.</p> <p>5. Increasing the students' proficiency and comprehension of the English language.</p> <p>6. Students will do an oral presentation and get comments on how they did.</p> <p>7. Increasing the students' reading proficiency through in-depth reading.</p> <p>8. Giving the students access to a wide variety of words.</p> <p>9. Using the grammatical forms in communicative contexts including homework, reading, and writing assignments.</p> <p>10. Improving students' abilities to write essay and academic paper in a skillful way.</p> <p>11. Improving students' proficiency in four</p>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p style="text-align: right;"><b>Indicative content includes the following.</b></p> <ul style="list-style-type: none"> <li>• Emphasizing the following four crucial English-language issues: speaking, reading, and listening; and [15 hrs]</li> <li>• comprehending the overall subject or main idea, major concepts, essential details, terminology used in context, and pronoun references. [15 hrs]</li> <li>• being able to understand the primary idea, important components, as well as essential information relevant to the main idea. [10 hrs]</li> <li>• Inside as well as outside of the classroom, students should be able to talk clearly. [15 hrs]</li> </ul> <p style="text-align: right;"><u>Part B - Analogue Electronics</u> Fundamentals</p> <ul style="list-style-type: none"> <li>• Learning tenses selecting the appropriate format, placing the sentences in the appropriate order, [15 hrs]</li> <li>• Covering aspects such as phonetics, semantics and pragmatics. [7 hrs]</li> <li>• Examining the language's grammatical foundations, developing a deeper knowledge of language, and learning how to organize words and sentences so that other people can understand them. [15 hrs]</li> </ul>

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>The student is a crucial component of the learning process, so we should consider his comprehension levels as the main concern by providing him with better and easier planning, improved ability to track student goals, teaching language skills across all curriculum topics, speaking slowly and giving students extra time to respond, and using a variety of methods to engage learning.</p>
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### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

<p><b>Structured SWL (h/sem)</b></p> <p>الحمل الدراسي المنتظم للطالب خلال الفصل</p>	<p>٣٣</p>	<p><b>Structured SWL (h/w)</b></p> <p>الحمل الدراسي المنتظم للطالب أسبوعيا</p>	<p>٢</p>
<p><b>Unstructured SWL (h/sem)</b></p> <p>الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	<p>٦٧</p>	<p><b>Unstructured SWL (h/w)</b></p> <p>الحمل الدراسي غير المنتظم للطالب أسبوعيا</p>	<p>٤</p>
<p><b>Total SWL (h/sem)</b></p> <p>الحمل الدراسي الكلي للطالب خلال الفصل</p>	<p>١٠٠</p>		

MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	20% (20)	5 and 13	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	hr\	10% (10)	7	LO #1 - #7
	Final Exam	hr٣	50% (50)	16	All
<b>Total assessment</b>			100%		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Giving a general information about English Language
Week 2	Speaking in classroom the student respond to questions & participate in academic discussions with other students
Week 3	Speaking the student must synthesize and summarize what they have read in their textbooks and heard in class
Week 4	Speaking (outside classroom) participate in casual conversations& express their opinions
Week 5	Listening understand the relationships between ideas presented (for example, compare/contrast, cause/effect, or steps in a process)
Week 6	Listening to various videos concerning the engineering fields as: (Mechanical engineering , electrical engineering in addition to renewable energies ).
Week 7	<b>Mid-term Exam</b>
Week 8	Reading each word and each sentence, practice skimming a passage quickly to get a general impression of the main idea.
Week 9	Reading (Choose some unfamiliar words in the passage and guess the meanings from the context (surrounding sentences).
Week 10	Speaking (communicate with people in such places as the bookstore, the library, and the housing office)
Week 11	Speaking (increasing the student' ability to speak fluency and increasing its rate )
Week 12	Listening for pragmatic understanding (recognize a speaker's attitude and degree of certainty)
Week 13	Listening make connections among pieces of information in a conversation or lecture
Week 14	Writing (Often students need to write a paper or an essay response on an exam about what they are learning in their classes. This requires combining information they have heard in class lectures with what they have read in textbooks or other materials).
Week 15	Witting (take notes on what they hear and read, and use them to organize information before writing / summarize, paraphrase, and cite information from the source material accurately / write about the ways the information they heard relates to the information they read)
Week 16	<b>Preparatory week before the final Exam</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	TOEFL Practice Online The official practice test that can help you go anywhere	No

MODULE DESCRIPTION FORM

Recommended Texts	The Cambridge Encyclopedia of the English Language By David Crystal	No
Websites	<a href="https://www.cambridge.org/">https://www.cambridge.org/</a>	

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	Engineering Mathematics I	Module Delivery
Module Type	C	<input checked="" type="checkbox"/> Theory
Module Code	UOBAB0302032	<input checked="" type="checkbox"/> Lecture
ECTS Credits	4	<input type="checkbox"/> Lab

MODULE DESCRIPTION FORM

SWL (hr/sem)	100	<input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Level	UC	Semester of Delivery	1
Administering Department		College	
Module Leader	Dr.wisam Naji hassan	e-mail	msb.wissam.naji@uobabylon.edu.iq
Module Leader's Acad. Title	lecturer	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0
<b>Relation with other Modules</b> العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	To provide the students with sufficient knowledge 1- Understanding of basic concepts of the differential equations. 2- Solve linear equations with the constant coefficients as well as the systems of such equations. 3- Model physical problems using mathematical equations, and then solve these equations. 4- Understanding of basic concepts of Vector-Valued Functions.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	The students able to: 1. Identify ordinary differential equations. 2. Solve First-Order Differential Equations. 3. Evaluate Second-Order Differential Equations. 4. Knowledge and solve of Second-Order Linear Differential Equations



## MODULE DESCRIPTION FORM

	<p>Applications .</p> <p>5. Solve higher order Differential Equations.</p> <p>6. Knowledge of vector valued function and Evaluate Velocity And Acceleration,</p> <p>,Curvature Unit Tangent Vector, Principal Normal Vector, Radius Of Curvature, Tangential And Normal Components Of Acceleration</p>
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Solution Of First Order Differential Equations. Separable Equations, Homogeneous Function Reducible To Homogeneous.[3hrs]</p> <p>Linear First Order Equations, Reducible To Linear.[3hrs]</p> <p>Exact Differential Equations ,Reducible To Exact.[3hrs]</p> <p>Second Order Linear Homogeneous Equations.[3hrs]</p> <p>Second Order Non-Homogeneous Linear Equations.[3hrs]</p> <p>Higher Order Differential Equation.[3hrs]</p> <p>Applications Of First-Order Differential Equations. ,Applications Of Second-Order Linear Differential Equations.[3hrs]</p> <p>Vectors (Vector In The Plane ,Algebra Of Vector. ,Length Of The Vector (Magnitude),,Vector In Space., The Dot Product) .[3hrs]</p> <p>Vector Projections And Scalar Components. ,Cross Product. ,Triple Scalar Or Box Product.[3hrs]</p> <p>Equation Lines In Space., The Distance From A Point To A Line In Space.</p> <p>Equation For Plane In Space. Angle Between Planes.[3hrs]</p> <p>Directional Derivatives.[3hrs]</p> <p>Vector-Valued Functions., Graphs Of Vector-Valued Functions. ,Limits And Derivatives., Continuity. [3hrs]</p> <p>Vector-Valued Functions., Derivative. Velocity And Acceleration.[3hrs]</p> <p>Integration Of Vector Valued Function.[3hrs]</p> <p>Vector-Valued Functions ,Curvature., Unit Tangent Vector., Principal Normal Vector.[3hrs]</p> <p>Radius Of Curvature. Tangential And Normal Components Of Acceleration.[3hrs]</p>

MODULE DESCRIPTION FORM

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	47	Structured SWL (h/w)	3
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	53	Unstructured SWL (h/w)	3
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)	<b>100</b>		
الحمل الدراسي الكلي للطالب خلال الفصل			

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	5 and 10	LO #1, #2 and #10, #11
	Assignments	٥	15% (15)	2 and 12	LO #2, #4,#6,#8 and #10
	Projects / Lab.				

MODULE DESCRIPTION FORM

	Report				
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #9
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Solution Of First Order Differential Equations. Separable Equations, Homogeneous Function Reducible To Homogeneous
Week 2	Linear First Order Equations, Reducible To Linear
Week 3	Exact Differential Equations ,Reducible To Exact
Week 4	Second Order Linear Homogeneous Equations
Week 5	Second Order Non-Homogeneous Linear Equations.
Week 6	Higher Order Differential Equation
Week 7	Applications Of First-Order Differential Equations. ,Applications Of Second-Order Linear Differential Equations.
Week 8	Vectors (Vector In The Plane ,Algebra Of Vector. ,Length Of The Vector (Magnitude),Vector In Space., The Dot Product).
Week 9	Vector Projections And Scalar Components. ,Cross Product. ,Triple Scalar Or Box Product.
Week 10	Equation Lines In Space., The Distance From A Point To A Line In Space. Equation For Plane In Space.Angle Between Planes.

MODULE DESCRIPTION FORM

<b>Week 11</b>	Directional Derivatives
<b>Week 12</b>	Vector-Valued Functions., Graphs Of Vector-Valued Functions. ,Limits And Derivatives., Continuity
<b>Week 13</b>	Vector-Valued Functions., Derivative. Velocity And Acceleration.,
<b>Week 14</b>	Integration Of Vector Valued Function.,
<b>Week 15</b>	Vector-Valued Functions .,Curvature., Unit Tangent Vector., Principal Normal Vector., Radius Of Curvature. Tangential And Normal Components Of Acceleration
<b>Week 16</b>	Preparatory Week Before The Final Exam

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	<b>Thomas Calculus</b>	Yes
<b>Recommended Texts</b>		
<b>Websites</b>		

**Grading Scheme**

مخطط الدرجات

<b>Group</b>	<b>Grade</b>	<b>التقدير</b>	<b>Marks %</b>	<b>Definition</b>
<b>Success Group (50 - 100)</b>	<b>A – Excellent</b>	امتياز	90 – 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 – 89	Above average with some errors
	<b>C – Good</b>	جيد	70 – 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 – 69	Fair but with major shortcomings
	<b>E – Sufficient</b>	مقبول	50 – 59	Work meets minimum criteria

MODULE DESCRIPTION FORM

<b>Fail Group</b> <b>(0 – 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

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

**Module Information**

معلومات المادة الدراسية

Module Title	Strength of Materials		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
Module Code	UOBAB0302033			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGx1	Semester of Delivery	3	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Dr. Ali Hussein Abead Ajaam		e-mail	met.ali.abed@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor		e-mail	E-mail	
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Engineering Mechanics (Statics)	Semester	2
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MODULE DESCRIPTION FORM

Co-requisites module	None	Semester	
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**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Introducing the concept of strength of materials.</li> <li>2. learning the principles of stress and the associated strain</li> <li>3. Studying the different types of deformations</li> </ol>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. reviewing some of the important principles of statics</li> <li>2. introducing the concepts of normal and shear stress and the associated strain</li> <li>3. discussing the relation between stress and strain for materials that are commonly used in engineering</li> <li>4. learning how to determine deformation of members subjected to axial loading with and without change in temperature</li> <li>5. discussing the stress and deformation of shafts or tubes that are subjected to torsion</li> <li>6. establishing the shear and moment diagrams in beam under bending then computing the stresses and the associated deformation</li> <li>7. reviewing and combining stresses learned previously and finding the state of stress</li> <li>8. showing how to transfer the state of stress into coordinate associated with different orientation</li> <li>9. computing the deformation (deflection and slope) of beams</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p style="text-align: right;"><u>Part 1: structured SWL</u></p> <ul style="list-style-type: none"> <li>• Simple Stress: normal stress, shear stress, shear stress equilibrium, bearing stress, allowable stresses (16 h)</li> <li>• stress strain relations : normal strain, shear strain, , normal stress strain diagram, hooks law, Poisson ratio, shear stress strain diagram (8 h)</li> <li>• Axial loading: deformation of axial members, statically indeterminate axial loaded members, thermal stresses. (8 h)</li> <li>• Torsion: shear stress in circular shafts, angle of twist, statically indeterminate torque loaded members. (8 h)</li> <li>• Shear and moment diagrams: equation method of establishing shear force and bending moment diagrams for beams, graphical method of constructing shear and moment diagrams (8 h)</li> <li>• Stresses in beams: bending stress, transvers shear stress (16 h)</li> <li>• combined loading: thin walled vessels, cylindrical vessels, spherical vessels, combined loading in members (16 h)</li> <li>• Stress transformation: equation method of stress transformation, Mohr's circle (16 h)</li> </ul>

## MODULE DESCRIPTION FORM

- Deflection in beams: integration method, moment area method (16 h)  
Part 2: unstructured SWL
- problem solving assignments: 10 assignment each contains 3 types of problems (fundamental problems, actual problem, conceptual problems) ( 40 h)
- project problem: selecting, investigating , analysis, and reporting a problem related stress and strain analysis of engineering materials ( 18 h including 3 h seminar )

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

#### Strategies

The main strategy to deliver this module is by encouraging the students to actively participate in solving homework, prepare and take quizzes, and attend discussion groups. This strategy, besides understanding the material, will enhance the student critical thinking.

## MODULE DESCRIPTION FORM

## Student Workload (SWL)

الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	117	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	8
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	58	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	150		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 12	1,2,3 and 5,6
	Assignments	10	10% (10)	2,3,4,6,7, 10,11,13,14 ,15	1 through 9
	Laboratory	5	10% (10)	Continuous	1 through 9
	Projects /Report	1	10% (10)	15	7 through 9
Summative assessment	Midterm Exam	2hr	10% (10)	8	1 through 5
	Final Exam	3hr	50% (50)	16	1 through 9
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
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MODULE DESCRIPTION FORM

<b>Week 1</b>	Introduction, normal stress
<b>Week 2</b>	Shear stress, bearing stress, allowable stress
<b>Week 3</b>	Strain, stress strain relations
<b>Week 4</b>	Axial loading, thermal stress
<b>Week 5</b>	Torsion, angle of twist
<b>Week 6</b>	Shear force and bending moment diagrams
<b>Week 7</b>	Bending stress in beams
<b>Week 8</b>	Midterm Exam
<b>Week 9</b>	Shear stress in beams
<b>Week 10</b>	Thin walled vessels
<b>Week 11</b>	Combined loading
<b>Week 12</b>	Stress transformation 1
<b>Week 13</b>	Stress transformation 2
<b>Week 14</b>	Deflections in beams 1
<b>Week 15</b>	Deflections in beams 2
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Lab 1: tension test
<b>Week 2</b>	Lab 2: compression test
<b>Week 3</b>	Lab 3: stress strain relation
<b>Week 4</b>	Lab 4: single vs. double shear

MODULE DESCRIPTION FORM

<b>Week 5</b>	Lab 5: torsion test	
<b>and Teaching Resources</b> مصادر التعلم والتدريس		
	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Mechanics of Materials By R. C. Hibbeler	Yes
<b>Recommended Texts</b>	Strength of Materials By Pytel and Singer	No
<b>Websites</b>		

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

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

<b>Module Information</b> معلومات المادة الدراسية
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MODULE DESCRIPTION FORM

Module Title	<b>Fluid mechanics</b>		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	<b>UOBAB0302034</b>		
ECTS Credits	6		
SWL (hr/sem)	<b>150</b>		
Module Level	UGx	Semester of Delivery	
Administering Department	Automobile Engineering	College	College of Engineering\Al-Musayab
Module Leader	Qais Hatem Mohammed		e-mail met.qais.hatem@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<p>To present the basic principles and equations of fluid mechanics. 1-</p> <p>To show numerous and diverse real-world engineering examples to give the student the intuition necessary for correct application of fluid mechanics principles in engineering applications. 2.</p> <p>To develop an intuitive understanding of fluid mechanics by emphasizing the physics, and reinforcing that understanding through illustrative figures and 3.</p>
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MODULE DESCRIPTION FORM

	photographs.
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Introduce properties of fluids</li> <li>2. Know pressure and its measurement</li> <li>3. Calculate hydrostatic forces on surfaces</li> <li>4. Find buoyancy and floatation</li> <li>5. Introduce kinematics of flow and ideal flow</li> <li>6. Know dynamics of fluid flow</li> <li>7. Introduce dimensional and model analysis</li> <li>8. Define viscous flow</li> <li>9. Define turbulent flow</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following:</p> <p>Chapter 1: Properties of Fluids. [20 hrs.]</p> <p>Chapter 2: Pressure and Its Measurement. [20 hrs.]</p> <p>Chapter 3: Hydrostatic Forces on Surfaces. [20 hrs.]</p> <p>Chapter 4: Buoyancy and Floatation. [20 hrs.]</p> <p>Chapter 5: Kinematics of Flow and Ideal Flow. [10 hrs.]</p> <p>Chapter 6: Dynamics of Fluid Flow. [20 hrs.]</p> <p>Chapter 7: Dimensional and Model Analysis. [10 hrs.]</p> <p>Chapter 8: Viscous Flow. [20 hrs.]</p> <p>Chapter 9: Turbulent Flow. [10 hrs.]</p>
<p><b>Learning and Teaching Strategies</b></p> <p>استراتيجيات التعلم والتعليم</p>	
<p><b>Strategies</b></p>	<p>The objective of this skill is for the student to believe in concrete (student abilities) and to understand when, what and how to think and to improve the ability to think reasonably. The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. High thinking skill (the goal of this skill is to teach thinking well before making the decision that determines the</p>

MODULE DESCRIPTION FORM

student's life).

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	89	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	61	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>150</b>		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	2.5% (5)	6 and 11	LO #3, and #6
	<b>Assignments</b>	8	2.5% (20)	2, 4, 6, 8, 11, 12, 13, and 14	LO #1, #2, #3, #4, #6, #7, #8, and #9
	<b>Projects / Lab.</b>	5	1% (5)	2, 4, 6, 8, and 10	LO #1, #2, #3, #4, and #6
	<b>Report</b>	5	1% (5)	3, 5, 7, 9, and 11	LO #1, #2, #3, #4, and #6
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	15% (15)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Properties of Fluids
<b>Week 2</b>	Properties of Fluids
<b>Week 3</b>	Pressure and Its Measurement
<b>Week 4</b>	Pressure and Its Measurement
<b>Week 5</b>	Hydrostatic Forces on Surfaces
<b>Week 6</b>	Hydrostatic Forces on Surfaces
<b>Week 7</b>	Buoyancy and Floatation
<b>Week 8</b>	Buoyancy and Floatation
<b>Week 9</b>	Kinematics of Flow and Ideal Flow
<b>Week 10</b>	Dynamics of Fluid Flow
<b>Week 11</b>	Dynamics of Fluid Flow
<b>Week 12</b>	Dimensional and Model Analysis
<b>Week 13</b>	Viscous Flow
<b>Week 14</b>	Viscous Flow
<b>Week 15</b>	Turbulent Flow
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
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MODULE DESCRIPTION FORM

<b>Week 1</b>	Lab 1: Viscosity property
<b>Week 2</b>	Lab 2: Pressure measure instruments, Pressure difference measuring
<b>Week 3</b>	Lab 3: Total hydrostatic pressure on surfaces
<b>Week 4</b>	Lab 4: Buoyancy
<b>Week 5</b>	Lab 5: Bernoulli equation + flow losses

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Bansal, R.K., 2010, A Textbook of Fluid Mechanics and hydraulic machines, Laxmi publications (p) ltd.	Yes
<b>Recommended Texts</b>	<p>1.Rajput, R.K., 2013. A textbook of fluid mechanics and hydraulic machines. S. Chand Publishing.</p> <p>2.Cengel, Y.A., Cimbala J.M. is 2014. Fluid Mechanics: Fundamen-tals and Applications, 3rd ed., (Si Units). McGraw Hill Education Private Limited.</p> <p>3.Gerhart, P.M., Gerhart, A.L. and Hochstein, J.I., 2016. Munson, Young and Okiishi's fundamentals of fluid mechanics. John Wiley &amp; Sons.</p> <p>4.White, F.M., 2016. Fluid mechanics, in SI units, McGraw-Hill Companies, Inc.</p>	No
<b>Websites</b>	<a href="https://www.youtube.com/watch?v=clVwKynHpB0">https://www.youtube.com/watch?v=clVwKynHpB0</a>	

**Grading Scheme**

مخطط الدرجات

<b>Group</b>	<b>Grade</b>	التقدير	<b>Marks %</b>	<b>Definition</b>
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings

MODULE DESCRIPTION FORM

	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Mechanical Drawing, I with Solid Work</b>		<b>Module Delivery</b>	
<b>Module Type</b>	s		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
<b>Module Code</b>	UOBAB0302035			
<b>ECTS Credits</b>	6			
<b>SWL (hr/sem)</b>	150			
<b>Module Level</b>	UGII	<b>Semester of Delivery</b>		
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code	
<b>Module Leader</b>	Dhyai H. Jawad Aljashaami		<b>e-mail</b>	<a href="mailto:dhyai.aljashaami@uobabylon.edu.iq">dhyai.aljashaami@uobabylon.edu.iq</a>
<b>Module Leader's Acad. Title</b>	Lecturer	<b>Module Leader's Qualification</b>	Ph.D.	
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail	
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail	
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى



MODULE DESCRIPTION FORM

<b>Prerequisite module</b>	Engineering Drawing- I, Engineering DrawingII	<b>Semester</b>	1,2
<b>Co-requisites module</b>	Machine Elements Design, Theory of Machines	<b>Semester</b>	5,6

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b></p> <p>أهداف المادة الدراسية</p>	<p>This course deals with identifying engineering drawing tools and materials, methods of using them, performing manual exercises, drawing lines, curves, and two- and three-dimensional shapes. Thus, developing the student's potential to study and apply the basics of engineering drawing. Which includes reading, disassembling and assembling geometric shapes through drawing, projection, and sections methods. In addition to how to draw engineering mechanical plans necessary to clarify design ideas. Also, To learn the student the basic principles and theories of engineering drawing and how to implement different sketches by using computer programs such as (AUTOCAD).</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Knowledge <ul style="list-style-type: none"> <li>-Knowing the tools used in engineering drawing and how to use them properly</li> <li>- The student's ability to understand and apply the basics of engineering</li> </ul> </li> <li>2. drawing. <ul style="list-style-type: none"> <li>- Reading, disassembling and assembling geometric shapes through drawing,</li> <li>-projection and cross sectional methods.</li> <li>- Developing the student's skill in using tools in drawing geometric shapes.</li> </ul> </li> <li>3. Skills <ul style="list-style-type: none"> <li>- Developing the student's engineering imagination through deducing the projections and sections of each geometric solid and realizing its dimensions.</li> <li>- Developing student skills through the use of AutoCAD drawing software.</li> <li>- Conducting auxiliary exercises to apply it correctly to increase its absorption capacity of the material</li> <li>- Communicate with the most important ideas presented by the article through the Internet.</li> </ul> </li> </ol>

## MODULE DESCRIPTION FORM

	<ul style="list-style-type: none"> <li>- Developing student skills through the use of AutoCAD drawing software</li> </ul> <p>4. Directions</p> <ul style="list-style-type: none"> <li>- Going to implement an engineering design with all its recognized requirements in the field of work, which reflect skills through designing engineering plans that meet the details and dimensions that can be implemented in reality.</li> <li>- Applications to various engineering processes..</li> </ul>
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<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A- Analogue Electronics</u></p> <p>- Introduction to the subject: basics of engineering drawing and the difference between it and free drawing: Engineering drawing, its elements, tools and drawing methods. 2- Introducing students to paper scales and drawing boards, and Free hand drawing (lines, circles, ...etc) 3- Distribute the canvas (frame, table, etc.), Types of lines in engineering drawing, Rules for writing dimensions and measurements and recognizing symbols and their significance, Drawing scales (zoom in and zoom out) 4- Construction and engineering operations: Create and divide angles, Divide circles and draw regular shapes in them .Create connecting lines between arcs and circles. 5- Drawing engineering perspectives, Types of engineering perspectives and its construction from projections. Perspective constructions (drawing 3D solids (isometric perspective) 6- Projection in orthogonal planes, vertical projection methods, Drop geometric shapes. 7- Distribution of projections on the drawing board, Conclusion of the third projection from two projections. 8-Inferring the isometric perspective from projections with dimensions 9- Single simple and complex geometric objects 10- Sectors in engineering drawing, their importance, Cutting, sector, and hatching levels, Types of sectors and their classification. [15 hrs]</p> <p>. [7 hrs]</p> <p>. [15 hrs]</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>Planning a unit or lesson involves a number of instructional decisions. The teacher must identify the following: the content and processes to be addressed, the strengths, needs, and interests of students, the Common Essential Learnings that could be incorporated, and the most effective instructional approaches. Such decisions are critical and must be made consciously and purposefully. It begins with</p>
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MODULE DESCRIPTION FORM

the student's interest in engineering tools and the drawing board. To reach the highest level of understanding in the application of all theoretical and laboratory lesson processes

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	74	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	5
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	75	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.015
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	150		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	<b>Assignments</b>	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	<b>Practice</b>	13	10% (10)	Continuous	All
	<b>H.W</b>	1	10% (10)	13	LO # 5, 8 and 10
<b>Summative assessment</b>	<b>Midterm Exam</b>	3hr	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	
Week 16	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

MODULE DESCRIPTION FORM

المناهج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1.الرسم الهندسي، عبد الرسول عبد الحسين الخفاف، دار الكتب والوثائق العراقي Beginning Auto CAD, by Bob McFarlane, Elseveir, 2007 ]2	Yes
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group	A - Excellent	امتياز	90 - 100	Outstanding Performance

MODULE DESCRIPTION FORM

(50 - 100)	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Automobiles Technology		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302036			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	3	Semester of Delivery		
Administering Department		College		
Module Leader	Dr.Sabah Auda AbdulAmeer		e-mail	sabah.abdulameer@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor	Hussein ahmed hassan Ali		e-mail	ha4681177@gmail.com
Peer Reviewer Name		e-mail		

MODULE DESCRIPTION FORM

Scientific Committee Approval Date	01/06/2023	Version Number	1.0
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<p>To enable the students to:</p> <ol style="list-style-type: none"> <li>1. Vehicle Design and Development: One objective is to understand the principles of vehicle design and development, including aspects such as aerodynamics, ergonomics, materials selection, and structural analysis. This module aims to equip students with the knowledge required to design and develop efficient and safe automobiles.</li> <li>2. Powertrain Systems: This module focuses on the study of powertrain systems, including engines, transmissions, drivelines, and associated components. The objectives may include understanding the working principles, performance characteristics, and optimization techniques for powertrain systems.</li> <li>3. Vehicle Dynamics and Control: The objective here is to learn about the dynamics of vehicles, including topics such as suspension systems, steering mechanisms, braking systems, and stability control. This module aims to provide knowledge about vehicle handling, stability, and control to enhance overall safety and performance.</li> <li>4. Automotive Electronics: With the increasing role of electronics in modern vehicles, the objective of this module is to provide an understanding of electronic systems used in automobiles. Topics covered may include sensors, actuators, electronic control units (ECUs), communication networks, and vehicle diagnostics.</li> <li>5. Alternative Fuels and Powertrains: As the automotive industry moves towards sustainable and environmentally friendly solutions, modules on alternative fuels and powertrains become relevant. The objectives may include studying electric and hybrid vehicle technologies, fuel cell systems, and alternative fuel options like biofuels and hydrogen.</li> <li>6. Vehicle Safety and Crashworthiness: This module focuses on vehicle safety features, crash testing, and design for crashworthiness. The objectives may include understanding the principles of occupant protection, structural integrity, active safety systems, and</li> </ol>
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## MODULE DESCRIPTION FORM

	<p>crash simulation techniques.</p> <p>7. Automotive Manufacturing Processes: The objective here is to learn about the various manufacturing processes involved in automobile production. Topics may include assembly techniques, quality control, lean manufacturing principles, and automation in the automotive industry.</p> <p>8. Vehicle Maintenance and Service: This module aims to provide knowledge about vehicle maintenance, servicing, and diagnostics. The objectives may include understanding routine maintenance procedures, troubleshooting techniques, and the use of diagnostic equipment and software.</p> <p>9. Emerging Technologies: Automobile technology is constantly evolving, and this module focuses on the latest trends and emerging technologies in the industry. Objectives may include exploring topics such as autonomous driving, connected vehicles, advanced driver-assistance systems (ADAS), and smart transportation solutions.</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"><li>1. Demonstrate an understanding of the principles of vehicle design and development, including aerodynamics, materials selection, and structural analysis.</li><li>2. Explain the working principles, performance characteristics, and optimization techniques for powertrain systems, such as engines, transmissions, and drivelines.</li><li>3. Apply knowledge of vehicle dynamics to analyze and predict the behavior of vehicles, including suspension systems, steering mechanisms, braking systems, and stability control.</li><li>4. Understand the functioning of electronic systems used in automobiles, including sensors, actuators, electronic control units (ECUs), communication networks, and vehicle diagnostics.</li><li>5. Evaluate and analyze alternative fuels and powertrain technologies, such as electric and hybrid vehicles, fuel cell systems, biofuels, and hydrogen.</li><li>6. Analyze and apply principles of vehicle safety and crashworthiness, including occupant protection, structural integrity, active safety systems, and crash simulation techniques.</li><li>7. Demonstrate knowledge of various automotive manufacturing processes, including assembly techniques, quality control, lean manufacturing principles, and automation in the automotive industry.</li><li>8. Perform routine vehicle maintenance procedures, troubleshoot issues, and use diagnostic equipment and software to identify and rectify problems.</li><li>9. Stay updated on emerging technologies and trends in the automotive industry,</li></ol>



## MODULE DESCRIPTION FORM

	<p>such as autonomous driving, connected vehicles, advanced driver-assistance systems (ADAS), and smart transportation solutions.</p> <p>10. Apply critical thinking and problem-solving skills to address real-world challenges in the field of automobile technology, including sustainability, efficiency, and safety concerns.</p> <p>11. Effectively communicate technical concepts related to automobile technology through oral presentations, written reports, and other forms of documentation.</p> <p>12. Collaborate effectively in multidisciplinary teams to design, develop, and implement innovative solutions in the field of automobile technology.</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>The indicative contents of an automobile technology:</p> <ol style="list-style-type: none"> <li>1. Introduction to Automobile Technology: <b>4hrs</b> <ul style="list-style-type: none"> <li>- Evolution of automobiles</li> <li>- Basic vehicle components and systems</li> <li>- Automotive industry overview</li> </ul> </li> <li>2. Vehicle Design and Development: <b>4hrs</b> <ul style="list-style-type: none"> <li>- Vehicle architecture and layout</li> <li>- Aerodynamics and vehicle performance</li> <li>- Materials selection and lightweighting</li> <li>- Structural analysis and crashworthiness</li> </ul> </li> <li>3. Powertrain Systems: <b>4hrs</b> <ul style="list-style-type: none"> <li>- Internal combustion engines (gasoline, diesel, rotary)</li> <li>- Engine performance characteristics and calculations</li> <li>- Transmissions and drivelines</li> <li>- Engine management systems and control</li> </ul> </li> <li>4. Vehicle Dynamics and Control: <b>4hrs</b> <ul style="list-style-type: none"> <li>- Suspension systems and design</li> <li>- Steering mechanisms and geometries</li> <li>- Braking systems and technologies</li> <li>- Vehicle stability and control systems</li> </ul> </li> <li>5. Automotive Electronics: <b>4hrs</b> <ul style="list-style-type: none"> <li>- Sensors and actuators in automobiles</li> </ul> </li> </ol>

## MODULE DESCRIPTION FORM

- Electronic control units (ECUs) and their functions
- Communication networks (CAN, LIN, FlexRay)
- Vehicle diagnostics and troubleshooting
- 6. Alternative Fuels and Powertrains: 4hrs
  - Electric and hybrid vehicle technologies
  - Fuel cell systems and hydrogen-powered vehicles
  - Biofuels and their applications
  - Sustainable energy sources for transportation
- 7. Vehicle Safety and Crashworthiness: 4hrs
  - Occupant protection systems (seat belts, airbags)
  - Crash testing and regulations
  - Structural design for crashworthiness
  - Active safety systems (ABS, ESC, ADAS)
- 8. Automotive Manufacturing Processes: 4hrs
  - Assembly techniques and processes
  - Quality control in automotive manufacturing
  - Lean manufacturing principles and practices
  - Automation and robotics in automotive production
- 9. Vehicle Maintenance and Service: 4hrs
  - Routine maintenance procedures (oil change, filter replacement)
  - Troubleshooting common vehicle issues
  - Diagnostic equipment and software
  - Service and repair manuals
- 10. Emerging Technologies: 4hrs
  - Autonomous driving technologies and systems
  - Connected vehicles and V2X communication
  - Advanced driver-assistance systems (ADAS)
  - Smart transportation solutions (traffic management, IoT)
- 11. Environmental and Sustainability Considerations: 4hrs
  - Emissions control technologies (catalytic converters, particulate filters)

## MODULE DESCRIPTION FORM

- Energy efficiency and fuel economy improvements
- Life cycle assessment of vehicles
- Environmental regulations and standards

### 12. Industry Trends and Future Developments: 4hrs

- Global automotive market trends
- Electric and autonomous vehicle market projections
- Industry challenges and opportunities
- Future developments in automotive technology

### 13. Autonomous Driving: AI and deep learning play a crucial role in enabling autonomous driving technology. Topics in this area may include: 3hrs

- Sensor fusion and perception for autonomous vehicles.
- Object detection, recognition, and tracking using deep learning algorithms.
- Path planning and decision-making algorithms for autonomous navigation.
- Simulations and reinforcement learning techniques for training autonomous driving systems.

### 14. Advanced Driver-Assistance Systems (ADAS): AI and deep learning are utilized in ADAS to enhance vehicle safety and assist drivers. Topics may include: 2hrs

- Lane detection and departure warning using computer vision and deep learning.
- Collision detection and mitigation systems.
- Adaptive cruise control and automatic emergency braking.
- Driver monitoring and behavior analysis using AI algorithms.

### 15. Natural Language Processing (NLP) for In-Vehicle Systems: AI techniques, including NLP, are used to develop voice-controlled infotainment and communication systems. Topics may include: 6hrs

- Speech recognition and speech synthesis using deep learning.
- Natural language understanding and dialogue systems.
- Intelligent personal assistants and voice-based controls for in-car systems.

#### a. Predictive Maintenance: AI and deep learning are employed to predict and prevent vehicle failures and optimize maintenance schedules. Topics may include:

- Predictive modeling using machine learning and deep learning for component failure prediction.
- Sensor data analysis and anomaly detection to identify potential maintenance

## MODULE DESCRIPTION FORM

issues.

- Prognostics and health management (PHM) systems for predicting vehicle maintenance needs.

b. Vehicle Diagnostics and Troubleshooting: AI techniques are used to diagnose and resolve vehicle faults and malfunctions. Topics may include:

- Fault detection and diagnosis using machine learning algorithms.
- Intelligent diagnostic systems for vehicle subsystems.
- Real-time monitoring and alert systems for detecting abnormalities.

c. Traffic Management and Optimization: AI and deep learning algorithms are used to optimize traffic flow and improve transportation efficiency. Topics may include:

- Traffic prediction and congestion detection using machine learning.
- Intelligent traffic signal control and optimization.
- Route optimization and smart navigation systems.

d. Computer Vision for Automotive Applications: AI and deep learning are employed in various computer vision applications within the automotive industry. Topics may include:

- Object detection and recognition for advanced driver assistance.
- Gesture recognition and driver monitoring.
- Augmented reality (AR) for heads-up displays (HUD) and enhanced vehicle perception.

e. Data Analytics and Vehicle Telematics: AI techniques are used to analyze large volumes of vehicle and telematics data. Topics may include:

- Data-driven insights for vehicle performance optimization.
- Predictive analytics for fuel efficiency and energy management.
- Driver behavior analysis and insurance telematics.

### Learning and Teaching Strategies

MODULE DESCRIPTION FORM

استراتيجيات التعلم والتعليم

Strategies

1. Lectures and Presentations: Instructors can deliver lectures and presentations to introduce theoretical concepts, principles, and technical knowledge related to automobile technology. This method helps provide a foundation of understanding and can be supplemented with visual aids, multimedia presentations, and real-world examples.
2. Hands-on Practical Activities: Practical sessions and laboratory work are crucial for students to apply theoretical knowledge in a practical setting. Hands-on activities can include disassembling and assembling components, conducting experiments, diagnosing, and troubleshooting problems, and performing maintenance tasks. These activities promote skill development and reinforce theoretical concepts.
3. Case Studies and Problem-Solving Exercises: Case studies and problem-solving exercises allow students to analyze and apply their knowledge to real-world scenarios. They can be presented with automotive-related challenges, such as optimizing powertrain performance, improving vehicle safety, or solving technical issues. Students work individually or in groups to develop solutions, fostering critical thinking and problem-solving skills.
4. Group Discussions and Debates: Group discussions and debates encourage active student participation and collaboration. Students can discuss and debate topics related to automobile technology, such as emerging technologies, environmental impacts, or industry trends. This strategy promotes critical thinking, communication skills, and the exchange of different perspectives.
5. Simulations and Virtual Laboratories: Simulations and virtual laboratories provide virtual environments where students can engage in realistic automotive simulations. This can include virtual vehicle testing, virtual assembly lines, or virtual diagnostic exercises. These tools offer a cost-effective and accessible way to gain practical experience and reinforce theoretical concepts.
6. Field Visits and Industry Collaboration: Organizing field visits to automotive manufacturing facilities, research institutes, or industry events can offer students firsthand exposure to the industry. Collaborating with industry professionals can provide insights into the latest technologies, practices, and industry demands. Guest lectures and industry projects can further enhance students' understanding of real-

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	59	Structured SWL (h/w)	4
الحمل الدراسي المنتظم للطالب خلال		الحمل الدراسي المنتظم للطالب أسبوعيا	

MODULE DESCRIPTION FORM

الفصل			
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	41	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	3
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	100		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	3	15% (15)	4,6 and 9	LO#1,2,3,4,5,6,7,8,9,10, 13and 14
	<b>Assignments</b>	5	15% (15)	2,5,6,9,13,14, and 15	LO #13, #14 and #6, #7
	<b>Projects / Lab.</b>	5	10% (10)		
	<b>Report</b>				
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	8	LO #1 - #8
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	<b>Material Covered</b>
<b>Week 1</b>	Introduction to Automobile Technology
<b>Week 2</b>	Vehicle Design and Development
<b>Week 3</b>	Powertrain Systems
<b>Week 4</b>	Vehicle Dynamics and Control
<b>Week 5</b>	Automotive Electronics
<b>Week 6</b>	Alternative Fuels and Powertrains
<b>Week 7</b>	Vehicle Safety and Crashworthiness
<b>Week 8</b>	Automotive Manufacturing Processes
<b>Week 9</b>	Vehicle Maintenance and Service
<b>Week 10</b>	Emerging Technologies
<b>Week 11</b>	Environmental and Sustainability Considerations
<b>Week 12</b>	Industry Trends and Future Developments
<b>Week 13</b>	Autonomous Driving
<b>Week 14</b>	Advanced Driver-Assistance Systems (ADAS)
<b>Week 15</b>	Natural Language Processing (NLP) for In-Vehicle Systems: AI techniques, including NLP, are used to develop voice-controlled infotainment and communication systems
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
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**MODULE DESCRIPTION FORM**

<p align="center"><b>Required Texts</b></p>	<p>1. Heisler, H. (2019). Advanced Vehicle Technology (3rd ed.). Butterworth-Heinemann.</p> <p>2. Bosch Automotive Handbook (10th ed.). (2017). Bosch Automotive Technology.</p> <p>3. Gilmore, B. (Ed.). (2019). Automotive Engineering: Powertrain, Chassis System and Vehicle Body. Intech Open</p>	<p align="center">No</p>
<p align="center"><b>Recommended Texts</b></p>	<p>1. Adler, R. J., &amp; Dolin, R. (Eds.). (2019). Safety and Reliability of Autonomous Vehicles: Developing and Applying New Technologies. CRC Press.</p> <p>2. Jazar, R. (2018). Vehicle Dynamics: Theory and Application (2nd ed.). Springer.</p> <p>3. Bifulco, G. N. (2016). Automotive Mechatronics: Operational and Practical Issues (2nd ed.). Springer.</p>	<p align="center">No</p>
<p align="center"><b>Websites</b></p>	<p>1. Society of Automotive Engineers (SAE) International: <a href="http://www.sae.org">www.sae.org</a></p> <p>2. Automotive Engineering Online: <a href="http://www.autocarpro.in">www.autocarpro.in</a></p> <p>3. Automotive News: <a href="http://www.autonews.com">www.autonews.com</a></p> <p>4. Automotive World: <a href="http://www.automotiveworld.com">www.automotiveworld.com</a></p> <p>5. Car and Driver: <a href="http://www.caranddriver.com">www.caranddriver.com</a></p> <p>6. Edmunds: <a href="http://www.edmunds.com">www.edmunds.com</a></p> <p>7. Motor Trend: <a href="http://www.motortrend.com">www.motortrend.com</a></p> <p>8. Car Design News: <a href="http://www.carsdesignnews.com">www.carsdesignnews.com</a></p> <p>9. Auto blog: <a href="http://www.autoblog.com">www.autoblog.com</a></p> <p>10. Green Car Reports: <a href="http://www.greencarreports.com">www.greencarreports.com</a></p>	

**Grading Scheme**



## MODULE DESCRIPTION FORM

## مخطط الدرجات

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

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

# Level UGIII

# Semester Four

## Module Information

معلومات المادة الدراسية

Module Title	Computer programming II (C++)	Module Delivery
Module Type	B	<input checked="" type="checkbox"/> Theory
Module Code	UOBAB0302041	<input checked="" type="checkbox"/> Lecture

MODULE DESCRIPTION FORM

ECTS Credits	3		<input checked="" type="checkbox"/> Lab	
SWL (hr/sem)	75		<input checked="" type="checkbox"/> Tutorial	
				<input type="checkbox"/> Practical
				<input checked="" type="checkbox"/> Seminar
Module Level		UGx1	Semester of Delivery	
			4	
Administering Department		Type Dept. Code	College	Type College Code
Module Leader		Dr. Ali Hussein Abead Ajaam	e-mail	met.ali.abed@uobabylon.edu.iq
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification	
			Ph.D.	
Module Tutor			e-mail	E-mail
Peer Reviewer Name		Name	e-mail	E-mail
Scientific Committee Approval Date		01/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Computer programming I	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>4. reviewing the main concepts of computer programming</li> <li>5. learning the principles of C++ language</li> <li>6. studying the basic and control statements of C++ language and its engineering applications</li> </ol>
Module Learning Outcomes	<ol style="list-style-type: none"> <li>10. reviewing some of the important concepts of computer programming</li> <li>11. introducing the principles of data types and the variables</li> <li>12. discussing the varies types of control statement of C++ computer</li> </ol>

MODULE DESCRIPTION FORM

<p>مخرجات التعلم للمادة الدراسية</p>	<p>language 13. learning the programming of arrays with C++ 14. studying functions of C++</p>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p style="text-align: right;"><u>Part 1: structured SWL</u></p> <ul style="list-style-type: none"> <li>• <u>introduction</u>: history of C++, need of C++, OOP principle, Simple program with C++ (3 h)</li> <li>• <u>Data and Variables</u>: reading and printing, data types, variable types, variable declaration, variable initialization (6 h)</li> <li>• <u>Operators and functions</u>: arithmetic operators, relational operators, logical operators, mathematical functions (3 h)</li> <li>• <u>Control statements</u>:             <ul style="list-style-type: none"> <li>a- <u>selection statements</u>: if statement , switch statement (9 h)</li> <li>b- <u>iteration statements</u>: for statement, while statement, do-while statement (9 h)</li> <li>c- <u>Jump statements</u>: break, continue, return, goto (3 h)</li> </ul> </li> <li>• <u>Arrays</u>: one dimension array, two dimension array (6 h)</li> <li>• <u>Functions</u>: general form of functions, create a function, function prototype (6 h)</li> </ul> <p style="text-align: right;"><u>Part 2: unstructured SWL</u></p> <ul style="list-style-type: none"> <li>• problem solving assignments: 5 assignment each contains 2 types of problems (fundamental problems and engineering application problems) ( 20 h)</li> <li>• project problem: selecting, investigating , programming, and reporting a problem related an engineering application (10 h including 2 h seminar )</li> </ul>
<p><b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم</p>	
<p><b>Strategies</b></p>	<p>The main strategy to deliver this module is by encouraging the students to actively participate in solving homework, prepare and take quizzes, and attend discussion groups. This strategy, besides understanding the material, will enhance the student critical thinking.</p>

**Student Workload (SWL)**

MODULE DESCRIPTION FORM

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	45	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	3
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	30	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 12	1,2 and 3,4
	Assignments	5	10% (10)	2,4,7, 11,14	1 through 5
	Laboratory	5	10% (10)	Continuous	1 through 5
	Projects /Report	1	10% (10)	15	1 through 5
Summative assessment	Midterm Exam	2hr	10% (10)	8	1 through 3
	Final Exam	3hr	50% (50)	16	1 through 5
<b>Total assessment</b>			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

MODULE DESCRIPTION FORM

	Material Covered
Week 1	Introduction to C++
Week 2	Data types
Week 3	Variables
Week 4	Operators and math. functions
Week 5	Control statements: selection : if statement
Week 6	Control statements: selection : if statement
Week 7	Control statements: selection : switch
Week 8	Midterm Exam
Week 9	Control statements: iteration: for statement
Week 10	Control statements: iteration: while statement
Week 11	Control statements: iteration: do-while statement
Week 12	Control statements: jump statements
Week 13	Arrays: one way arrays
Week 14	Arrays: two way arrays
Week 15	Functions
Week 16	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1 through 15	Students attend the computers central laboratory, practically working on materials covered in theoretical lectures.

**Learning and Teaching Resources**

MODULE DESCRIPTION FORM

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	C++ A Beginner's Guide by Herbert Schildt	No
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information

معلومات المادة الدراسية

Module Title	Automobiles Technology I	Module Delivery
Module Type	Core	<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab
Module Code	UOBAB0302042	
ECTS Credits	4	

MODULE DESCRIPTION FORM

SWL (hr/sem)	100		<input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Level	3	Semester of Delivery	1	
Administering Department		College		
Module Leader	Dr.Sabah Auda AbdulAmeer	e-mail	sabah.abdulameer@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor	Hussein ahmed hassan Ali	e-mail	ha4681177@gmail.com	
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

To enable the students to:

Module Objectives

أهداف المادة الدراسية

1. Vehicle Design and Development: One objective is to understand the principles of vehicle design and development, including aspects such as aerodynamics, ergonomics, materials selection, and structural analysis. This module aims to equip students with the knowledge required to design and develop efficient and safe automobiles.
2. Powertrain Systems: This module focuses on the study of powertrain systems, including engines, transmissions, drivelines, and associated components. The objectives may include understanding the working principles, performance characteristics, and optimization techniques for powertrain systems.



## MODULE DESCRIPTION FORM

3. Vehicle Dynamics and Control: The objective here is to learn about the dynamics of vehicles, including topics such as suspension systems, steering mechanisms, braking systems, and stability control. This module aims to provide knowledge about vehicle handling, stability, and control to enhance overall safety and performance.

4. Automotive Electronics: With the increasing role of electronics in modern vehicles, the objective of this module is to provide an understanding of electronic systems used in automobiles. Topics covered may include sensors, actuators, electronic control units (ECUs), communication networks, and vehicle diagnostics.

5. Alternative Fuels and Powertrains: As the automotive industry moves towards sustainable and environmentally friendly solutions, modules on alternative fuels and powertrains become relevant. The objectives may include studying electric and hybrid vehicle technologies, fuel cell systems, and alternative fuel options like biofuels and hydrogen.

6. Vehicle Safety and Crashworthiness: This module focuses on vehicle safety features, crash testing, and design for crashworthiness. The objectives may include understanding the principles of occupant protection, structural integrity, active safety systems, and crash simulation techniques.

7. Automotive Manufacturing Processes: The objective here is to learn about the various manufacturing processes involved in automobile production. Topics may include assembly techniques, quality control, lean manufacturing principles, and automation in the automotive industry.

8. Vehicle Maintenance and Service: This module aims to provide knowledge about vehicle maintenance, servicing, and diagnostics. The objectives may include understanding routine maintenance procedures, troubleshooting techniques, and the use of diagnostic equipment and software.

9. Emerging Technologies: Automobile technology is constantly evolving, and this module focuses on the latest trends and emerging technologies in the industry. Objectives may include exploring topics such as autonomous driving, connected vehicles, advanced driver-assistance systems (ADAS), and smart transportation solutions.

### Module Learning Outcomes

1. Demonstrate an understanding of the principles of vehicle design and development, including aerodynamics, materials selection, and structural analysis.

2. Explain the working principles, performance characteristics, and optimization techniques for powertrain systems, such as engines, transmissions, and drivelines.

3. Apply knowledge of vehicle dynamics to analyze and predict the behavior of vehicles, including suspension systems, steering mechanisms, braking systems, and stability control.

مخرجات التعلم للمادة الدراسية

## MODULE DESCRIPTION FORM

4. Understand the functioning of electronic systems used in automobiles, including sensors, actuators, electronic control units (ECUs), communication networks, and vehicle diagnostics.
5. Evaluate and analyze alternative fuels and powertrain technologies, such as electric and hybrid vehicles, fuel cell systems, biofuels, and hydrogen.
6. Analyze and apply principles of vehicle safety and crashworthiness, including occupant protection, structural integrity, active safety systems, and crash simulation techniques.
7. Demonstrate knowledge of various automotive manufacturing processes, including assembly techniques, quality control, lean manufacturing principles, and automation in the automotive industry.
8. Perform routine vehicle maintenance procedures, troubleshoot issues, and use diagnostic equipment and software to identify and rectify problems.
9. Stay updated on emerging technologies and trends in the automotive industry, such as autonomous driving, connected vehicles, advanced driver-assistance systems (ADAS), and smart transportation solutions.
10. Apply critical thinking and problem-solving skills to address real-world challenges in the field of automobile technology, including sustainability, efficiency, and safety concerns.
11. Effectively communicate technical concepts related to automobile technology through oral presentations, written reports, and other forms of documentation.
12. Collaborate effectively in multidisciplinary teams to design, develop, and implement innovative solutions in the field of automobile technology.

### Indicative Contents

المحتويات الإرشادية

The indicative contents of an automobile technology:

1. Introduction to Automobile Technology: **4hrs**
  - Evolution of automobiles
  - Basic vehicle components and systems
  - Automotive industry overview

## MODULE DESCRIPTION FORM

### 2. Vehicle Design and Development: 4hrs

- Vehicle architecture and layout
- Aerodynamics and vehicle performance
- Materials selection and lightweighting
- Structural analysis and crashworthiness

### 3. Powertrain Systems: 4hrs

- Internal combustion engines (gasoline, diesel, rotary)
- Engine performance characteristics and calculations
- Transmissions and drivelines
- Engine management systems and control

### 4. Vehicle Dynamics and Control: 4hrs

- Suspension systems and design
- Steering mechanisms and geometries
- Braking systems and technologies
- Vehicle stability and control systems

### 5. Automotive Electronics: 4hrs

- Sensors and actuators in automobiles
- Electronic control units (ECUs) and their functions
- Communication networks (CAN, LIN, FlexRay)
- Vehicle diagnostics and troubleshooting

### 6. Alternative Fuels and Powertrains: 4hrs

- Electric and hybrid vehicle technologies
- Fuel cell systems and hydrogen-powered vehicles
- Biofuels and their applications
- Sustainable energy sources for transportation

### 7. Vehicle Safety and Crashworthiness: 4hrs

- Occupant protection systems (seat belts, airbags)
- Crash testing and regulations

## MODULE DESCRIPTION FORM

- Structural design for crashworthiness

- Active safety systems (ABS, ESC, ADAS)

### 8. Automotive Manufacturing Processes: 4hrs

- Assembly techniques and processes

- Quality control in automotive manufacturing

- Lean manufacturing principles and practices

- Automation and robotics in automotive production

### 9. Vehicle Maintenance and Service: 4hrs

- Routine maintenance procedures (oil change, filter replacement)

- Troubleshooting common vehicle issues

- Diagnostic equipment and software

- Service and repair manuals

### 10. Emerging Technologies: 4hrs

- Autonomous driving technologies and systems

- Connected vehicles and V2X communication

- Advanced driver-assistance systems (ADAS)

- Smart transportation solutions (traffic management, IoT)

### 11. Environmental and Sustainability Considerations: 4hrs

- Emissions control technologies (catalytic converters, particulate filters)

- Energy efficiency and fuel economy improvements

- Life cycle assessment of vehicles

- Environmental regulations and standards

### 12. Industry Trends and Future Developments: 4hrs

- Global automotive market trends

- Electric and autonomous vehicle market projections

- Industry challenges and opportunities

- Future developments in automotive technology

## MODULE DESCRIPTION FORM

13. Autonomous Driving: AI and deep learning play a crucial role in enabling autonomous driving technology. Topics in this area may include: **3hrs**

- Sensor fusion and perception for autonomous vehicles.
- Object detection, recognition, and tracking using deep learning algorithms.
- Path planning and decision-making algorithms for autonomous navigation.
- Simulations and reinforcement learning techniques for training autonomous driving systems.

14. Advanced Driver-Assistance Systems (ADAS): AI and deep learning are utilized in ADAS to enhance vehicle safety and assist drivers. Topics may include: **2hrs**

- Lane detection and departure warning using computer vision and deep learning.
- Collision detection and mitigation systems.
- Adaptive cruise control and automatic emergency braking.
- Driver monitoring and behavior analysis using AI algorithms.

15. Natural Language Processing (NLP) for In-Vehicle Systems: AI techniques, including NLP, are used to develop voice-controlled infotainment and communication systems. Topics may include: **6hrs**

- Speech recognition and speech synthesis using deep learning.
- Natural language understanding and dialogue systems.
- Intelligent personal assistants and voice-based controls for in-car systems.

a. Predictive Maintenance: AI and deep learning are employed to predict and prevent vehicle failures and optimize maintenance schedules. Topics may include:

- Predictive modeling using machine learning and deep learning for component failure prediction.
- Sensor data analysis and anomaly detection to identify potential maintenance issues.
- Prognostics and health management (PHM) systems for predicting vehicle maintenance needs.

b. Vehicle Diagnostics and Troubleshooting: AI techniques are used to diagnose and resolve vehicle faults and malfunctions. Topics may include:

- Fault detection and diagnosis using machine learning algorithms.
- Intelligent diagnostic systems for vehicle subsystems.
- Real-time monitoring and alert systems for detecting abnormalities.

c. Traffic Management and Optimization: AI and deep learning algorithms are used to

## MODULE DESCRIPTION FORM

optimize traffic flow and improve transportation efficiency. Topics may include:

- Traffic prediction and congestion detection using machine learning.
- Intelligent traffic signal control and optimization.
- Route optimization and smart navigation systems.

d. Computer Vision for Automotive Applications: AI and deep learning are employed in various computer vision applications within the automotive industry. Topics may include:

- Object detection and recognition for advanced driver assistance.
- Gesture recognition and driver monitoring.
- Augmented reality (AR) for heads-up displays (HUD) and enhanced vehicle perception.

e. Data Analytics and Vehicle Telematics: AI techniques are used to analyze large volumes of vehicle and telematics data. Topics may include:

- Data-driven insights for vehicle performance optimization.
- Predictive analytics for fuel efficiency and energy management.
- Driver behavior analysis and insurance telematics.

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

#### Strategies

1. Lectures and Presentations: Instructors can deliver lectures and presentations to introduce theoretical concepts, principles, and technical knowledge related to automobile technology. This method helps provide a foundation of understanding and can be supplemented with visual aids, multimedia presentations, and real-world examples.

2. Hands-on Practical Activities: Practical sessions and laboratory work are crucial for students to apply theoretical knowledge in a practical setting. Hands-on activities can include disassembling and assembling components, conducting experiments, diagnosing, and troubleshooting problems, and performing maintenance tasks. These activities promote skill development and reinforce theoretical concepts.

3. Case Studies and Problem-Solving Exercises: Case studies and problem-solving exercises allow students to analyze and apply their knowledge to real-world scenarios. They can be presented with automotive-related challenges, such as optimizing powertrain performance, improving vehicle safety, or solving technical issues. Students work individually or in groups to develop solutions, fostering critical thinking and problem-solving skills.

4. Group Discussions and Debates: Group discussions and debates encourage active student

## MODULE DESCRIPTION FORM

participation and collaboration. Students can discuss and debate topics related to automobile technology, such as emerging technologies, environmental impacts, or industry trends. This strategy promotes critical thinking, communication skills, and the exchange of different perspectives.

5. Simulations and Virtual Laboratories: Simulations and virtual laboratories provide virtual environments where students can engage in realistic automotive simulations. This can include virtual vehicle testing, virtual assembly lines, or virtual diagnostic exercises. These tools offer a cost-effective and accessible way to gain practical experience and reinforce theoretical concepts.

6. Field Visits and Industry Collaboration: Organizing field visits to automotive manufacturing facilities, research institutes, or industry events can offer students firsthand exposure to the industry. Collaborating with industry professionals can provide insights into the latest technologies, practices, and industry demands. Guest lectures and industry projects can further enhance students' understanding of real-world applications.

7. Research Projects and Independent Study: Assigning research projects and encouraging independent study allows students to explore specific areas of interest within automobile technology. They can conduct in-depth research, analyze data, and present their findings. This strategy promotes self-directed learning, research skills, and the ability to stay updated with advancements in the field.

8. Online Resources and E-Learning Platforms: Utilizing online resources, digital libraries, and e-learning platforms can enhance learning accessibility and flexibility. Students can access lecture materials, interactive modules, instructional videos, and online quizzes to reinforce their understanding and review concepts at their own pace.

9. Assessment Methods: Assessments can include written exams, practical assessments, project reports, and presentations. They evaluate students' knowledge, skills, and understanding of automobile technology concepts. Incorporating a variety of assessment methods ensures a comprehensive evaluation of students' learning outcomes.

10. Continuous Feedback and Support: Providing regular feedback and support is essential to monitor students' progress and address any challenges they may face. Instructors can offer individual feedback on assignments, provide clarification during class sessions, and offer opportunities for students to seek additional help or guidance.

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	59	Structured SWL (h/w)	4
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	

MODULE DESCRIPTION FORM

<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	41	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	3	15% (15)	4,6 and 9	LO#1,2,3,4,5,6,7,8,9,10, 13and 14
	<b>Assignments</b>	5	15% (15)	2,5,6,9,13,14, and 15	LO #13, #14 and #6, #7
	<b>Projects / Lab.</b>	5	10% (10)		
	<b>Report</b>				
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	8	LO #1 - #8
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Introduction to Automobile Technology
<b>Week 2</b>	Vehicle Design and Development



MODULE DESCRIPTION FORM

<b>Week 3</b>	Powertrain Systems
<b>Week 4</b>	Vehicle Dynamics and Control
<b>Week 5</b>	Automotive Electronics
<b>Week 6</b>	Alternative Fuels and Powertrains
<b>Week 7</b>	Vehicle Safety and Crashworthiness
<b>Week 8</b>	Automotive Manufacturing Processes
<b>Week 9</b>	Vehicle Maintenance and Service
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<b>Week 15</b>	Natural Language Processing (NLP) for In-Vehicle Systems: AI techniques, including NLP, are used to develop voice-controlled infotainment and communication systems
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
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**MODULE DESCRIPTION FORM**

<p align="center"><b>Required Texts</b></p>	<p>1. Heisler, H. (2019). Advanced Vehicle Technology (3rd ed.). Butterworth-Heinemann.</p> <p>2. Bosch Automotive Handbook (10th ed.). (2017). Bosch Automotive Technology.</p> <p>3. Gilmore, B. (Ed.). (2019). Automotive Engineering: Powertrain, Chassis System and Vehicle Body. Intech Open</p>	<p align="center">No</p>
<p align="center"><b>Recommended Texts</b></p>	<p>1. Adler, R. J., &amp; Dolin, R. (Eds.). (2019). Safety and Reliability of Autonomous Vehicles: Developing and Applying New Technologies. CRC Press.</p> <p>2. Jazar, R. (2018). Vehicle Dynamics: Theory and Application (2nd ed.). Springer.</p> <p>3. Bifulco, G. N. (2016). Automotive Mechatronics: Operational and Practical Issues (2nd ed.). Springer.</p>	<p align="center">No</p>
<p align="center"><b>Websites</b></p>	<p>1. Society of Automotive Engineers (SAE) International: <a href="http://www.sae.org">www.sae.org</a></p> <p>2. Automotive Engineering Online: <a href="http://www.autocarpro.in">www.autocarpro.in</a></p> <p>3. Automotive News: <a href="http://www.autonews.com">www.autonews.com</a></p> <p>4. Automotive World: <a href="http://www.automotiveworld.com">www.automotiveworld.com</a></p> <p>5. Car and Driver: <a href="http://www.caranddriver.com">www.caranddriver.com</a></p> <p>6. Edmunds: <a href="http://www.edmunds.com">www.edmunds.com</a></p> <p>7. Motor Trend: <a href="http://www.motortrend.com">www.motortrend.com</a></p> <p>8. Car Design News: <a href="http://www.carsdesignnews.com">www.carsdesignnews.com</a></p> <p>9. Auto blog: <a href="http://www.autoblog.com">www.autoblog.com</a></p> <p>10. Green Car Reports: <a href="http://www.greencarreports.com">www.greencarreports.com</a></p>	

**Grading Scheme**

MODULE DESCRIPTION FORM

مخطط الدرجات

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

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

**Module Information**

معلومات المادة الدراسية

Module Title	Engineering Mathematics II	Module Delivery

MODULE DESCRIPTION FORM

Module Type	<b>UOBAB0302042</b>		<input checked="" type="checkbox"/> Theory
Module Code			<input checked="" type="checkbox"/> Lecture
ECTS Credits	4		<input type="checkbox"/> Lab
SWL (hr/sem)	100		<input checked="" type="checkbox"/> Tutorial
			<input type="checkbox"/> Practical
			<input type="checkbox"/> Seminar
Module Level	UO	Semester of Delivery	2
Administering Department		College	
Module Leader	Dr.wisam Naji hassan	e-mail	msb.wissam.naji@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Engineering Mathematics I	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	To provide the students with sufficient knowledge
	<ol style="list-style-type: none"> <li>To understand the concepts of basic mathematical methods for sequence , series and concepts divergent and convergent.</li> <li>To apply integration methods to solve engineering problems such as evaluation area and volume.</li> <li>Evaluate Vector Calculus.</li> <li>To understand the concepts of basic mathematical methods for complex numbers, polar coordinates and matrices.</li> </ol>

MODULE DESCRIPTION FORM

<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>The students able to:</p> <ol style="list-style-type: none"> <li>7. Identify sequence and series.</li> <li>8. Determine the sequence divergent or convergent.</li> <li>9. Evaluate double integrals techniques over a region in two dimensional geometry.</li> <li>10. Evaluation triple integrals techniques over a region in three dimensional geometry.</li> <li>11. Evaluate Vector Calculus: Scalar and vector fields, gradient, divergence, curl.</li> <li>12. Evaluate line integrals, surface integrals, Green, Stokes and Gauss theorems.</li> <li>13. Evaluate Simultaneous linear algebraic equations.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Polar Coordinates.[3hrs]</p> <p>Parametric Equations.[3hrs]</p> <p>Double Integration.[3hrs]</p> <p>Applications Of Double Integration.[3hrs]</p> <p>Triple Integration.[3hrs]</p> <p>Applications Of Triple Integration</p> <p>Sequences, Infinite Sequences, Convergence And Divergence, Infinite Series, Geometric Series, P-Series, Test For Convergence And Divergence.[3hrs]</p> <p>Power Series.[3hrs]</p> <p>Taylor And Maclorrian Series</p> <p>Complex Numbers And Variables.[3hrs]</p> <p>Lagrange Multipliers; Extra (Max, Min, And Saddle Points) .[3hrs]</p> <p>Line Integral, Surface Integral.[3hrs]</p> <p>Function Of Several Variables, Divergence Theorem Of Gauss, Green Theorem, Stokes's Theorem.[3hrs]</p> <p>Simultaneous Linear Algebraic Equations (Crammer Rule) .[3hrs]</p> <p>Simultaneous Linear Algebraic Equations ( Matrix- Inversion Method, Gauss-Elimination Method).[3hrs]</p>

MODULE DESCRIPTION FORM

Preparatory Week Before The Final Exam.[3hrs]

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	47	Structured SWL (h/w)	3
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	53	Unstructured SWL (h/w)	3
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)	<b>100</b>		
الحمل الدراسي الكلي للطالب خلال الفصل			

**Module Evaluation**

تقييم المادة الدراسية

	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative	Quizzes	3	15% (15)	5 and 10	LO #1, #2,#3,#6 and

MODULE DESCRIPTION FORM

assessment					#10, #11
	Assignments	5	15% (15)	2 and 12	LO #3, #4,#6,#9,#11 and #13
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #8
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Polar Coordinates
Week 2	Parametric Equations
Week 3	Double Integration
Week 4	Applications Of Double Integration
Week 5	Triple Integration
Week 6	Applications Of Triple Integration
Week 7	Sequences, Infinite Sequences, Convergence And Divergence, Infinite Series, Geometric Series, P-Series, Test For Convergence And Divergence
Week 8	Power Series
Week 9	Taylor And Maclorrian Series

MODULE DESCRIPTION FORM

Week 10	Complex Numbers And Variables
Week 11	Lagrange Multipliers; Extra (Max, Min, And Saddle Points)
Week 12	Line Integral, Surface Integral
Week 13	Function Of Several Variables, Divergence Theorem Of Gauss, Green Theorem, Stokes S Theorem.
Week 14	Simultaneous Linear Algebraic Equations (Crammer Rule)
Week 15	Simultaneous Linear Algebraic Equations ( Matrix- Inversion Method, Gauss- Elimination Method)
Week 16	Preparatory Week Before The Final Exam

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas Calculus	Yes
Recommended Texts		
Websites		

**Grading Scheme**

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings



MODULE DESCRIPTION FORM

	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group</b> <b>(0 – 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Thermodynamics</b>	<b>Module Delivery</b>
<b>Module Type</b>	<b>Core</b>	<input checked="" type="checkbox"/> Theory
<b>Module Code</b>	<b>UOBAB0302045</b>	<input type="checkbox"/> Lecture

MODULE DESCRIPTION FORM

ECTS Credits	7		<input checked="" type="checkbox"/> Lab	
SWL (hr/sem)	١٧٥		<input checked="" type="checkbox"/> Tutorial	
			<input type="checkbox"/> Practical	
			<input type="checkbox"/> Seminar	
Module Level	UGX	Semester of Delivery	4	
Administering Department	Automobile Engineering	College	College of Engineering\Al-Musayab	
Module Leader	Adnan Qahtan Ibrahim Issa	e-mail	adnan.issa@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>To develop problem solving skills and understanding types and transformations of energy.</li> <li>To understand types of thermodynamic processes.</li> <li>This course deals with the conversion of heat into energy, aspects of energy</li> </ol>
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MODULE DESCRIPTION FORM

	<p>and energy transformations.</p> <p>4. This is the basic subject for the case under study and describes the impact of thermodynamic processes on the properties of engineering materials.</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Recognize types and transformations of energy.</li> <li>2. Describe types of thermodynamic processes.</li> <li>3. Discuss and analyze the case under study and describe the impact of thermodynamic processes on the properties of engineering materials.</li> <li>4. Discuss the various processes including energy generation, cooling, the relationships between matter properties, and the principle of energy conservation through the study of thermodynamic processes.</li> <li>5. Explain the solutions of the quantity of energy required for carrying out a particular task in all engineering applications.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A - Application of Thermodynamics</u></p> <p>Thermodynamics and Energy Application Areas of Thermodynamics, Forms of Energy Some Physical Insight to Internal Energy Mechanical Energy More on Nuclear Energy, Energy Conversion Efficiencies, Property Diagrams for Phase-Change Processes, The T-v Diagram, The P-v Diagram Extending the Diagrams to Include the Solid Phase, The P-T Diagram The P-v-T Surface. [15 hrs]</p> <p>Property Tables Enthalpy—A Combination Property, Saturated Liquid and Saturated Vapor States 1b Saturated Liquid–Vapor Mixture. Superheated Vapor, Compressed Liquid. [15 hrs]</p> <p>The Ideal-Gas Equation of State Is Water Vapor an Ideal Gas, Compressibility Factor— A Measure of Deviation from Ideal-Gas Behavior, Energy Analysis of Closed Systems. [15 hrs]</p> <p>Moving Boundary Work Polytropic Process, Energy Balance for Closed Systems, Specific Heats, Internal Energy, Enthalpy, and Specific Heats of Ideal Gases Specific Heat Relations of Ideal Gases. Internal Energy, Enthalpy, and Specific Heat of Solids and Liquids Internal Energy Changes Enthalpy Changes. Mass and Energy Analysis of Control Volumes. [15 hrs]</p>

MODULE DESCRIPTION FORM

	<p style="text-align: right;">Revision problem classes [6 hrs]</p> <p><u>Part B - Conservation of Mass (Principle Mass Balance for Steady-Flow Processes</u> <u>Special Case: Incompressible Flow, Unsteady-Flow Processes Mass Balance)</u></p> <p style="text-align: right;">Fundamentals</p> <p>Flow Work and the Energy of a Flowing Fluid Total Energy of a Flowing Fluid Energy Transport by Mass, Energy Analysis of Steady-Flow Systems Energy Balance, Some Steady-Flow Engineering Devices, Nozzles and Diffusers, Turbines and Compressors, Throttling Valves, Mixing Chambers, Heat Exchangers, Pipe and Duct Flow.[15 hrs]</p> <p>The Second Law of Thermodynamics, Thermal Energy Reservoirs. The Second Law of Thermodynamics: Kelvin–Planck Statement, Refrigerators and Heat Pumps Coefficient of Performance Heat Pumps The Second Law of Thermodynamics: Clausius Statement Equivalence of the Two Statements, Reversible and Irreversible Processes Irreversibilities Internally and Externally Reversible Processes. [15 hrs]</p> <p>The Carnot Cycle The Reversed Carnot Cycle, Entropy A Special Case: Internally Reversible Isothermal Heat Transfer Processes, The Entropy Change of Ideal Gases Constant Specific Heats, Otto Cycle: The Ideal Cycle for Spark-Ignition Engines, Diesel Cycle: The Ideal Cycle for Compression-Ignition Engines Brayton Cycle: The Ideal Cycle for Gas-Turbine Engines Development of Gas Turbines Deviation of Actual Gas-Turbine Cycles from Idealized Ones. [15 hrs]</p>
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<p><b>Learning and Teaching Strategies</b></p> <p>استراتيجيات التعلم والتعليم</p>
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<p><b>Strategies</b></p>	<p>The objective of this skill is for the student to believe in concrete (student abilities) and to understand when, what and how to think and to improve the ability to think reasonably. The main strategy that will be adopted in delivering this module is to encourage students’ participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes,</p>
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MODULE DESCRIPTION FORM

interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. High thinking skill (the goal of this skill is to teach thinking well before making the decision that determines the student's life).

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	117	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	8
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	175		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7

MODULE DESCRIPTION FORM

	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	<b>Material Covered</b>
<b>Week 1</b>	Thermodynamics and Energy Application Areas of Thermodynamics
<b>Week 2</b>	Processes and Cycles The Steady-Flow Process
<b>Week 3</b>	The First Law of Thermodynamics Energy Balance Energy Change of a System
<b>Week 4</b>	Phase-Change Processes of Pure Substances Compressed Liquid and Saturated Liquid Saturated Vapor and Superheated Vapor Saturation
<b>Week 5</b>	The T-v Diagram, The P-v Diagram Extending the Diagrams to Include the Solid Phase, The P-T Diagram, The P-v-T Surface
<b>Week 6</b>	Property Tables Enthalpy- A Combination Property , Saturated Liquid and Saturated Vapor States 1b Saturated Liquid–Vapor Mixture, Superheated Vapor, Compressed Liquid
<b>Week 7</b>	Mid-term Exam + The Ideal-Gas Equation of State Is Water Vapor an Ideal Gas
<b>Week 8</b>	Energy Analysis of Closed Systems, Internal Energy, Enthalpy, and Specific Heats of Ideal Gases Specific Heat Relations of Ideal Gases
<b>Week 9</b>	Mass and Energy Analysis of Control Volumes, Conservation of Mass , Principle Mass Balance for Steady-Flow Processes Special Case: Incompressible Flow
<b>Week 10</b>	Flow Work and the Energy of a Flowing Fluid Total Energy of a Flowing Fluid Energy Transport by Mass
<b>Week 11</b>	Some Steady-Flow Engineering Devices

MODULE DESCRIPTION FORM

<b>Week 12</b>	Energy Analysis of Unsteady-Flow Processes Mass Balance, The Second Law of Thermodynamics, Thermal Energy Reservoirs, Reversible and Irreversible Processes
<b>Week 13</b>	The Carnot Principles, Entropy, Rankine cycle
<b>Week 14</b>	Otto Cycle: The Ideal Cycle for Spark-Ignition Engines
<b>Week 15</b>	Diesel Cycle: The Ideal Cycle for Compression-Ignition Engines
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Lab 1: Determining the volumetric expansion coefficient of liquids
<b>Week 2</b>	Lab 2: Verification of Boyle's law
<b>Week 3</b>	Lab 3: Verification of Charle's law
<b>Week 4</b>	Lab 4: Measurement of the specific heat of a solid sample
<b>Week 5</b>	Lab 5: Converting electrical energy into heat energy – Measuring with a voltmeter and an ammeter ( Joule equivalent )

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Thermodynamics An Engineering Approach (Fifth Edition)	Yes
<b>Recommended Texts</b>		No

MODULE DESCRIPTION FORM

**Module Information**

معلومات المادة الدراسية

<b>Websites</b>	<a href="https://www.coursera.org/search?query=thermodynamics&amp;index=prod_all_launched_products_term_optimization&amp;topic=Physical%20Science%20and%20Engineering">https://www.coursera.org/search?query=thermodynamics&amp;index=prod_all_launched_products_term_optimization&amp;topic=Physical%20Science%20and%20Engineering</a>
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**Grading Scheme**

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
<b>Success Group</b> (50 - 100)	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
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	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group</b> (0 - 49)	<b>FX - Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F - Fail</b>	راسب	(0-44)	Considerable amount of work required

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



MODULE DESCRIPTION FORM

Module Title	<b>Mechanical Drawing II</b>		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302056			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	GUV	Semester of Delivery	1	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Dhyai H. Jawad Aljashaami	e-mail	Dhyai.aljashaami@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Engineering Drawing	Semester	1,2
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

MODULE DESCRIPTION FORM

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. To acquire essential skills that are part of the mechanical engineering practice</li> <li>2. -To be able to communicate with other mechanical engineering professionals regardless of their spoken language.</li> <li>3. -To be able to communicate with manufacturers of mechanical system To study how the power derived from engine is transferred to rear axle</li> <li>4. To identify the obstacles faced by automobiles when goes on the road.</li> <li>5. To study the various components in automobile transmission system and its uses.</li> </ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p style="text-align: right;">At the end of this course, the student will be able to</p> <ol style="list-style-type: none"> <li>45. identify various components of SI and CI engines</li> <li>46. Describe the basic knowledge on SI and CI engine combustion and its related parameters</li> <li>47. 5. Apply their knowledge in analyzing the engine performance and pollution characteristics.</li> <li>48. Identify the different types of frame and chassis used in Automotive.</li> <li>49. Classify the different types of drivelines and drives used in Automotive.</li> <li>50. Acquire knowledge about different types of front axle and rear axles used in motor vehicles.</li> <li>51. Examine the working principle of conventional and independent suspension systems.</li> <li>52. Apply knowledge on working principles of brake and its subsystems</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p style="text-align: right;">Indicative content includes the following.</p> <p style="text-align: right;">Part A Screws</p> <p style="text-align: right;">- Classifications of Screws</p> <p style="text-align: right;">Joining by bolts or screws. Bolts Nuts</p> <p style="text-align: right;">Types of Nut Locking Arrangements</p> <p style="text-align: right;">Review Questions</p>

MODULE DESCRIPTION FORM

Application on the computer -

Using AutoCAD to draw an example of joining by bolts

Keys

- Classifications of Keys

General Discussion

Keys Joints

Cotter Joints

]

Part B - Application on computer

Using AutoCAD to draw the joining of keys or pins

Springs

- Classifications of Springs

- Drawing springs

Drawing springs

Drawing Schematic Spring Representations

Welding

Types of welding- Gas welding

- Arc welding

Basic symbols for welding gas & arc welding

Application on computer

Using AutoCAD to draw- welding assembly

Manufacturing Processes Manufacturing Processes

Surface finishing Application of surface finishing symbol

Gears: Spur Gear

-Classification of gears

- Applications

MODULE DESCRIPTION FORM

	<p>- Drawing of spur gear</p> <p>Spur gears assembly Drawing</p> <p>Application on the computer</p> <p>Using AutoCAD to draw spur gears assembly</p> <p>Bevel gear</p> <p>- Drawing of bevel gear</p>
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**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.</p>
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**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b>	62	<b>Structured SWL (h/w)</b>	4
الحمل الدراسي المنتظم للطلاب خلال الفصل		الحمل الدراسي المنتظم للطلاب أسبوعيا	
<b>Unstructured SWL (h/sem)</b>	63	<b>Unstructured SWL (h/w)</b>	4.5
الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
<b>Total SWL (h/sem)</b>			125
الحمل الدراسي الكلي للطلاب خلال الفصل			

MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments		10% (10)	2, 12	LO # 3, 4, 6 and 7
	Pr	15	10% (10)	Continuous	All
	Report		10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	3hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Screws - Classifications of Screws
Week 2	Joining by bolts or screws. Bolts Nuts Types of Nut Locking Arrangements Review Questions
Week 3	Application on the computer - Using AutoCAD to draw an example of joining
Week 4	Keys - Classifications of Keys

MODULE DESCRIPTION FORM

	<p>General Discussion</p> <p>Keys Joints</p> <p>Cotter Joints</p>
Week 5	<p>ins &amp; Rivets</p> <p>- Classifications of Pins &amp; Rivets</p>
Week 6	<p>computer</p> <p>Using AutoCAD to draw the joining of keys or pins</p>
Week 7	<p><b>Mid-term Exam</b></p>
Week 8	<p>Welding</p> <p>Types of welding- Gas welding</p> <p>- Arc welding</p>
Week 9	<p>. Energy Stored in a Flywheel. 7. Stresses in a Flywheel</p> <p>Basic symbols for welding gas &amp; arc welding</p>
Week 10	<p>1. Application on computer</p> <p>Using AutoCAD to draw- welding assembly.</p>
Week 11	<p>1. Introduction. 2. Friction Wheels. 3. Advantages and Disadvantages of Gear Drives. 4. Classification of Gears.5. Terms used in Gears. 6. Condition for Constant Velocity Ratio of Gears– Law of Gearing.</p> <p>examples</p>
Week 12	<p>Manufacturing Processes Manufacturing Processes</p> <p>Surface finishing Application of surface finishing symbol</p> <p>Review Question</p>
Week 13	<p>Spur gears assembly Drawing</p>
Week 14	<p>Gears: Spur Gear</p> <p>-Classification of gears</p>

MODULE DESCRIPTION FORM

	- Applications - Drawing of spur gear
<b>Week 15</b>	Application on the computer Using AutoCAD to draw spur gears assembly
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Engineering Drawing (الرسم الهندسي... عبد الرسول الخفاف) ١ . MACHINE DRAWING .. N. D. JUNNARKAR. 2	Y
<b>Recommended Texts</b>	Engineering Drawing & Design. (David A. Madsen)	No
<b>Websites</b>		

**Grading Scheme**

MODULE DESCRIPTION FORM

مخطط الدرجات

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

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



# Level UGIII

# Semester Five

**Module Information**

معلومات المادة الدراسية

MODULE DESCRIPTION FORM

Module Title	<b>Tribology and Automobiles lubricants</b>		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<b>UOBAB0302051</b>			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	UGIII	Semester of Delivery		
Administering Department	Automobile Dprt.	College	Type College Code	
Module Leader	Mushrek Allawi Mahdi		e-mail	Msb.mushrek.alawi@uobabylon.ed u.iq
Module Leader's Acad. Title	Lec.	Module Leader's Qualification		
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Mechanical Design	Semester	2
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>To understand the basic concepts of Tribology and lubrication.</li> <li>To understand the classification of Lubricants</li> <li>Recognize the oil Viscosity Classification</li> <li>Explain the hydrodynamic theory of lubrication</li> <li>To understand the lubrication system in internal combustion engine (ICE).</li> <li>Describe the Squeeze-Film Lubrication</li> <li>Explain the Elasto-hydrodynamic lubrication.</li> </ol>
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## MODULE DESCRIPTION FORM

	8. Explain the friction and wear.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<p style="text-align: center;">Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Recognize on the concepts of the tribology in mechanical parts.</li> <li>2. Explain the classification of lubricants.</li> <li>3. Describe the hydrodynamic lubrication in journal bearing</li> <li>4. Summarize what is lubrication.</li> <li>5. Explain the Engine Lubrication System.</li> <li>6. Describe friction and wear.</li> </ol>
<b>Indicative Contents</b> المحتويات الإرشادية	
<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	45	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	3
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	30	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	75		

### Module Evaluation

تقييم المادة الدراسية

MODULE DESCRIPTION FORM

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Tribology
Week 2	Classification of Lubricants
Week 3	Oil Viscosity Classification
Week 4	Classification of Bearings
Week 5	Hydrodynamic Lubrication Theory
Week 6	Hydrodynamic journal bearing-2
Week 7	Hydrodynamic journal bearing -2
Week 8	Mid-Exam
Week 9	Engine Lubrication System
Week 10	Squeeze-Film Lubrication
Week 11	Rolling/ball Bearings

MODULE DESCRIPTION FORM

Week 12	Elasto-hydrodynamic
Week 13	Friction
Week 14	wear
Week 15	Other Applications of tribology
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introduction to Tribology of Bearings, B. C. Majumder Basic Lubrication Theory, Alastair Cameron	no
Recommended Texts	Basic Lubrication Theory, Alastair Cameron Principles of Tribology, J.Halling	No
Websites		

Grading Scheme

مخطط الدرجات

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

MODULE DESCRIPTION FORM

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

**Module Information**

معلومات المادة الدراسية

Module Title	Engineering Analyses		Module Delivery	
Module Type			<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302052			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGx11 3	Semester of Delivery	1	
Administering Department		College		
Module Leader	Dr.wisam Najji hassan		e-mail	msb.wissam.naji@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor		e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

Prerequisite module		None	Semester	
Co-requisites module		None	Semester	

MODULE DESCRIPTION FORM

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<p>To enable the students to :</p> <ol style="list-style-type: none"> <li>1. implement and solve mathematical models for engineering problems.</li> <li>2. understand Fourier series and its applications.</li> <li>3. Knowledge OF the basic concept of Laplace transformations and its applications.</li> <li>4. Solve ordinary and partial differential equations .</li> </ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Knowledge of applications Laplace transformation applications and solving problems that involve it.</li> <li>2. Knowledge applications of Fourier series applications and solving problems that involve it</li> <li>3. solving integration problems Using Special functions (Gamma and Beta).</li> <li>4. solving Complex integration by integral by residual method.</li> <li>5. Solving ordinary differential equations.</li> <li>6. Solving partial differential equations.</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Laplace Transformation.[4hrs]</p> <p>Laplace Transformation Applications.[4hrs]</p> <p>Fourier Series.[4hrs]</p> <p>Fourier Series.[4hrs]</p> <p>Fourier Series. .[4hrs]</p> <p>Power series solutions of differential equations (Legendre, Bessel) .[4hrs]</p> <p>Complex integration (integral by residual method) .[4hrs]</p> <p>Laplace Partial differential equation.[4hrs]</p> <p>Poisson Partial differential equation.[4hrs]</p> <p>heat Partial differential equation.[4hrs]</p> <p>wave Partial differential equation.[4hrs]</p>

MODULE DESCRIPTION FORM

	<p>Line integrals.[4hrs]</p> <p>surface integrals.[4hrs]</p> <p>Conformal Mapping.[4hrs]</p> <p>Special functions (Gamma, Beta, Error ) .[4hrs]</p>
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**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.</p>
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**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b>	60	<b>Structured SWL (h/w)</b>	4
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
<b>Unstructured SWL (h/sem)</b>	65	<b>Unstructured SWL (h/w)</b>	4
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
<b>Total SWL (h/sem)</b>	<b>125</b>		
الحمل الدراسي الكلي للطالب خلال الفصل			



MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	3,6 and 9	LO#1,2,3,4,5,6,7,8,9,10, 13and 14
	Assignments	5	15% (15)	2,5,6,9 and 13	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Laplace Transformation
Week 2	Laplace Transformation Applications:
Week 3	Fourier Series
Week 4	Fourier Series
Week 5	Fourier Series
Week 6	Power series solutions of differential equations (Legendre, Bessel);
Week 7	Complex integration (integral by residual method)
Week 8	Laplace Partial differential equation

MODULE DESCRIPTION FORM

Week 9	Poisson Partial differential equation
Week 10	heat Partial differential equation
Week 11	wave Partial differential equation
Week 12	Line integrals
Week 13	surface integrals
Week 14	Conformal Mapping
Week 15	Special functions (Gamma, Beta, Error )
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, by C. R. Wylie	Yes
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria

MODULE DESCRIPTION FORM

<b>Fail Group</b> <b>(0 – 49)</b>	<b>FX – Fail</b>	راسب (فيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Internal Combustion Engine</b>		<b>Module Delivery</b>	
<b>Module Type</b>	<b>Core</b>		<b>x Theory</b>	
<b>Module Code</b>	<b>UOBAB0302053</b>		<b>Lecture</b>	
<b>ECTS Credits</b>	<b>6</b>		<b>x Lab</b>	
<b>SWL (hr/sem)</b>	<b>150</b>		<b>x Tutorial</b>	
			<b>Practical</b>	
			<b>Seminar</b>	
<b>Module Level</b>		<b>3</b>	<b>Semester of Delivery</b>	
			<b>1</b>	
<b>Administering Department</b>		Type Dept. Code	<b>College</b>	Type College Code
<b>Module Leader</b>	Emad Dawood Aboud		<b>e-mail</b>	met.emad.dawood@uobabylon.edu.iq
<b>Module Leader's Acad. Title</b>		Assist Professor	<b>Module Leader's Qualification</b>	
			Ph.D.	
<b>Module Tutor</b>	Name (if available)		<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>		Name	<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>		01/06/2023	<b>Version Number</b>	
			1.0	

MODULE DESCRIPTION FORM

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	Automobiles Technology I+Automobiles Technology II	<b>Semester</b>	1 + 2
<b>Co-requisites module</b>	Hybrid Vehicles	<b>Semester</b>	2

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1- Learn how to study the design, manufacture, assembly, and determination of the defect for automobiles.</li> <li>2- Calculating of thermal, mechanical, volumetric efficiencies, and work done.</li> <li>3- Study the engine performance.</li> <li>4- Investigate the combustion types and stages.</li> <li>5- Study the abnormal phenomena of the engine as well as Knock.</li> <li>6- Learn how to study the supercharging and turbocharging process for the engine.</li> <li>7- Educating and training students to obtain a Bachelor of Science in Engineering degree in Automotive Engineering.</li> <li>8- 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.</li> <li>9- 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.</li> <li>10- 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.</li> </ol>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Learn with understand the parts of engine.</li> <li>2. Calculation of the work of engines.</li> <li>3. Comparison between Two and Four Stroke.</li> <li>4. Derivations of Otto cycle.</li> <li>5. Derivations of diesel cycle.</li> <li>6. Derivations of Dual Cycle.</li> </ol>

**MODULE DESCRIPTION FORM**

	<p>7. Study of performance of the engines.</p> <p>8. Understand the indicated pressure diagram .</p> <p>9. Understand the heat balance sheet.</p> <p>10. Study of fuel injection systems.</p> <p>11. Study the engine cooling system.</p> <p>12. Study and understand most of the diagrams related to performance, combustion and exhaust gases.</p>
<p align="center"><b>Indicative Contents</b></p> <p align="center">المحتويات الإرشادية</p>	<p align="right"><b><u>Indicative content includes the following.</u></b></p> <p>General information on engines, specification and parameters of engines, engines working, theoretical cycles, derivational of Otto cycles, solving exercises of Otto cycle, derivational of Diesel Cycle, solving exercises of Diesel cycle, Dual cycle, solving exercises of Dual cycle . [16 hrs]</p> <p>Study of engine performance, Analysis of engine parameters, Calculation of all Efficiencies, Study of indicator diagram, study of heat balance sheet, Analyzing most engine parameter diagrams, Analysis of most exhaust gas diagrams, solving exercises of Engine performance parameters . [16 hrs]</p> <p>Fuel injection system, Definition and explanation, Principle of Carburetor working, Air-fuel flow derivations for the incompressible fluid flow, Air-fuel flow derivations for the compressible fluid flow, Types of Carburetor, Carburetor characteristics at altitude, Characteristics of a carburetor using an air cleaner, solving exercises on Carburetor . [16 hrs]</p> <p>Fuel and Combustion, Types of combustion, Exhaust gas analysis for the theoretical combustion case, Exhaust gas analysis for the complete combustion case, Exhaust gas analysis for the incomplete combustion case, Calculation of Exhaust gas Temperature and Pressure. [20 hrs]</p> <p>Principle working of Supercharge engines, Principle working of turbocharge Engines, Tpes of Supercharger, Power derivations for the Compressor, solving exercises on Supercharging, solving exercises on Turbocharging . [16 hrs]</p> <p>Principle working of Two stroke Engines, Two-stroke engine specifications, solving exercises on Two stroke engines. [7 hrs]</p> <p>Combustion Stages in Diesel Engines, Factors affecting combustion stages, Diagrams describing combustion stages, Knock phenomenon in diesel engines [7 hrs]</p>

MODULE DESCRIPTION FORM

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students and 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.

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب ل ١٥ أسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	103	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	7
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	47	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	3
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>150</b>		

MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1- #10
	Assignments	2	10% (10)	2 and 12	LO #1-#12
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #4, #5, #9 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	General information on engines, specification and parameters of engines, engines working, theoretical cycles.
Week 2	Derivational of Otto cycles solving exercises of Otto cycle.
Week 3	Derivational of Diesel Cycle, solving exercises of Diesel cycle.
Week 4	Dual cycle, solving exercises of Dual cycle.
Week 5	Study of engine performance, Analysis of engine parameters, Calculation of all Efficiencies, Study of indicator diagram study of heat balance sheet.
Week 6	Analyzing most engine parameter diagrams, Analysis of most exhaust gas diagrams, solving exercises of Engine performance parameters.
Week 7	<b>Mid-term Exam</b> + Fuel injection system, Definition and explanation, Principle of Carburetor working.
Week 8	Air-fuel flow derivations for the incompressible fluid flow, Air-fuel flow derivations for the compressible fluid flow.

## MODULE DESCRIPTION FORM

<b>Week 9</b>	Types of Carburetor, Carburetor characteristics at altitude, Characteristics of a carburetor using an air cleaner, solving exercises on Carburetor.
<b>Week 10</b>	Fuel and Combustion, Types of combustion.
<b>Week 11</b>	Exhaust gas analysis for the theoretical combustion case, Exhaust gas analysis for the complete combustion case.
<b>Week 12</b>	Exhaust gas analysis for the incomplete combustion case, Calculation of Exhaust gas Temperature and Pressure.
<b>Week 13</b>	Principle working of Supercharge engines, Principle working of turbocharge Engines, Types of Supercharger, Power derivations for the Compressor.
<b>Week 14</b>	solving exercises on Supercharging, solving exercises on Turbocharging.
<b>Week 15</b>	Combustion Stages in Diesel Engines, Factors affecting combustion stages, Diagrams describing combustion stages, Knock phenomenon in diesel engines.
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Lab 1: Experimental study on the Engine parts
<b>Week 2</b>	Lab 2: Air Fuel Ratio measurement
<b>Week 3</b>	Lab 3: Calculation of the volumetric Efficiency under Various Load for single cylinder four stroke Diesel Engine
<b>Week 4</b>	Lab 4: Calculation of Mass Flow Rate of fuel
<b>Week 5</b>	Lab 5: Measurement of specific Fuel Consumption at Constant Speed with Varying of output Power
<b>Week 6</b>	Lab 6: Measurement of the Engine Thermal Efficiency
<b>Week 7</b>	Lab 7: Analytical of The Exhaust Gas Emissions



MODULE DESCRIPTION FORM

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introduction to Internal Combustion Engines Richard Stone	Yes
Recommended Texts	Internal Combustion Engine Fundamentals Heywood, John	No
Websites	<a href="https://gctbooks.files.wordpress.com/2016/02/internal-combustion-engine-fundamentals-by-j-b-heywood.pdf">https://gctbooks.files.wordpress.com/2016/02/internal-combustion-engine-fundamentals-by-j-b-heywood.pdf</a>	

**Grading Scheme**

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Machine Elements Design (with CAD)</b>		<b>Module Delivery</b>	
<b>Module Type</b>	Support or related learning activity		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	<b>UOBAB0302054</b>			
<b>ECTS Credits</b>	6			
<b>SWL (hr/sem)</b>	88			
<b>Module Level</b>	UO	<b>Semester of Delivery</b>	5	
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code	
<b>Module Leader</b>	Name Ahmed Ali Toman	<b>e-mail</b>	E-mail	
<b>Module Leader's Acad. Title</b>	Ass. Lecturer	<b>Module Leader's Qualification</b>	M.Sc.	
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail: ahmed.toman@uobabylon.edu.iq	
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail	
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

MODULE DESCRIPTION FORM

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	Mathematics I, Mathematics II, Engineering Mathematics I, Engineering Mathematics II, Metallurgy & Automobile Materials, Mechanical Drawing I with Solid Works, Engineering Mechanics (Statics), Engineering Mechanics (Dynamics), Strength of Materials	<b>Semester</b>	1,2,3,4
<b>Co-requisites module</b>	Theory of Machines	<b>Semester</b>	5

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

**Module Objectives**

أهداف المادة الدراسية

1. To develop problem solving skills and understanding of materials static failure theories through the application of techniques.
2. To develop problem solving skills and understanding of materials dynamic (fatigue) failure theories through the application of techniques.
3. To understand safety factors.
4. To understand stress concentration factor and fatigue stress concentration factors.
5. To understand and perform Stress –life curves.
- 6.
7. This course deals with the concept of material failure under static and dynamic loads.
8. To understand the differences between the failure of ductile materials and brittle materials.
9. To understand the differences between the failure of even brittle materials and uneven brittle materials.
- 10.

**Module Learning Outcomes**

- 1- Students develop a complete knowledge on:
- Why do parts fail under static load?

## MODULE DESCRIPTION FORM

مخرجات التعلم للمادة  
الدراسية

- Failure of Ductile Materials Under Static Loading
- How to estimate the safety factor of a part under a certain static load.

2- Students develop a complete knowledge on:

- Mechanism of Fatigue Failure.
- Fatigue-Failure Models.
- Measuring Fatigue Failure Criteria.
- Estimating Fatigue Failure Criteria.
- Estimating the Theoretical Fatigue Strength  $S_f'$  or Endurance Limit.

3. To design shafts.

4. To design different types of keys.

5. To design different types of mechanical shaft couplings.

6-Develop a complete knowledge on how to use the equations and tables, that used to design and evaluate the life of the machine parts.

**Indicative  
Contents**

المحتويات الإرشادية

This is often the first course for automobile engineering students that presents them with design challenges. Nevertheless, the type of design addressed in this course is that of detailed design, which is only one part of the entire design-process spectrum.

This course deals with the concept of material failure under static and dynamic loads. Stress and strain were discussed in the previous stages but were incompletely defined at that juncture. In this course, we will present a more complete definition of what is meant by the terms stress, strain, and deflection. Module Objectives are to develop problem solving skills and understanding of materials static failure theories through the application of techniques, develop problem solving skills and understanding of materials dynamic (fatigue) failure theories through the application of techniques, understand safety factors, understand stress concentration factor and fatigue stress concentration factors, understand and perform Stress – life curves, understand the differences between the failure of ductile materials and brittle materials, understand the differences between the failure of even brittle materials and uneven brittle materials.

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

**Strategies**

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple assignments involving

MODULE DESCRIPTION FORM

activities that are interesting to the students.

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	88	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	62	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>150</b>		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	3	5% (5)	4 ,8,12	LO #3, #4 and #6, #7
	Projects / Lab.	2	20% (20)	Continuous	All
Summative assessment	Midterm Exam	2hr	15% (15)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

MODULE DESCRIPTION FORM

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Design Philosophy
Week 2	Design Procedure and review of Engineering Materials
Week 3	Stresses In Machine Elements
Week 4	Static Failure Theories For Ductile Materials
Week 5	Static Failure Theories For Brittle Materials
Week 6	Factors Of Safety And Design Codes
Week 7	Mid-term Exam.
Week 8	Mechanism Of Fatigue Failure
Week 9	Fatigue Loads
Week 10	Fatigue Failure Under Uniaxial Loading
Week 11	Design For Combined Fatigue Loading
Week 12	Notches And Stress Concentrations
Week 13	Design Of Shafts
Week 14	Design Of Keys And Couplings
Week 15	Design Of Couplings
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered: Computer Aided Design (CAD) by SolidWorks
Week 1	Introduction to computer aided design (CAD) by SolidWorks, SolidWorks windows and SolidWorks Tools.

MODULE DESCRIPTION FORM

**Learning and Teaching Resources**

مصادر التعلم والتدريس

		Text	Available in the Library?
<b>Week 4</b>	<b>3D Fe</b>		
<b>Required Texts</b>		Machine Design: An Integrated Approach, by Robert L.	Yes
		Chapter 1: Evaluation of Normal, Shear and Principal <b>Stresses</b> by SolidWorks.	
<b>Recommended Texts</b>		Chapter II: Evaluation of <b>stress concentration</b> factor by SolidWorks.	No
		Shigley's Mechanical Engineering Design	
<b>Websites</b>		Chapter III: Evaluation of <b>fatigue life</b> by SolidWorks.	
		<a href="https://www.coursera.org/browse/physical-science-and-engineering">https://www.coursera.org/browse/physical-science-and-engineering</a>	

**Grading Scheme**

مخطط الدرجات

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

MODULE DESCRIPTION FORM

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Theory of Machines</b>		<b>Module Delivery</b>	
<b>Module Type</b>	<b>Support</b>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	<b>UOBAB0302055</b>			
<b>ECTS Credits</b>	٦			
<b>SWL (hr/sem)</b>	١٥.			
<b>Module Level</b>	U	<b>Semester of Delivery</b>	1	
<b>Administering Department</b>	Automobile	<b>College</b>	College of Engineering/ AL-Musayab	
<b>Module Leader</b>	Mohanad Ramadhan Hameed	<b>e-mail</b>	msb.mohanad.ramadhan@uobabylon.edu.iq	
<b>Module Leader's Acad. Title</b>	Assistant Lecturer	<b>Module Leader's Qualification</b>	M.Sc.	
<b>Module Tutor</b>		<b>e-mail</b>		
<b>Peer Reviewer Name</b>		<b>e-mail</b>		
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

**Relation with other Modules**



MODULE DESCRIPTION FORM

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	<p style="text-align: right;">Understand</p> <ol style="list-style-type: none"> <li>1- Fundamentals of Mechanisms and Machines.</li> <li>2- Displacement, Velocity and Acceleration in Mechanism.</li> <li>3- Flywheels and Gears.</li> </ol>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> <li>1- Student will be able to analyze the displacement of different mechanisms using graphical techniques.</li> <li>2- Student will be able to analyze the velocity of different mechanisms using graphical and analytical techniques.</li> <li>3- Student will be able to analyze the acceleration of different mechanisms using graphical and analytical techniques.</li> <li>4- Student will know the turning moment diagram and how the flywheel differs from the governor.</li> <li>5- Student will be able to understand flywheel function and energy fluctuation.</li> <li>6- Student will be able to understand types of gears, terminology for gear teeth and gears trains, kinematics of gears.</li> </ol>
<b>Indicative Contents</b> المحتويات الإرشادية	<p><b>Mechanisms</b> - Basic definitions, Method of transmitting motion, Angler velocity ratio. [6 hrs]</p> <p><b>Velocity in Mechanism</b> - Method for determining velocities, Instant centers, Relative velocities, Linear velocities, Velocity image, Angular velocities. [6 hrs]</p> <p><b>Acceleration in Mechanism</b> - Linear acceleration, Acceleration image, Equivalent linkage, Coriolis acceleration. [6 hrs]</p>

## MODULE DESCRIPTION FORM

	<p><b>Turning Moment Diagram</b> - Turning moment or torque on the crankshaft, Single Cylinder Double Acting Steam Engine, Four Stroke Cycle Internal Combustion Engine, Multicylinder Engine, Fluctuation of Energy, Maximum fluctuation of energy, Coefficient of fluctuation of energy. [24 hrs]</p> <p><b>Flywheel</b> - Coefficient of Fluctuation of Speed, Energy Stored in a Flywheel, Dimensions of the Flywheel Rim, Flywheel in Punching Press. [24 hrs]</p> <p><b>Gear</b> - Types of gears, Gear tooth terminology. [6 hrs]</p> <p><b>Gear Trains</b> - Automotive transmission, Planetary or epicyclic gear trains, Velocity ratio of epicyclic gear trains, Tabular method. [6 hrs]</p> <p><b>Kinematics of Gears</b> - Kinematics of Gears - Arc of contact, contact ratio, sliding velocity, checking for interference, Minimum number of teeth on the pinion in order to avoid interference, Internal gears. [6 hrs]</p>
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### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.</p>
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### Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b>	88	<b>Structured SWL (h/w)</b>	6
الحمل الدراسي المنتظم للطلاب خلال الفصل		الحمل الدراسي المنتظم للطلاب أسبوعيا	
<b>Unstructured SWL (h/sem)</b>	62	<b>Unstructured SWL (h/w)</b>	4

MODULE DESCRIPTION FORM

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
<b>Total SWL (h/sem)</b>	<b>150</b>		
الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4 and 7	LO #1 - #3
	Assignments	2	10% (10)	10 and 14	LO #4 - #6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #1, #2 and #3
Summative assessment	Midterm Exam	2hr	10% (10)	9	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Mechanisms
Week 2	Velocity in Mechanism
Week 3	Acceleration in Mechanism
Week 4	Turning Moment Diagram
Week 5	Single Cylinder Double Acting Steam Engine
Week 6	Four Stroke Cycle Internal Combustion Engine

MODULE DESCRIPTION FORM

<b>Week 7</b>	Multicylinder Engine
<b>Week 8</b>	Fluctuation of Energy
<b>Week 9</b>	Mid-term Exam + Flywheel
<b>Week 10</b>	Coefficient of Fluctuation of Speed
<b>Week 11</b>	Energy Stored in a Flywheel
<b>Week 12</b>	Dimensions of the Flywheel Rim
<b>Week 13</b>	Gear types and Terminology
<b>Week 14</b>	Gear Trains
<b>Week 15</b>	Kinematics of Gears
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Lab 1: Slider – Crank Mechanism
<b>Week 2</b>	Lab 2: Four bar chain
<b>Week 3</b>	Lab 3: Moment of inertia of flywheel
<b>Week 4</b>	Lab 4: Epicyclic Gear Trains
<b>Week 5</b>	Lab Exam

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?

MODULE DESCRIPTION FORM

<b>Required Texts</b>	Khurmi, R. S., & Gupta, J. K. (2005). Theory of machines. S. Chand Publishing	Yes
<b>Recommended Texts</b>	Singh, S. (2005). Theory of machines. Pearson Education India.	No
<b>Websites</b>		

**Grading Scheme**

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Automotive Hydraulics and Pneumatics Systems</b>			<b>Module Delivery</b>
<b>Module Type</b>	Support or related learning activity			<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
<b>Module Code</b>	<b>UOBAB0302056</b>			
<b>ECTS Credits</b>	<b>4</b>			
<b>SWL (hr/sem)</b>	<b>114</b>			
<b>Module Level</b>	UGIIIU	<b>Semester of Delivery</b>	5	
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code	
<b>Module Leader</b>	Hamid Hussain Hadwan	<b>e-mail</b>	met.hamed.huss@uobabylon.edu.iq	
<b>Module Leader's Acad. Title</b>	Master	<b>Module Leader's Qualification</b>	M.E.	
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail	
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail	
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

**Relation with other Modules**

MODULE DESCRIPTION FORM

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	Fluid Mechanics	<b>Semester</b>	3
<b>Co-requisites module</b>	Engineering Mechanics (Dynamics)	<b>Semester</b>	4
<b>Co-requisites module</b>	Engineering Mechanics (Statics)	<b>Semester</b>	2

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<p>Students learn In this e-seminar covers the most relevant topics related to Hydraulic and pneumatic systems – which consist of:</p> <p>1. Advantages of fluid power, Applications of fluid power system. A brief comparison - Electrical system – Hydraulic system – Pneumatic system. Pascal's law - Boyle's law. Types of fluid power system - Properties of hydraulic fluids - Properties of air.- Hydraulic and Pneumatic symbols.</p> <p>2. HYDRAULIC SYSTEMS: Hydraulic valves: Classification – Pressure – Flow – Direction controls.</p> <p>3. HYDRAULIC CIRCUITS: Hydraulic circuits – Reciprocating - Quick return – Sequencing – Synchronizing – Intensifier circuit - Accumulator circuits – Safety circuits –Milling Machine circuits - Press – Planner – Fork lift. Electro hydraulic circuits.</p> <p>4. PNEUMATIC SYSTEMS 5. PNEUMATIC CIRCUITS: Principles of Low Cost Automation - Case studies</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>1. Explain what fluid power is.</p> <p>2. Differentiate between the terms hydraulics and pneumatics.</p> <p>3. Understand the difference between fluid power systems and fluid transport systems.</p> <p>4. Appreciate the history of the fluid power industry.</p> <p>5. Discuss the advantages and disadvantages of fluid power.</p> <p>6. Describe key applications of fluid power.</p> <p>7. Specify the basic components of fluid power systems.</p> <p>8. Appreciate the size and scope of the fluid power industry.</p>

## MODULE DESCRIPTION FORM

9. Identify the categories of personnel who employed in the fluid power industry.
10. Explain the primary functions of a hydraulic fluid.
11. Define the term fluid.
12. Distinguish between a liquid and a gas.
13. Appreciate the properties desired of a hydraulic fluid.
14. Define the terms specific weight, density, and specific gravity.
15. Understand the terms pressure, head, and force.
16. Differentiate between gage pressures and absolute pressures.
17. Calculate the force created by a pressure.
18. Understand the terms kinematic viscosity and absolute viscosity.
19. Convert viscosity from one set of units to another set of units.
20. Explain the difference between viscosity and viscosity index.
21. Describe the purpose, construction, and operation of various directional control valves.
22. Differentiate among two-way, three-way, and four-way directional control valves.
23. Identify the graphic symbols used for directional, pressure, and flow control valves.
24. Describe the purpose, construction, and operation of mechanical hydraulic and electrohydraulic servo valves.
25. Discuss the purpose, construction, and operation of cartridge valves
26. Identify the most common causes of hydraulic system breakdown.
27. Understand the significance of oxidation and corrosion prevention of hydraulic fluids.
28. Discuss the various types of fire-resistant fluids.
29. Recognize the significance of foam-resistant fluids.
30. Understand the significance of the neutralization number of a hydraulic fluid.
31. Explain the environmental significance of properly maintaining and disposing of hydraulic fluids.
32. Describe the operation of filters and strainers and specify the locations where filters and strainers should be located in hydraulic circuits.
33. Understand the significance of the parameter Beta ratio relative to how well a filter traps particles.
34. Calculate the Beta ratio and Beta efficiency of filters.
35. Understand the concept of specifying fluid cleanliness levels required for various hydraulic components



## MODULE DESCRIPTION FORM

<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Introduction to Hydraulics and Pneumatics[5 hrs]</p> <p>Applications of fluid power system. A brief comparison - Electrical system – Hydraulic system – Pneumatic system. [5 hrs]</p> <p>Pascal's law - Boyle's law. Types of fluid power system - Properties of hydraulic fluids [5 hrs] Properties of air.- Hydraulic and Pneumatic symbols. [5 hrs]</p> <p>Hydraulic pumps: Pump classification – Gear pump, Vane pump, Piston pump, construction and working of pumps – Variable [5 hrs]</p> <p>Displacement pumps. Hydraulic actuators: Classification – Linear hydraulic actuators – Types of hydraulic cylinders – single acting, Double acting and telescopic – Cushioning mechanism. Rotary actuators-Fluid motors, Gear, Vane and Piston motors. Hydraulic valves: Classification – Pressure – Flow – Direction controls. [5 hrs]</p> <p>Hydraulic circuits – Reciprocating - Quick return – Sequencing – Synchronizing – Intensifier circuit [5 hrs]</p> <p>Accumulator circuits – Safety circuits –Milling Machine circuits [5 hrs]</p> <p>Press – Planner – Forklift. Electro hydraulic circuits[5 hrs]</p> <p>Fundamentals of Pneumatics [5 hrs]</p> <p>Control Elements - Logic Circuits - Position - Pressure Sensing[5 hrs] - Switching – Electro Pneumatic Circuits - Robotic Circuits. [5 hrs]</p> <p>Design of Pneumatic circuits [5 hrs]</p> <p>Classic-Cascade-Step counter - Combination -Methods - PLC Microprocessors [5 hrs]</p> <p>Installation and Maintenance of Hydraulic and Pneumatic power packs - Fault finding - Principles of Low Cost Automation [5 hrs]</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>Type something Like the main strategy that will be adopted in delivering this module is to encourage students’ participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.</p>
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MODULE DESCRIPTION FORM

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	89	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	61	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>150</b>		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	<b>Assignments</b>	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

<b>Material Covered</b>
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MODULE DESCRIPTION FORM

<b>Week 1</b>	Introduction to Hydraulics and Pneumatics
<b>Week 2</b>	Applications of fluid power system. A brief comparison - Electrical system – Hydraulic system – Pneumatic system.
<b>Week 3</b>	Pascal's law - Boyle's law. Types of fluid power system - Properties of hydraulic fluids - Properties of air.- Hydraulic and Pneumatic symbols.
<b>Week 4</b>	Hydraulic pumps: Pump classification – Gear pump, Vane pump, Piston pump, construction and working of pumps – Variable
<b>Week 5</b>	Displacement pumps. Hydraulic actuators: Classification – Linear hydraulic actuators – Types of hydraulic cylinders – single acting,
<b>Week 6</b>	Double acting and telescopic – Cushioning mechanism. Rotary actuators-Fluid motors, Gear, Vane and Piston motors. Hydraulic valves: Classification – Pressure – Flow – Direction controls.
<b>Week 7</b>	Midterm Exam + Hydraulic circuits – Reciprocating - Quick return – Sequencing – Synchronizing – Intensifier circuit
<b>Week 8</b>	Accumulator circuits – Safety circuits –Milling Machine circuits
<b>Week 9</b>	Press – Planner – Forklift. Electro hydraulic circuits
<b>Week 10</b>	Fundamentals of Pneumatics
<b>Week 11</b>	Control Elements - Logic Circuits - Position - Pressure Sensing - Switching – Electro Pneumatic Circuits - Robotic Circuits.
<b>Week 12</b>	Design of Pneumatic circuits
<b>Week 13</b>	Classic-Cascade-Step counter - Combination -Methods -
<b>Week 14</b>	PLC Microprocessors
<b>Week 15</b>	Installation and Maintenance of Hydraulic and Pneumatic power packs - Fault finding - Principles of Low Cost Automation
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	Lab 1: Hydraulic Applications of Pascal's law - Boyle's law.
<b>Week 2</b>	Lab 2: Types of fluid power system - Properties of hydraulic fluids - Properties of air

MODULE DESCRIPTION FORM

<b>Week 3</b>	Lab 3: Hydraulic Applications of pumps: Pump classification – Gear pump, Vane pump, Piston pump, construction and working of pumps – Variable displacement pumps.  Using Fundamentals of Hydraulic Applications of Pneumatics - Control Elements - Logic Circuits - Position - Pressure Sensing - Switching – Electro Pneumatic Circuits - Robotic Circuits. 5. PNEUMATIC CIRCUITS Design of Pneumatic circuits - Classic-Cascade-Step counter.
<b>Week 4</b>	Lab 4: using Hydraulic Applications of actuators: Classification – Linear hydraulic actuators – Types of hydraulic cylinders – single acting, Double acting and telescopic – Cushioning mechanism. Rotary actuators-Fluid motors, Gear, Vane and Piston motors.
<b>Week 5</b>	Lab 5: Hydraulic Applications of valves: Classification – Pressure – Flow – Direction controls.
<b>Week 6</b>	Lab 6: Hydraulic Applications of circuits – Reciprocating – Quick return – Sequencing – Synchronizing – Intensifier circuit - Accumulator circuits – Safety circuits –Milling Machine circuits - Press – Planner – Forklift. Electro hydraulic circuits.
<b>Week 7</b>	Lab 7: Hydraulic Applications of Combination Methods - PLC-Microprocessors - Uses - Selection criteria for Pneumatic components - Installation and Maintenance of Hydraulic and Pneumatic power packs - Fault finding - Principles of Low Cost Automation - Case studies

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Anthony Esposito, —Fluid Power with Applications  , Pearson Education 2000.	Yes
<b>Recommended Texts</b>	Andrew Parr, " Hydraulics and Pneumatics (HB) ", Jaico Publishing House, 1999.	No
<b>Websites</b>	<a href="https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering</a>	

**Grading Scheme**

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors

MODULE DESCRIPTION FORM

	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

# Level UGIII

# Semester Six

## Module Information

معلومات المادة الدراسية

Module Title	Numerical Analysis (with computer applications)	Module Delivery	
Module Type	B	<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302061		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	U		Semester of Delivery

MODULE DESCRIPTION FORM

<b>Administering Department</b>		<b>College</b>	
<b>Module Leader</b>	Dr.wisam Naji hassan	<b>e-mail</b>	msb.wissam.naji@uobabylon.edu.iq
<b>Module Leader's Acad. Title</b>	lecturer	<b>Module Leader's Qualification</b>	Ph.D.
<b>Module Tutor</b>		<b>e-mail</b>	
<b>Peer Reviewer Name</b>		<b>e-mail</b>	
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<p>To enable the students to :</p> <ol style="list-style-type: none"> <li>1- Find the solution of the first order and second order equation with constant coefficient .</li> <li>2- Find the solution of ordinary differential equation of first order by Euler, Taylor and Runge-Kutta methods .</li> <li>3- Derive Least – Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Curve fitting by a sum of exponentials.</li> <li>4- Find the derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formulae, Stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.</li> <li>5- Derive Trapezoidal rule, Simpson's 1/3 – rule and Simpson's 3/8 – rule.</li> <li>6- Find the solution of linear systems by using Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method.</li> <li>7- To improve the student's skills in numerical methods by using the numerical analysis software and computer facilities.</li> </ol>
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MODULE DESCRIPTION FORM

<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1- Acquire basic knowledge in solving interpolation with equal interval problems by various numerical methods.</li> <li>2- Estimate the missing terms through interpolation methods.</li> <li>3- Develop skills in analyzing the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method.</li> <li>4- Use relevant numerical techniques for interpolation with equal and unequal intervals by using various central difference formulae and code a numerical method in a modern computer language.</li> <li>5- Apply appropriate numerical methods to solve the problem with most accuracy.</li> <li>6- Be able to derive Least – Squares curve fitting procedures, fitting a straight line, fitting a parabola, nonlinear curve fitting, Curve fitting by a sum of exponentials.</li> <li>7- Be able to find the derivatives using Newton’s forward difference formula, Newton’s backward difference formula, Derivatives using central difference formulae, Stirling’s interpolation formula, Newton’s divided difference formula, Maximum and minimum values of a tabulated function.</li> <li>8- Be able to derive Trapezoidal rule, Simpson’s 1/3 – rule and Simpson’s 3/8 .</li> <li>9- Be able to find the solution of linear systems by using Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method.</li> <li>10- Be able to find the solution of ordinary differential equation of first order by Euler, Taylor and Runge-Kutta methods .</li> <li>11- Compare different methods in numerical analysis with accuracy and efficiency</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>Introduction ,Newton-Raphson Method.[5hrs]</p> <p>Solutions Of Linear System.[5hrs]</p> <p>Curve Fitting.[5hrs]</p> <p>Interpolation.[5hrs]</p> <p>Interpolation.[5hrs]</p> <p>Numerical Differentiation.[5hrs]</p> <p>Numerical Integration.[5hrs]</p> <p>Numerical Integration.[5hrs]</p> <p>Initial Value Problems For Ordinary Differential Equations.[5hrs]</p> <p>Initial Value Problems For Ordinary Differential Equations.[5hrs]</p> <p>Finite Difference Method.[5hrs]</p> <p>Finite Difference Solution For One-Dimensional Heat Equation.[5hrs]</p> <p>Finite Difference Solution For One-Dimensional Wave Equation.[5hrs]</p> <p>Finite Difference Solution For One-Dimensional Wave Equation.[5hrs]</p> <p>Finite Difference Solution For Two-Dimensional Laplace And Poisson</p>



MODULE DESCRIPTION FORM

Equations. .[5hrs]

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	75	Structured SWL (h/w)	5
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	75	Unstructured SWL (h/w)	5
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)	<b>150</b>		
الحمل الدراسي الكلي للطالب خلال الفصل			

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	4,9and 13	LO 1,2,3,4,5,6,7,8,and 12
	Assignments	5	10% (10)	2 and 12	LO 2,4,6,10, and 13
	Projects / Lab.	1	10% (10)	Continuous	All
	Report				

MODULE DESCRIPTION FORM

Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction ,Newton-Raphson Method
Week 2	Solutions Of Linear System
Week 3	Curve Fitting
Week 4	Interpolation
Week 5	Interpolation
Week 6	Numerical Differentiation
Week 7	Numerical Integration
Week 8	Numerical Integration
Week 9	Initial Value Problems For Ordinary Differential Equations
Week 10	Initial Value Problems For Ordinary Differential Equations
Week 11	Finite Difference Method
Week 12	Finite Difference Solution For One-Dimensional Heat Equation
Week 13	Finite Difference Solution For One-Dimensional Wave Equation
Week 14	Finite Difference Solution For One-Dimensional Wave Equation
Week 15	Finite Difference Solution For Two-Dimensional Laplace And Poisson Equations
Week 16	Preparatory week before the final Exam

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Introduction to MATLAB
<b>Week 2</b>	Introduction to Functions and Plot.
<b>Week 3</b>	Newton Raphson
<b>Week 4</b>	Gaussian elimination, Jacobi, Gauss Seidel methods
<b>Week 5</b>	Lagrange's interpolation formula, Newton's divided difference formula
<b>Week 6</b>	Trapezoidal rule, Simpson's 1/3,3/8-rules
<b>Week 7</b>	Euler's method modified Euler's method, Runge-Kutta method
<b>Week8</b>	Numerical solution of an elliptic boundary value problem using the method of finite differences.

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Numerical Methods, by R. W. Hornbeck.	No
<b>Recommended Texts</b>	Numerical Methods Using MATLAB, by J. H. Mathew and K. D. Fink.	No
<b>Websites</b>		

MODULE DESCRIPTION FORM

**Grading Scheme**

مخطط الدرجات

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

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

**Module Information**

معلومات المادة الدراسية

Module Title	<b>Heat Transfer</b>		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<b>UOBAB0302062</b>			
ECTS Credits	6			
SWL (hr/sem)	<b>150</b>			
Module Level	UGIII	Semester of Delivery		
Administering Department	Automobile Engineering	College	College of Engineering\Al-Musayab	

MODULE DESCRIPTION FORM

<b>Module Leader</b>	Adnan Qahtan Ibrahim Issa	<b>e-mail</b>	adnan.issa@uobabylon.edu.iq
<b>Module Leader's Acad. Title</b>	Lecturer	<b>Module Leader's Qualification</b>	Ph.D.
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. To develop problem solving skills and understanding the mechanism of heat transfer.</li> <li>2. To understand different types of thermal energy transfer.</li> <li>3. This course deals with the basic concept of heat transfer.</li> <li>4. To analyze the case under study and describe the surrounding circumstances.</li> <li>5. To put the appropriate solutions to calculate the amount of thermal energy in all engineering applications.</li> </ol>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Recognize how the mechanisms of heat transfer.</li> <li>2. Discuss and know the different types of thermal energy transfer.</li> <li>3. Discuss and analyze the case under study and describe the surrounding circumstances.</li> <li>4. Identify and put the appropriate solutions to calculate the amount of thermal</li> </ol>

## MODULE DESCRIPTION FORM

	energy in all engineering applications.
<b>Indicative Contents</b> المحتويات الإرشادية	<p>Indicative content includes the following.</p> <p><u>Part A - Modes of heat transfer</u></p> <p>Introduction/ Modes of heat transfer/ Thermal conductivity/ Steady state conduction, Extended surface/Thermal contact resistance /Steady state multi Dimension /Introduction/Graphical Analogy and conduction, shape factor. Unsteady state conduction /Introduction/Lumped Heat- Capacity system. [15 hrs]</p> <p>Principle of convection/Introduction /The thermal Boundary layer/The relation between fluid friction and heat transfer, Heat transfer in laminar Tube flow, Heat transfer in Turbulent flow in a tube, Flow across cylinders and spheres/Flow across Tube banks. [10 hrs]</p> <p>Empirical and practical relations for forced convection/Introduction, Empirical Relations for free convection/Free infection from vertical plane sand cylinder. Empirical relations for pipe and Tube flow. [10 hrs]</p> <p>Flow across cylinders and spheres/Flow across Tube banks, Natural Convection Systems/INTRODUCTION/ FREE-CONVECTION HEAT TRANSFER ON A VERTICAL FLAT PLATE /EMPIRICAL RELATIONS FOR FREE CONVECTION FREE CONVECTION FROM VERTICAL PLANES AND CYLINDERS/ FREE CONVECTION FROM HORIZONTAL CYLINDERS/ INCLINED SURFACES/ SPHERES.[12 hrs]</p> <p>Revision problem classes [6 hrs]</p> <p><u>Part B – RADIATION and Heat Exchangers</u></p> <p>COMBINED FREE AND FORCED CONVECTION/ Radiation Heat Transfer/ INTRODUCTION/ RADIATION PROPERTIES, Relations between radiation shape factors, HEAT EXCHANGE BETWEEN NONBLACKBODIES/ INFINITE PARALLEL SURFACES, RADIATION SHIELDS/ GAS RADIATION/ SOLAR RADIATION. [10 hrs]</p> <p>Heat Exchangers/ INTRODUCTION/ FOULING FACTORS/ TYPES OF HEAT EXCHANGERS, THE LOG MEAN TEMPERATURE DIFFERENCE/ EFFECTIVENESS-NTU METHOD COMPACT HEAT EXCHANGERS/ ANALYSIS FOR VARIABLE PROPERTIES, Mass Transfer. [10 hrs]</p> <p>Summary and Design Information/ CONDUCTION PROBLEMS/ CONVECTION HEAT-TRANSFER RELATIONS, RADIATION HEAT TRANSFER/ HEAT EXCHANGERS. [15 hrs]</p>

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

<b>Strategies</b>	The objective of this skill is for the student to believe in concrete (student abilities)
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MODULE DESCRIPTION FORM

and to understand when, what and how to think and to improve the ability to think reasonably. The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. High thinking skill (the goal of this skill is to teach thinking well before making the decision that determines the student's life).

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	88	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	62	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	150		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	<b>Assignments</b>	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All

MODULE DESCRIPTION FORM

<b>Total assessment</b>	100% (100 Marks)		
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MODULE DESCRIPTION FORM  
**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	<b>Material Covered</b>
<b>Week 1</b>	Introduction/ Modes of heat transfer/ Thermal conductivity/ Steady state conduction, Conduction in Plane wall /Radial system/Insulation
<b>Week 2</b>	Overall heat transfer coefficient/Critical thickness of insulation/Heat source systems, Extended surface/Thermal contact resistance /Steady state multi Dimension /Introduction/Graphical Analogy and conduction, shape factor
<b>Week 3</b>	Electrical Analogy for two- dimensional conduction, Unsteady state conduction /Introduction/Lumped Heat- Capacity system, Transient Heat flow in a semi-Infinite slab and cylinder
<b>Week 4</b>	Principle of convection/Introduction /The thermal Boundary layer/The relation between fluid friction and heat transfer, Heat transfer in laminar Tube flow
<b>Week 5</b>	Heat transfer in Turbulent flow in a tube, Flow across cylinders and spheres/Flow across Tube banks
<b>Week 6</b>	Empirical and practical relations for forced convection/Introduction, Empirical Relations for free convection/Free infection from vertical plane sand cylinder
<b>Week 7</b>	Mid-term Exam + Empirical relations for pipe and Tube flow, Flow across cylinders and spheres/Flow across Tube banks
<b>Week 8</b>	Natural Convection Systems/INTRODUCTION/ FREE-CONVECTION HEAT TRANSFER ON A VERTICAL FLAT PLATE /EMPIRICAL RELATIONS FOR FREE CONVECTION, FREE CONVECTION FROM VERTICAL PLANES AND CYLINDERS
<b>Week 9</b>	FREE CONVECTION FROM HORIZONTAL CYLINDERS/ INCLINED SURFACES/ SPHERES, COMBINED FREE AND FORCED CONVECTION
<b>Week 10</b>	Radiation Heat Transfer / RADIATION PROPERTIES Relations between radiation shape factors
<b>Week 11</b>	HEAT EXCHANGE BETWEEN NONBLACKBODIES/ INFINITE PARALLEL SURFACES, Heat Exchangers/ INTRODUCTION/ FOULING FACTORS
<b>Week 12</b>	TYPES OF HEAT EXCHANGERS, THE LOG MEAN TEMPERATURE DIFFERENCE/ EFFECTIVENESS-NTU METHOD
<b>Week 13</b>	Summary and Design Information-CONDUCTION PROBLEMS

MODULE DESCRIPTION FORM

<b>Week 14</b>	Summary and Design Information-CONVECTION HEAT-TRANSFER RELATIONS
<b>Week 15</b>	Summary and Design Information- RADIATION HEAT TRANSFER/ HEAT EXCHANGERS
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
<b>Week 1</b>	Lab 1: CONDUCTION
<b>Week 2</b>	Lab 2: FORCED CONVECTION HEAT-TRANSFER
<b>Week 3</b>	Lab 3: FREE CONVECTION HEAT-TRANSFER
<b>Week 4</b>	Lab 4: Heat transfer in laminar Tube flow
<b>Week 5</b>	Lab 5: Heat transfer in Turbulent flow in a tube
<b>Week 6</b>	Lab 6: Internal Force Convection
<b>Week 7</b>	Lab 7: heat exchanger with different water volume rate

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Holman (Heat Transfer)10th	Yes
<b>Recommended Texts</b>	JOHN WILEY & SONS, INC.(Introduction to Heat Transfer) SIXTH EDITION	No
<b>Websites</b>		

## MODULE DESCRIPTION FORM

## Grading Scheme

## مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Automotive Aerodynamics</b>		<b>Module Delivery</b>	
<b>Module Type</b>	<b>Core</b>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	<b>UOBAB03020563</b>			
<b>ECTS Credits</b>	<b>3</b>			
<b>SWL (hr/sem)</b>	<b>75</b>			
<b>Module Level</b>	<b>U</b>	<b>Semester of Delivery</b>		
<b>Administering Department</b>	<b>Type Dept. Code</b>	<b>College</b>	<b>Type College Code</b>	
<b>Module Leader</b>	Hanan Kareem Khadim		<b>e-mail</b>	msb.hanan.kareem@uobabylon.edu.iq
<b>Module Leader's Acad. Title</b>	Assistant lecturer	<b>Module Leader's Qualification</b>		M.Sc.
<b>Module Tutor</b>	Name (if available)		<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name		<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

MODULE DESCRIPTION FORM

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Understand the fundamentals of fluid mechanics related to vehicles.</li> <li>2. Understand the flow phenomena related to vehicles.</li> <li>3. Know about the aerodynamics drag of cars.</li> <li>4. Identify various forces and moments associated with aerodynamics.</li> <li>5. Learn about the shape optimization of cars.</li> <li>6. Enhance the knowledge of vehicle handling.</li> <li>7. Understand the principle of wind tunnel technology and measurement techniques.</li> </ol>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Knowledge of historical development of cars.</li> <li>2. Know and understand the phenomena related to vehicle, internal and external flow</li> <li>3. Know and recognize the different types of drag.</li> <li>4. Know and understand the shock waves.</li> <li>5. Knowledge of the frictional flow at constant area ducts</li> <li>6. Knowledge of the adiabatic flow at constant area ducts</li> <li>7. Describe the physics of fluid flow over vehicle body and its optimization techniques.</li> <li>8. Know and enhance the vehicle handling.</li> <li>9. Calculate lift and drag of automotive models.</li> <li>10. Know the force aerodynamics and moments.</li> <li>11. Apply basic principles of aerodynamics for the design of vehicle body and reducing drag.</li> <li>12. Know how to use the wind tunnel for testing the vehicles.</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p>- Introduction, historical development, basic shape, streamline shape, optimization of body details- Flow phenomena related to vehicles (external flow, internal flow, effect of viscosity, laminar and turbulent boundary layer, separation – Resistance of motion -performance, Fuel consumption, strategy for fuel consumption. [10 hrs.]</p>

## MODULE DESCRIPTION FORM

-Aerodynamics drag of cars , car as a bluff body, flow field I around car, types of drag, drag coefficient of cars, analysis of drag( physical mechanism, Local origins, effects of the environment.- isentropic flow with variable area ducts, isentropic tables, normal shock waves ,tables of shock waves- constant area adiabatic flow(fanno flow) , fanno tables - constant area flow with heat transfer(Rayleigh flow), Rayleigh tables [12 hrs.]

- shape optimization of cars (front end modification, front spoilers, rear spoilers, shape optimization- vehicle handling, aerodynamics stability – aerodynamics effect of forces and moments (lift and pitching moment, side force and yawing moment, rolling moment)- vehicle dynamics under side wind- Drag reduction in commercial vehicle. [10 hrs.]

- drag reduction in commercial vehicles. - principle of wind tunnel testing, full scale wind tunnel, limitation of simulation\, test road, - pressure measurement equipment (pressure prop, pressure transducer, measurement outside and inside a vehicle of air flow velocity, determination of air flow velocity, flow visualization Techniques [10 hrs.]

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

#### Strategies

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

MODULE DESCRIPTION FORM

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	45	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	3
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	30	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	75		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (20)	5 and 10	LO #1- #10
	<b>Assignments</b>	2	10% (10)	2 and 12	LO #1- #11
	<b>Report</b>	1	10% (10)	13	LO #1- #11
	<b>Midterm Exam</b>	2hr	10% (10)	8	LO #1 - #6
<b>Summative assessment</b>	<b>Final Exam</b>	3hr	50% (50)	16	All
	100% (10 Marks)				

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

<b>Material Covered</b>	
<b>Week 1</b>	Introduction – historical development

MODULE DESCRIPTION FORM

<b>Week 2</b>	Flow phenomena related to vehicles
<b>Week 3</b>	Resistance of motion - performance
<b>Week 4</b>	Aerodynamics drag of cars- types of drag forces – cars as a bluff body – flow field around the car
<b>Week 5</b>	Isentropic flow with variable area ducts- nozzle, diffuser, shock waves
<b>Week 6</b>	Constant area flow, adiabatic flow (fanno flow)
<b>Week 7</b>	Constant area flow with heat transfer (Rayleigh flow)
<b>Week 8</b>	Midterm exam + shape optimization of cars
<b>Week 9</b>	Vehicle handling, aerodynamic stability
<b>Week 10</b>	Aerodynamic effects of forces and moments, Aerodynamic Effects of the Features of Actual Vehicles
<b>Week 11</b>	Vehicle dynamic under side wind
<b>Week 12</b>	Drag reduction in commercial vehicle
<b>Week 13</b>	Wind tunnel testing – principle of wind tunnel testing, Properties of the Essential Components
<b>Week 14</b>	Limitation of simulation, test of road, Full-Scale Wind Tunnels
<b>Week 15</b>	Pressure measurement equipment, flow, flow visualization Techniques
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Hucho, W.H. , Aerodynamics of Road vehicles, Butterworths Co. Ltd., 1987	Yes
<b>Recommended Texts</b>	1.Pope, A., Wind Tunnel Testing, John Wiley & Sons, 2nd Edition., New York, 1974. 2. Automotive Aerodynamics: Update SP – 1145, SAE, 1996. 3. Vehicle Aerodynamics, SP -1145, SAE, 1996	No



MODULE DESCRIPTION FORM

<b>Websites</b>	<a href="https://www.amazon.com/Automotive-Aerodynamics-Joseph-Katz-ebook/dp/B01FQNWKG2">https://www.amazon.com/Automotive-Aerodynamics-Joseph-Katz-ebook/dp/B01FQNWKG2</a>	

**Grading Scheme**

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Theory of Automobile</b>		<b>Module Delivery</b>	
<b>Module Type</b>	<b>Support</b>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	<b>UOBAB0302064</b>			
<b>ECTS Credits</b>	٦			
<b>SWL (hr/sem)</b>	١٥٠			
<b>Module Level</b>	U	<b>Semester of Delivery</b>	2	
<b>Administering Department</b>	Automobile	<b>College</b>	College of Engineering/ AL-Musayab	
<b>Module Leader</b>	Mohanad Ramadhan Hameed	<b>e-mail</b>	msb.mohanad.ramadhan@uobabylon.edu.iq	
<b>Module Leader's Acad. Title</b>	Assistant Lecturer	<b>Module Leader's Qualification</b>	M.Sc.	
<b>Module Tutor</b>		<b>e-mail</b>		
<b>Peer Reviewer Name</b>		<b>e-mail</b>		
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b>	4- Understand the mechanics of the steering system. 5- Understanding the balancing of reciprocating and rotating masses.
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MODULE DESCRIPTION FORM

<p>أهداف المادة الدراسية</p>	<p>6- Analysis of the relative motion and design of cams and followers. 7- Understand the principle of governors. 8- Studying gyroscopes and gyroscope effects.</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>1- The student will be able to understand the basic requirement for correct steering, the types of steering systems, and their comparative advantages. 2- Develop knowledge of analytical and graphical methods for balancing rotating and reciprocating masses. 3- The student will be able to design a cam profile for given follower motions. 4- The student will be able to study and analyze dead weight governors and understand their relationship with variable loads. 5- The student will be able to study and analyze spring-controlled governors and understand their relationship with variable loads. 6- The student will analyze the gyroscopic couple or effect for stabilization of Ship Airplane and Four-wheeler vehicles.</p>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p><b>Steering Gear Mechanism</b> - Davis Steering Gear, Ackerman Steering Gear. [12 hrs]</p> <p><b>Universal or Hooke's Joint</b> - Ratio of the Shafts Velocities, Maximum and Minimum Speeds of the Driven Shaft, Condition for Equal Speeds of the Driving and Driven Shafts, Angular Acceleration of the Driven Shaft, Maximum Fluctuation of Speed, Double Hooke's Joint. [6 hrs]</p> <p><b>Balancing of Rotating Masses</b> - Balancing of a Single Rotating Mass by a Single Mass Rotating in the Same Plane, balancing of a Single Rotating Mass by Two Masses Rotating in Different Planes, Balancing of Several Masses Rotating in the Same Plane, Balancing of Several Masses Rotating in Different Planes. [6 hrs]</p> <p><b>Balancing of Reciprocating Masses</b> - Primary and Secondary Unbalanced Forces of Reciprocating Masses, Partial Balancing of Unbalanced Primary Force in a Reciprocating Engine. [6 hrs]</p> <p><b>kinematics of disc cams</b> - Cams with Specified Contours, Tangent Cam with Reciprocating Roller Follower, Circular Arc Cam with Flat Faced Follower. [18 hrs]</p> <p><b>Governors</b> - Types of Governors, Centrifugal Governors, Terms Used in Governors, Watt Governor, Porter Governor, Proell Governor, Hartnell Governor, Hartung Governor. [24 hrs]</p> <p><b>Gyroscopes</b> - Processional Angular Motion, Gyroscopic Couple, Effect of Gyroscopic Couple on an Aero plane, Terms Used in a Naval Ship, Effect of Gyroscopic Couple on a Naval Ship during Steering, Effect of Gyroscopic Couple on a Naval Ship during Pitching, Effect of Gyroscopic Couple on a Naval ship during Rolling, Stability of a Four-Wheel drive Moving in a Curved Path, Stability of a Two Wheel Vehicle Taking a Turn. [12 hrs]</p>

MODULE DESCRIPTION FORM

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

<b>Strategies</b>	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	88	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>150</b>		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	3 and 6	LO #1 - #2
	<b>Assignments</b>	2	10% (10)	9 and 14	LO #3 - #6
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	15	LO #1 - #3
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	10	LO #1 - #3
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Davis Steering Gear
Week 2	Ackerman Steering Gear
Week 3	Universal or Hooke's Joint
Week 4	Balancing of Rotating Masses
Week 5	Balancing of reciprocating masses
Week 6	kinematics of disc cams
Week 7	straight arc flank
Week 8	circular arc flank
Week 9	Governors
Week 10	Mid-term Exam + Watt Governors
Week 11	porter Governors
Week 12	proell Governors
Week 13	Hartnell Governors
Week 14	Gyroscopes
Week 15	Gyroscopic effects
Week 16	Preparatory week before the final Exam

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Balancing of rotating masses
Week 2	Lab 2: Cam Analysis
Week 3	Lab 3: Dead weight type governor
Week 4	Lab 4: Spring-controlled governor
Week 5	Lab 5: Gyroscopic
Week 6	Lab Exam

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Khurmi, R. S., & Gupta, J. K. (2005). Theory of machines. S. Chand Publishing	Yes
Recommended Texts	Singh, S. (2005). Theory of machines. Pearson Education India.	No
Websites		

**Grading Scheme**

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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MODULE DESCRIPTION FORM

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Design of Mechanical Systems (with SolidWorks)</b>		<b>Module Delivery</b>	
<b>Module Type</b>	<b>Support or related learning activity</b>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	<b>UOBAB0302065</b>			
<b>ECTS Credits</b>	<b>6</b>			
<b>SWL (hr/sem)</b>	<b>88</b>			
<b>Module Level</b>	UO	<b>Semester of Delivery</b>	6	
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code	
<b>Module Leader</b>	Name Ahmed Ali Toman	<b>e-mail</b>	E-mail	
<b>Module Leader's Acad. Title</b>	Ass. Lecturer	<b>Module Leader's Qualification</b>	M.Sc.	
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail: ahmed.toman@uobabylon.edu.iq	
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail	
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	Mathematics I, Mathematics II, Engineering Mathematics I, Engineering Mathematics II, Metallurgy	<b>Semester</b>	1,2,3,4,5
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MODULE DESCRIPTION FORM

	& Automobile Materials, Mechanical Drawing I with Solid Works, Engineering Mechanics (Statics), Engineering Mechanics (Dynamics), Strength of Materials, Machine Elements Design (with CAD)		
<b>Co-requisites module</b>	Theory of Machines, Tribology and Automobiles lubricants	<b>Semester</b>	5,6

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	<p>11. To develop problem solving skills and understanding of machine elements static failure through the application of techniques.</p> <p>12. To develop problem solving skills and understanding of machine elements dynamic (fatigue) failure through the application of techniques.</p> <p>13. To apply safety factors in the process of machine part design.</p> <p>14. This course deals with the concept of machine parts design to avoid failure under static and dynamic loads.</p> <p>15. To be able to successfully design the geometry for different machine parts.</p> <p>16. To be able to successfully chose the proper material for the designed machine part that do the job without failure.</p>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<p>1- Students develop a complete knowledge on:</p> <ul style="list-style-type: none"> <li>• Why do machine elements fail under static load?</li> <li>• How to estimate the safety factor of a machine element under a certain static load.</li> <li>• How to design a machine element to avoid static failure.</li> </ul> <p>2- Students develop a complete knowledge on:</p> <ul style="list-style-type: none"> <li>• Why do machine elements fail under dynamic load?</li> <li>• Estimating the Fatigue life for a machine element.</li> <li>• How to design a machine element to avoid dynamic failure.</li> </ul> <p>3-Develop a complete knowledge on how to use the equations and tables, that used to design and evaluate the life of the machine parts.</p>



## MODULE DESCRIPTION FORM

	<ol style="list-style-type: none"> <li>4. To design welded joints.</li> <li>5. To design different types of rolling element bearings.</li> <li>6. To design of journal bearings.</li> <li>7. To design different types of mechanical breaks.</li> <li>8. To design different types of mechanical clutches.</li> <li>9. To design different types of screws.</li> <li>10. To design different types of mechanical power screws.</li> <li>11. To design different types of mechanical gears.</li> <li>12. To design different types of mechanical ropes.</li> <li>13. To design different types of mechanical chains.</li> <li>14. To design different types of mechanical belts.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>This is often the second design course for automobile engineering students. It presents them with design challenges rather than set-piece problems. Nevertheless, the type of design addressed in this course is that of detailed design, which is the Design of a mechanical entire System rather than only one part of the design-process spectrum.</p> <p>In detailed design, the general concept, application, and even general shape of the required device are typically known at the outset. We are not trying to invent a new device so much as define the shape, size, and material of a particular machine element such that it will not fail under the loading and environmental conditions expected in service.</p> <p>The Design of Mechanical System course typically given in the junior year of most automobile engineering curricula. The usual prerequisites are a first course in Statics and Dynamics, course in Strength of Materials and one course in machine elements design. The level is aimed at junior senior automobile engineering students. It emphasizes design and synthesis as well as analysis. Example problems, case studies, and solution techniques are spelled out in detail and are self-contained. Short problems are provided in each chapter and, where appropriate, longer unstructured design-project assignments are given.</p>

MODULE DESCRIPTION FORM

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple assignments involving activities that are interesting to the students.

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب ل ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	88	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>150</b>		

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	3	10% (10)	5 and 10	LO #1, #2 and #10, #11
	<b>Assignments</b>	3	5% (5)	4 ,8,12	LO #3, #4 and #6, #7

MODULE DESCRIPTION FORM

	<b>Projects / Lab.</b>	2	20% (20)	Continuous	All
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	15% (15)	10	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	<b>Material Covered</b>
<b>Week 1</b>	Design of butt welded joints
<b>Week 2</b>	Design of lap welded joints
<b>Week 3</b>	Design of journal bearings
<b>Week 4</b>	Design of rolling elements bearings
<b>Week 5</b>	Design of rolling mechanical clutches.
<b>Week 6</b>	Design of rolling mechanical clutches 2.
<b>Week 7</b>	Design of rolling mechanical breaks.
<b>Week 8</b>	Design of mechanical screws.
<b>Week 9</b>	Design of mechanical power screws.
<b>Week 10</b>	Mid. Term Exam.
<b>Week 11</b>	Design of gears.
<b>Week 12</b>	Design of gears 2.
<b>Week 13</b>	Design of mechanical chains
<b>Week 14</b>	Design of mechanical belts
<b>Week 15</b>	Design of mechanical ropes.
<b>Week 16</b>	Preparatory week before the final Exam

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

**Material Covered**

<b>Week 1</b>	3D Modelling of butt and lap weld joints by SolidWorks
<b>Week 2</b>	3D Modelling of journal bearings by SolidWorks
<b>Week 3</b>	3D Modelling of ball bearings by SolidWorks
<b>Week 4</b>	3D Modelling of clutches and breaks by SolidWorks
<b>Week 5</b>	3D Modelling of gears by SolidWorks
<b>Week 6</b>	3D Modelling of screws and mechanical power screws by SolidWorks
<b>Week 7</b>	3D Modelling of mechanical chains by SolidWorks

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	<b>Text</b>	<b>Available in the Library?</b>
<b>Required Texts</b>	Machine Design: An Integrated Approach, by Robert L. Norton	Yes
<b>Recommended Texts</b>	Shigley's Mechanical Engineering Design	No
<b>Websites</b>	<a href="https://www.coursera.org/browse/physical-science-and-engineering">https://www.coursera.org/browse/physical-science-and-engineering</a>	

MODULE DESCRIPTION FORM

**Grading Scheme**

مخطط الدرجات

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

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Industrial Engineering</b>		<b>Module Delivery</b>	
<b>Module Type</b>	<b>Core</b>		<b>x Theory</b>	
<b>Module Code</b>	<b>UOBAB0302066</b>		<b>Lecture</b>	
<b>ECTS Credits</b>	<b>3</b>		<b>x Lab</b>	
<b>SWL (hr/sem)</b>	<b>75</b>		<b>x Tutorial</b>	
			<b>Practical</b>	
			<b>Seminar</b>	
<b>Module Level</b>		<b>3</b>	<b>Semester of Delivery</b>	
			<b>1</b>	
<b>Administering Department</b>		Type Dept. Code	<b>College</b>	Type College Code
<b>Module Leader</b>	Emad Dawood About		<b>e-mail</b>	met.emad.dawood@uobabylon.edu.iq
<b>Module Leader's Acad. Title</b>		Assist Professor	<b>Module Leader's Qualification</b>	
			Ph.D.	

MODULE DESCRIPTION FORM

<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail
<b>Scientific Committee Approval Date</b>	04/06/2023	<b>Version Number</b>	1.0

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>		<b>Semester</b>	1 + 2
<b>Co-requisites module</b>		<b>Semester</b>	2

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<p>11- 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.</p> <p>12- Calculation of cost accounting, production control, second and variable cost calculation, break-even blister calculation, gross sales, gross and net profit calculation.</p> <p>13- Identification of fixed and current assets, cash assets, and how to do, plan and design production lines And calculate the number of machines required.</p> <p>14- The ability to understand and manage industrial projects and service projects, the method of managing and operating companies.</p> <p>15- 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.</p> <p>16- 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.</p> <p>17- 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.</p> <p>18- 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.</p>
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MODULE DESCRIPTION FORM

	<p>19- 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..</p> <p>20- 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.</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <p>13. Learn with understand Some basic definitions of industrial engineering.</p> <p>14. Depreciation and methods of calculating depreciation.</p> <p>15. Calculating the number of machines required.</p> <p>16. break-even analysis.</p> <p>17. General Notes on Break-Even Point .</p> <p>18. Annual profit and volume chart.</p> <p>19. New design economics.</p> <p>20. Sales forecasts and guesswork.</p> <p>21. linear programming.</p> <p>22. Network analysis of projects.</p> <p>23. Trnsport problems.</p> <p>24. Business Personalization Forms.</p> <p>25. Movement study.</p> <p>26. Study of time.</p> <p>27. Quality control.</p>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p><b>Indicative content includes the following.</b></p> <p>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. [4 hrs]</p> <p>Calculation of cost accounting, production control, second and variable cost calculation, break-even blister calculation, gross sales, gross and net profit calculation. [7 hrs]</p> <p>Identification of fixed and current assets, cash assets, and how to do, plan and design production lines And calculate the number of machines required . [5 hrs]</p> <p>The ability to understand and manage industrial projects and service projects, the method of managing and operating companies. [5 hrs]</p> <p>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</p>

## MODULE DESCRIPTION FORM

	<p>and means in calculating the costs of transporting products and planning to reduce these costs. [5 hrs]</p> <p>Learn the Analytic of Network analysis of projects, Trnsport problems and Business Personalization Forms. [8 hrs]</p> <p>Movement study, Study of time and Study the Quality control [8 hrs]</p>
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>Type something like: 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</p> <p>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.</p>
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### Student Workload (SWL)

#### الحمل الدراسي للطالب محسوب ل ١٥ اسبوعا

<b>Structured SWL (h/sem)</b>	45	<b>Structured SWL (h/w)</b>	7
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
<b>Unstructured SWL (h/sem)</b>	30	<b>Unstructured SWL (h/w)</b>	3
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
<b>Total SWL (h/sem)</b>	<b>75</b>		
الحمل الدراسي الكلي للطالب خلال الفصل			



MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1- #10
	Assignments	2	10% (10)	2 and 12	LO #1-#12
	Projects / Lab.	-----	-----	-----	-----
	Report	1	10% (10)	13	LO #4, #5, #9 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Some basic definitions of industrial engineering
Week 2	Depreciation and methods of calculating depreciation
Week 3	Calculating the number of machines required
Week 4	break-even analysis
Week 5	General Notes on Break-Even Point
Week 6	Annual profit and volume chart
Week 7	<b>Mid-term Exam</b> + New design economics
Week 8	Sales forecasts and guesswork
Week 9	linear programming

MODULE DESCRIPTION FORM

<b>Week 10</b>	Network analysis of projects
<b>Week 11</b>	Transport problems
<b>Week 12</b>	Business Personalization Forms
<b>Week 13</b>	Movement study
<b>Week 14</b>	Study of time
<b>Week 15</b>	Quality control
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	<b>Introduction to industrial management</b>	No
<b>Recommended Texts</b>	<b>Fundamentals of industrial engineering</b>	No
<b>Websites</b>	<a href="https://www.careers360.com/courses/industrial-engineering-course">https://www.careers360.com/courses/industrial-engineering-course</a>	

**Grading Scheme**

مخطط الدرجات

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

MODULE DESCRIPTION FORM

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

# Level -UGIV

# Semester Seven

MODULE DESCRIPTION FORM

Module Information

معلومات المادة الدراسية

Module Title	<b>Automobile Air-conditioning</b>		Module Delivery	
Module Type	Core		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302071			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	4	Semester of Delivery	7	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Ali Jaber Abdulhamed	e-mail	msb.ali.jaber@uobabylon.edu.iq	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor		e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	18. To develop problem solving skills and understanding of the Air and Humidity. 19. To understand Air-conditioning processes. 20. To develop problem solving skills and understanding Heat transfer cross wall. 21. To develop problem solving skills and understanding of heating and cooling load and the relation between it. 22. To develop problem solving skills and understanding of Duct design. 23. To develop problem solving skills and understanding of refrigerant cycles and the different between them. 24. To develop problem solving skills and understanding of compressor work. 25. To understand the maintenance of an automobile A/C system
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MODULE DESCRIPTION FORM

<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>21. Know how to use the Air-conditioning tables.</li> <li>22. Know how to use the Psychrometric Chart.</li> <li>23. Know how to calculate the Air and Humidity.</li> <li>24. Know &amp; understand the Air-conditioning processes.</li> <li>25. Recognize and know how to calculate Heat transfer cross wall.</li> <li>26. Understand how to calculate heat load.</li> <li>27. Understand how to calculate Cooling load.</li> <li>28. Recognize between heat &amp; cooling load.</li> <li>29. Understand how to calculate Duct design.</li> <li>30. Understand the refrigerant cycles.</li> <li>31. Understand, know to calculate e the coefficient of performance COP</li> <li>32. Understand how to calculate compressor work.</li> <li>33. Understand how to calculate Volumetric Efficiency.</li> <li>34. Understand; know the Maintenance of an automobile A/C system.</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p style="text-align: center;"><b>Indicative content includes the following.</b></p> <ul style="list-style-type: none"> <li>• Introduction, Definition, evaporator, condenser, expansion valve, compressor, Enthalpy of Air, Heating or Cooling of Air, Air-Mixing, Humidification &amp; Dehumidification of Moist Air. [24 hrs]</li> <li>• Conduction through a plain wall, Conduction through a composite wall, Air Film Coefficient, air space resistance, Wall-Surface temperature, Inside Air Temperature, Design Temp. for Unheated Inside Space, heat load, Calculation Method, Space Heating, Seasonal Heat &amp; Fuel Requirements-Degree-Days, steam consumption, amount of fuel per season. [20 hrs]</li> <li>• Cooling Load, Solar radiation, Cooling Load Calculations, Cooling Load Air Quantities, introduction in duct design, Duct – design procedure, fan selects, static pressure loss, friction loss. [20 hrs]</li> <li>• Refrigeration, Carnot, single stage, real single stage, Liquid Sub cooling &amp; Vapor Superheating cycles, Compressor work, gas equation, Volumetric Efficiency of Reciprocating Compressors, Clearance Volumetric Efficiency, actual Volumetric Efficiency, Maintenance of an automobile air-conditioning system. [20 hrs]</li> </ul>

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.</p>
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**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<p><b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل</p>	<p>88</p>	<p><b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا</p>	<p>6</p>
<p><b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	<p>62</p>	<p><b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا</p>	<p>4</p>
<p><b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل</p>	<p>150</p>		

MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (20)	5 and 10	LO #3, #4, #6, and #7
	Lab.	1	10% (10)	Continuous	All
	Projects	1	10% (10)	12	LO #1 - #11
Summative assessment	Midterm Exam	2hr	10% (10)	8	LO #1 - #8
	Final Exam	hr	50% (50)	16	All
<b>Total assessment</b>			100%		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction in Air-condition
Week 2	Air and Humidity Calculations
Week 3	Psychrometric Chart
Week 4	Air-Conditioning Processes
Week 5	Heat transfer cross wall
Week 6	Heat load
Week 7	Cooling load
Week 8	Mid-term Exam
Week 9	Duct Design
Week 10	Refrigerant Systems, Carnot Cycle,
Week 11	Ideal single stage Cycles
Week 12	Liquid Sub cooling & Vapour Superheating Cycles
Week 13	Compressor Work
Week 14	Volumetric Efficiency
Week 15	Maintenance of an automobile air-conditioning system
Week 16	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Performance study of Air-conditioning units.
Week 2	Lab 2: Performance study of cooling tower units.
Week 3	Lab 3: Performance study of heat pump units.
Week 4	Lab 4: Performance study of electrical refrigerator.
Week 5	Lab 5: Performance study of an Automobile Air-conditioning units
	Lab Exam

MODULE DESCRIPTION FORM

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Refrigeration of Air-conditioning / R.S. Khurmi & J.K. Gupta	Yes
<b>Recommended Texts</b>	Automotive Heat and Air-Conditioning System / K. Mitchell (1989)	No
	Environmental Engineering Analysis and Practice / B.H. Jennings (1970)	No
<b>Websites</b>	<a href="https://www.amazon.com/Heating-Ventilating-Conditioning-Analysis-Design/dp/0471470155">https://www.amazon.com/Heating-Ventilating-Conditioning-Analysis-Design/dp/0471470155</a>	

**Grading Scheme**

مخطط الدرجات

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

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

**Module Information**

معلومات المادة الدراسية

Module Title	<b>Mechanical Vibrations</b>		Module Delivery	
Module Type	S		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<b>UOBAB0302072</b>			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	4	Semester of Delivery		
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Name		e-mail	E-mail
Module Leader's Acad. Title	Professor		Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail



MODULE DESCRIPTION FORM

Scientific Committee Approval Date	01/06/2023	Version Number	1.0
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Aims</b> أهداف المادة الدراسية</p>	<p>Providing the student with a cognitive skill about the general concepts of vibration mechanics, which includes the vibrational movements of mechanical systems and the analysis of the dynamic forces of those systems, which will be the basis for designing structures and analyzing the dynamic stresses of structures that can be used either practically by an engineer or in postgraduate studies</p>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. To understand the basic concepts of vibration</li> <li>2. To study the introduction to oscillatory motion</li> <li>3. To learn how to analyze the dynamic loading on mechanical system</li> <li>4. To learn the analysis of free vibration of an undamped single degree of freedom systems.</li> <li>5. To learn the analysis of Simple energy method (Raleigh principle).</li> <li>6. Understanding the analysis of Free vibration with viscous damping on single degree of freedom systems.</li> <li>7. Understanding the Logarithmic decrement</li> <li>8. Understanding the analysis of Forced vibration of single degree of freedom systems.</li> <li>9. To study the Forced vibration for constant force</li> <li>10. To study the Forced Vibration for sinusoidal force.</li> <li>11. To study the Rotating unbalance.</li> <li>12. To understand Support motion example</li> <li>13. To identify Vibration isolation</li> <li>14. To identify Vibration measuring instruments</li> <li>15. Understanding the analysis of Two degree of freedom mechanical systems with oscillation.</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	

MODULE DESCRIPTION FORM

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	89	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	150		

**Module Evaluation**

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	LO #1-10
	<b>Assignments</b>	2	10% (10)	2, 12	LO # 3-10
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO # 5-15
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hrs	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	3 hrs	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Basic concepts of vibration
Week 2	Introduction to oscillatory motion
Week 3	Free vibration of an undamped single degree of freedom
Week 4	Simple energy method (Raleigh principle)

MODULE DESCRIPTION FORM

Week 5	Free vibration viscous damped single degree of freedom system
Week 6	Equivalent springs and dampers
Week 7	Logarithmic decrement
Week 8	Forced vibration of single degree of freedom
Week 9	Forced vibration for constant force
Week 10	Forced Vibration for sinusoidal force
Week 11	Rotating unbalance
Week 12	Support motion example
Week 13	Vibration isolation
Week 14	Vibration measuring instrument
Week 15	Two degree of freedom
Week 16	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Free vibration of an undamped single degree of freedom
Week 2	Lab 2: Free vibration viscous damped single degree of freedom system
Week 3	Lab 3: Equivalent springs and dampers
Week 4	Lab 4: Forced vibration of single degree of freedom
Week 5	Lab 5: Forced vibration for constant force
Week 6	Lab 6: Forced Vibration for sinusoidal force
Week 7	Lab 7: Vibration measuring instrument

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Theory_of_Vibration with Application by William T. Thomson, published by Chapman & Hall in 1993.	Yes

MODULE DESCRIPTION FORM

Recommended Texts	mechVib theory and applications-Graham Kelly, Den Hartog - Mechanical vibrations.	No
Websites	<a href="http://kgut.ac.ir/useruploads/1523432144334wuh.pdf">http://kgut.ac.ir/useruploads/1523432144334wuh.pdf</a>	

Grading Scheme

مخطط الدرجات

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

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Module Information

معلومات المادة الدراسية

Module Title	<b>Measurement Systems</b>		Module Delivery	
Module Type	Support or related learning activity		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<b>UOBAB0302074</b>			
ECTS Credits	<b>6</b>			
SWL (hr/sem)	<b>150</b>			
Module Level	4	Semester of Delivery		
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Hamid Hussain Hadwan		e-mail	met.hamed.huss@uobabylon.edu.iq
Module Leader's Acad. Title	Professor		Module Leader's Qualification	M.E.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	01/06/2023		Version Number	1.0

MODULE DESCRIPTION FORM

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	Mechanical Vibrations	<b>Semester</b>	7
<b>Prerequisite module</b>	Automotive Hydraulics and Pneumatics Systems	<b>Semester</b>	5
<b>Co-requisites module</b>	Engineering Mechanics (Dynamics)	<b>Semester</b>	4
<b>Co-requisites module</b>	Engineering Mechanics (Statics)	<b>Semester</b>	2

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<p>1- Describe units of measure.</p> <p>2- Use measuring tools.</p> <p>3- Explain purpose of measuring.</p> <p>4- Describe methods of measuring</p> <p>5-To use the techniques and skills for electrical projects.</p>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ul style="list-style-type: none"> <li>• Design a system, component or process to meet desired needs in electrical engineering.</li> <li>• Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy. <ul style="list-style-type: none"> <li>• Ability to balance Bridges to find unknown values.</li> <li>• Ability to measure frequency, phase with Oscilloscope.</li> <li>• Ability to use Digital voltmeters</li> <li>• Explain the operation of a relay-based controller.</li> </ul> </li> <li>• Understand the concept and purpose of a programmable logic controller (PLC). <ul style="list-style-type: none"> <li>• Understand the hardware and wiring required in a PLC-based system.</li> </ul> </li> <li>• List the steps that must be taken to make a PLC control system operational. <ul style="list-style-type: none"> <li>• Understand the basic instructions used in a PLC program.</li> </ul> </li> </ul>

## MODULE DESCRIPTION FORM

- Differentiate the ways that a PLC can be programmed.
- Understand how PLCs are used with networks.
- Explain the purpose and operation of a motion controller.

### Indicative Contents

المحتويات الإرشادية

Standards of measurement: Definition and Objectives of metrology, Standards of length-International prototype meter, Imperial standard yard, Wave length standard, subdivision of standards, line and end standard, calibration of end bars (Numerical), Slip gauges, Wringing phenomena, Indian Standards (M-81, M-12), Numerical problems on building of slip gauges. [5 hrs]

System of Limits, Fits, Tolerance and Gauging: Definition of tolerance, Specification in assembly, Principle of interchangeability and selective assembly limits of size, Indian standards, concept of limits of size and tolerances, compound tolerances, accumulation of tolerances, definition of fits, types of fits and their designation (IS919-1963), geometrical tolerance, positional-tolerances, hole basis system, shaft basis system, classification of gauges, brief concept of design of gauges (Taylor's principles), Wear allowance on gauges, Types of gauges-plain plug gauge, ring gauge, snap gauge, limit gauge and gauge materials. [5 hrs]

Pressure measurements [5 hrs]

Angular measurements, bevel protractor, sine principle and use of sine bars, sine center, use of angle gauges (numerical on building of angles), clinometers. [5 hrs]

Flow measurement 5 hrs]

Measurement of temperature 5 hrs]

Midterm Exam + Force, Torque and Strain measurements [ 5 hrs]

System response-times delay. Errors in measurement, classification of errors.

Transducers [5 hrs]

Secondary transducers, electrical, mechanical, electronic transducers, advantages of each type transducers. [5 hrs]

motion and vibration measurements [5 hrs]

Ballast circuit, electronic amplifiers and telemetry. Terminating devices, mechanical, cathode ray oscilloscope, Oscillographs, X-Y plotters. [5 hrs]

Measurement of force, torque and pressure: Principle, analytical balance, platform balance, proving ring. Torque measurement, Prony brake, hydraulic dynamometer. [5 hrs]

gauge. [5 hrs]

Basic Electrical Measurements and Sensing Devices [5 hrs]

MODULE DESCRIPTION FORM

Data acquisition and processing [5 hrs]

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

Type something Like the main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

**Structured SWL (h/sem)**

الحمل الدراسي المنتظم للطلاب خلال الفصل

88

**Structured SWL (h/w)**

الحمل الدراسي المنتظم للطلاب أسبوعيا

6

**Unstructured SWL (h/sem)**

الحمل الدراسي غير المنتظم للطلاب خلال الفصل

62

**Unstructured SWL (h/w)**

الحمل الدراسي غير المنتظم للطلاب أسبوعيا

4

**Total SWL (h/sem)**

الحمل الدراسي الكلي للطلاب خلال الفصل

150

**Module Evaluation**

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10

MODULE DESCRIPTION FORM

Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Standards of measurement: Definition and Objectives
Week 2	System of Limits, Fits, Tolerance and Gauging
Week 3	Pressure measurements
Week 4	Comparators and Angular measurement: Introduction to comparators, characteristics, classification
Week 5	Flow measurement
Week 6	Measurement of temperature Midterm Exam + Force, Torque and Strain measurements
Week 7	Midterm Exam + Force, Torque and Strain measurements
Week 8	System response-times delay. Errors in measurement, classification of errors. Transducers
Week 9	Secondary transducers, electrical, mechanical, electronic transducers
Week 10	motion and vibration measurements
Week 11	Ballast circuit, electronic amplifiers and telemetry. Terminating devices, mechanical, cathode ray oscilloscope, Oscillographs, X-Y plotters.
Week 12	Measurement of force, torque and pressure
Week 13	Pressure measurements, principle
Week 14	Basic Electrical Measurements and Sensing Devices
Week 15	Data acquisition and processing
Week 16	<b>Preparatory week before the final Exam</b>



MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Calibration of Pressure Gauge
Week 2	Lab 2: Calibration of Thermocouple
Week 3	Lab 3: Calibration of Load cell
Week 4	Lab 4: Determination of modulus of elasticity of a mild steel specimen using strain gauge
Week 5	Lab 5: Measurements using Optical Projector
Week 6	Lab 6: Toolmaker Microscope
Week 7	Lab 7: Measurement of angle using Sine Center/ Sine bar/ bevel protractor

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<p>1. Mechanical Measurements, Beckwith Marangoni and Lienhard, Pearson Education, 6th Ed., 2006.</p> <p>2. Engineering Metrology, R.K. Jain, Khanna Publishers, 1994.</p> <p>REFERENCE BOOKS:</p> <p>3. Engineering Metrology, I.C. Gupta, Dhapat Rai Publications, Delhi. 2. Mechanical Measurements, R.K. Jain</p>	Yes
Recommended Texts	<p>1. Industrial Instrumentation, Alsutko, Jerry. D. Faulk, Thompson Asia Pvt. Ltd.2002.</p> <p>2. Measurement Systems Applications and Design, Ernest O. Doblin, McGraw Hill Book C</p>	No
Websites	<p><a href="https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering</a></p>	

MODULE DESCRIPTION FORM

Grading Scheme

مخطط الدرجات

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

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

Module Information

معلومات المادة الدراسية

Module Title	<b>CAE</b>		Module Delivery	
Module Type	<b>B</b>		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	UOBAB0302075			
ECTS Credits	<b>4</b>			
SWL (hr/sem)	100			
Module Level	٤	Semester of Delivery		7
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Sameh Qahtan Jawad Al-Najjar		e-mail	Sameh.jawad@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	

MODULE DESCRIPTION FORM

Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. To understand how to simulate the practical case.</li> <li>2. To use and handling with computer-aided programs in solving difficult and complicated case studies. .</li> <li>3. This course deals with the basic simulation in multi vehicle parts.</li> <li>4. To understand how that CAE programs provide material cost and working stuff.</li> <li>5. To know how to change the material type and geometry reaching to optimum simulation conditions.</li> <li>6. To perform mesh and Nodal analysis.</li> </ol>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Recognize how to convert experimental case to programming case.</li> <li>2. List the various loading and boundary conditions applied.</li> <li>3. To predict the error percentage between modeling and experimental.</li> <li>4. Knowing the requirements before going to practical application.</li> <li>5. Saving time and money when predicting the required simulation.</li> <li>6. Describe static and dynamic cases and how to use the correct analysis type.</li> <li>7. Identify the static structural analysis and their applications.</li> <li>8. Identify the vibration and mode shapes analysis and their applications.</li> <li>9. Using the optimization process to know how to obtain it.</li> </ol>
<p><b>Indicative Contents</b></p>	<p>Indicative content includes the following.</p>

## MODULE DESCRIPTION FORM

المحتويات الإرشادية

### Part 1: structured SWL

Introduction: Introduction to CAE II, CAD, introduction to Finite Element Method. (3h).

- Analysis of : Static Structure and Buckling simulation to show results of stresses and deformation (6h).
- Analysis of Transient Thermal and Steady State Thermal to determine thermal stresses in different heat transfer media (6h).
- Interaction : Static structure & Steady state interaction and Static structure & Transient thermal interaction(6h).
- Analysis of: Explicit Dynamic (3h) .
- Analysis of: Fluid flow (fluent) and Fluid CFX (6h).
- Interaction : Static structure & Fluid flow (fluent) and Fluid CFX (6h).
- Optimization (3h).
- Analysis of: Modal Harmonic response (6h).

### Part 2: unstructured SWL

- problem solving assignments: 5 assignment each contains 2 types of problems (fundamental problems and engineering application problems) ( 20 h)
- project problem: selecting, investigating , programming, and reporting a problem related an engineering application (10 h including 2 h seminar )

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

**Strategies**

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

## Student Workload (SWL)

MODULE DESCRIPTION FORM

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	60	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>100</b>		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Assignments	5	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Laboratory	13	20% (20)	Continuous	All
	Projects / Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to CAE II
Week 2	Static Structure analysis
Week 3	Buckling analysis
Week 4	Transient Thermal

MODULE DESCRIPTION FORM

Week 5	Steady State Thermal
Week 6	Explicit Dynamic
Week 7	Midterm Exam
Week 8	Static structure & Steady state interaction
Week 9	Static structure & Transient thermal interaction
Week 10	Fluid flow (fluent)
Week 11	Fluid flow (fluent) & interaction with static structure
Week 12	Fluid CFX
Week 13	optimization
Week 14	Modal
Week 15	Harmonic response
Week 16	Preparatory week before the final Exam

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

**Material Covered**

Week 1 through 15	Students attend the computers central laboratory, practically working on materials covered in theoretical lectures.
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**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ANSYS Workbench Documentation, ANSYS Inc., 2005.	No
Recommended Texts		No
Websites		

MODULE DESCRIPTION FORM

**Grading Scheme**

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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Code	Course/Module Title	ECTS	Semester
UOBAB0302076	Graduation Project I (Related to Automobiles)	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		30	45
Description			
<p>Design and development of a prototype for a new product or technology.                      Optimization of a manufacturing process to improve efficiency or reduce costs.                      Analysis and improvement of a mechanical or electrical system.                      Development of a software application or mobile app to solve a specific problem.                      Design and implementation of a renewable energy system.                      Computer Science and Information Technology:</p> <p>Development of a web-based platform or application for a specific purpose.                      Implementation of a machine learning algorithm for data analysis or prediction.                      Creation of a computer program or software tool to automate a task or process.                      Design and development of a database management system.</p>			

MODULE DESCRIPTION FORM

Investigation and implementation of cybersecurity measures for a network or system.  
Business and Management:

Development of a comprehensive business plan for a new venture or startup.  
Market analysis and feasibility study for a specific product or service.  
Creation of a marketing campaign and strategy for a company or organization.  
Optimization of business processes to improve efficiency and productivity.  
Analysis of financial data and formulation of investment strategies.

Module Information			
معلومات المادة الدراسية			
Module Title	Automobile Electrical and Electronics		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	UOBAB0302081		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	U	Semester of Delivery	
Administering Department		College	
Module Leader	Ahmed Mohammed Merza	e-mail	ahmed.hatrush@uobabylon.edu.iq
Module Leader's Acad. Title	Assist . Lec	Module Leader's Qualification	MSC
Module Tutor		e-mail	
Peer Reviewer Name	None	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Electrical Circuits	Semester	1
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>1. The importance of learning automotive electrical systems.</li> <li>2. The role of electrical systems in today's vehicles.</li> <li>3. The purposes of the battery.</li> <li>4. The main elements of the battery.</li> <li>5. The purpose of the starting system.</li> <li>6. The components of the starting system.</li> <li>7. The purpose of the charging system.</li> </ol>
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## MODULE DESCRIPTION FORM

8. The major components of the charging system.
9. The role of the computer in today's vehicles.
10. The purpose of vehicle communication networks.
11. The purpose of various electronic accessory systems.

### Module Learning Outcomes

مخرجات التعلم للمادة  
الدراسية

Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.

1. The main elements of the automotive battery.
2. The chemical action that occurs to produce current in a battery.
3. The differences, advantages, and disadvantages between battery types.
4. Determine the correct battery to be installed into a vehicle.
5. The principle of operation of the DC motor.
6. The purpose and operation of the field coil.
7. The differences between starter drive mechanisms.
8. The function of the major components of the AC generator.
9. How AC current is rectified to DC current in the AC generator.
10. The operation and construction of automotive lamps.
11. The differences between conventional sealed beam, halogen, and composite headlight lamps.
12. The operation and controlled circuits of the headlight switch.
13. The various types of ignition system.
14. The various types of sensors and their principles of operation used in automobiles.

### Indicative Contents

المحتويات الإرشادية

Indicative content includes the following.

- Introduction to Automotive Electrical and Electronic Systems, Batteries, Starting system, Charging system. [24hrs]
- Ignition system, **Lighting System & Accessories, Sensors and actuators of automotive.** [20hrs]
- Digital Engine Control System, Electronic Fuel Injection and Ignition Systems, Automotive Electronics. [20hrs]

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

### Strategies

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	89	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل			<b>150</b>

MODULE DESCRIPTION FORM

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	3 and 12	LO #3, #4 and #6, #7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to Automotive Electrical and Electronic Systems.
Week 2	<b>Batteries:</b> Principles and construction of lead-acid battery. Characteristics of battery, rating capacity and efficiency of batteries. Various tests on battery condition, charging methods. Constructional aspect of alkaline battery.
Week 3&4	<b>Starting System:</b> Condition at starting. Behavior of starter during starting. Series motor and its characteristics. Principle & construction of starter motor. Working of different starter drive units, care and maintenance of starter motor. Starter Switches
5&6 Week	<b>Charging System:</b> Generation of direct current. Shunt generator characteristics. Armature reaction. Third brush regulation. Cut-out. Voltage & current regulators. Compensated voltage regulator alternators principle & constructional aspects and bridge benefits.
Week 7&8	<b>Ignition Systems:</b> Types, Construction & working of battery coil and magneto ignition systems. Relative merits, Centrifugal and vacuum advance mechanisms, types and construction of spark plugs, electronic ignition systems.
Week 9	<b>Lighting System &amp; Accessories:</b> Insulated & earth return systems. Positive & negative earth systems. Details of head light & side light. Headlight dazzling & preventive methods. Electrical fuel-pump, Speedometer, Fuel, oil & temperature gauges, Horn, Wiper system, Trafficator.
Week 10&11	<b>Sensors and Actuators:</b> Basic sensor arrangement, Types of sensors such as-Oxygen sensors, Crank angle position sensors-Fuel metering/vehicle speed sensor and detonation sensor-Altitude sensor, flow sensor. Throttle position sensors. Solenoids, stepper motors, and relays.
Week 12&13	<b>Digital Engine Control System:</b> Open loop and closed loop control systems-Engine cranking and warm up control-Acceleration Enrichment-Deceleration leaning and idle speed control. Distributor less ignition-Integrated engine control systems, Exhaust emission control engineering. Electronic dashboard instruments-Onboard diagnosis system, security and warning system.
Week 14	<b>Electronic Fuel Injection and Ignition Systems:</b> Introduction, feedback carburetor systems. Throttle body injection and multi-port or point fuel injection., fuel injection systems, Injection system controls.
Week 15	<b>Automotive Electronics:</b> Current trends in modern automobiles Open and close loop systems-Components for electronic engine management. Electronic management of chassis

MODULE DESCRIPTION FORM

	system. Vehicle motion control.
Week 16	<b>Preparatory week before the final Exam.</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	<b>Starting System:</b> Condition at starting. Behavior of starter during starting.
Week 2	<b>Charging System.</b>
Week 3&4	<b>Ignition Systems:</b> Types, & working of battery coil and magneto ignition systems.
Week 5&6	<b>Sensors and Actuators</b>
Week 7&8	<b>Digital Engine Control System</b>
Week 9&10	<b>Electronic Fuel Injection</b>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<i>Barry_Hollebeak_Automotive_Electricity_&amp;_Electronics, 5th_2011</i>	No
Recommended Texts	<b>Automobile Electrical and Electronic Systems Third edition, TOM DENTON.</b>	
Websites		

**Grading Scheme**

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

**Module Information**

معلومات المادة الدراسية

Module Title	<b>Automobiles Control Systems</b>		Module Delivery	
Module Type	Support or related learning activity		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<b>UOBAB0302082</b>			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level		Semester of Delivery		
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Hamid Hussain Hadwan		e-mail	met.hamed.huss@uobabylon.edu.iq
Module Leader's Acad. Title	Master		Module Leader's Qualification	M.E.
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Mechanical Vibrations	Semester	7
Prerequisite module	Automotive Hydraulics and Pneumatics Systems	Semester	5
Co-requisites module	Theory of Machines	Semester	6
Co-requisites module	Engineering Mechanics (Dynamics)	Semester	4
Co-requisites module	Engineering Mechanics (Statics)	Semester	2

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1- To learn Definitions and concept of automatic controls
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MODULE DESCRIPTION FORM

	<p>2- To learn Open and closed loop systems</p> <p>3- To learn Mathematical Modeling</p> <p>4- To learn Block Diagrams</p> <p>5-learn Transient and Steady State Response Analysis</p> <p>6- Understand the Frequency Response Analysis using Nyquist Plots: Polar plots</p> <p>7- Understand Stability Analysis</p> <p>8- To understand Frequency Response Analysis</p> <p>9- To understand Root locus plots</p> <p>10- To study the Control Action</p> <p>11- To study the Proportional Integral Derivative controllers</p> <p>12- To learn Mathematical Representation</p> <p>13- To understand Properties of Rotation Matrices</p> <p>14- To understand Types of Joints and Links</p>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<ul style="list-style-type: none"> <li>• Distinguish between open loop and closed-loop control systems.             <ul style="list-style-type: none"> <li>• Understand control system block diagrams.</li> <li>• Explain transfer functions.</li> </ul> </li> <li>• Differentiate between analog and digital control systems.             <ul style="list-style-type: none"> <li>• Know how process control systems work.</li> </ul> </li> <li>• Understand mechanical switch types, configurations, and terms.             <ul style="list-style-type: none"> <li>• Describe the types and operation of electromechanical relays.</li> </ul> </li> <li>• Understand the characteristics of solid-state relays and the advantages and disadvantages of solid-state relays compared with electromechanical relays.</li> <li>• Comprehend the operation of power transistors and power amplifiers, calculate transistor circuit currents, and select a replacement power transistor.             <ul style="list-style-type: none"> <li>• Understand basic JFET and power MOSFET characteristics and applications.</li> </ul> </li> <li>• Understand the characteristics and operation of silicon-controlled rectifiers and basic silicon-controlled rectifier circuits.             <ul style="list-style-type: none"> <li>• Understand the properties of static, sliding, and viscous friction.</li> </ul> </li> </ul>

## MODULE DESCRIPTION FORM

- Differentiate among the various types of springs and calculate the force that a spring exerts.
- Use the basic equations of linear and rotational motion to calculate the distance, velocity, and acceleration of an object acted on by a force.
- Convert the equivalent amounts of energy used in chemical, thermal, mechanical, and electrical systems and calculate energy-conversion efficiency.
- Understand the concept of heat conduction and perform simple heat-conduction calculations.
- Understand the properties of underdamped, overdamped, and critically damped mechanical systems.
  - Calculate mechanical resonant frequencies.
- Understand the use of the various gear types and their terminology and perform gear train calculations.
  - Know the characteristics of belts and roller chains used for power transfer.
- Explain the theory of operation of electric motors in general and DC motors in particular.
  - Distinguish the characteristics of series-wound, shunt-wound, compound and permanent magnet motors.
    - Use the torque-speed curve of a motor to predict its performance.
      - Select a DC motor based on mechanical requirements.
- Understand the operation of linear amplifier drivers for DC motors that incorporate power transistors, IC amplifiers, Darlington transistors, and power MOSFETS.
  - Understand DC motor-speed control using pulse-width-modulation concepts.
  - Understand operating a DC motor from rectified AC, using silicon-controlled rectifier circuits.
    - Understand the operating principles of brushless DC motors.
- Explain what a stepper motor is, how it is different from a “regular” motor, and the applications it used.
  - Understand the basic parts and operation of the three kinds of stepper motors: permanent magnet, variable reluctance, and hybrid.
  - Differentiate between two-phase, three-phase, and four-phase stepper motors.
  - Understand the different operational modes—single-step versus slew, single- and dual-phase excitation, half step, and micro stepping.
  - Calculate the final position of a stepper motor, given the sequence of drive pulses.
    - Explain the operation of stepper motor driver circuits
- Understand the principles of AC motor control, including start-stop control, jogging,

## MODULE DESCRIPTION FORM

reduced voltage starting, and variable-speed control with a DC link converter.

- Understand the terms and operation of a closed-loop control-system block diagram.
  - Describe the basic operation of on-off control systems.
- Understand the concept and operation of a proportional control system (including bias) and calculate the error and controller output, given the system gain and inputs.
  - Understand the concept of dead band and calculate the dead-band range for a proportional control system.
    - Understand the concept and characteristics of integral control.
  - Understand the concept and characteristics of derivative control.
    - Understand the concepts and characteristics of PID control.
      - Explain the circuit operation of an analog controller.
- Explain the principles of operation of a digital controller, including programming concepts and sample rate.
  - Understand the concept of stability and interpret a Bode plot.
  - Implement two methods of tuning a process control system.
- Explain the principles of operation and applications of fuzzy logic controllers.
- Explain the operation of electromechanical relays, time-delay relays, counters, and sequencers.
  - Explain the purpose and operation of a ladder diagram.
    - Explain the operation of a relay-based controller.
- Understand the concept and purpose of a programmable logic controller (PLC).
  - Understand the hardware and wiring required in a PLC-based system.
- List the steps that must be taken to make a PLC control system operational.
  - Understand the basic instructions used in a PLC program.
    - Differentiate the ways that a PLC can be programmed.
      - Understand how PLCs are used with networks.
  - Explain the purpose and operation of a motion controller.

### Indicative Contents

المحتويات الإرشادية

Indicative content includes the following.

Introduction: Definitions and concept of automatic controls, classification of control system. [5 hrs]

## MODULE DESCRIPTION FORM

Open and closed loop systems, concepts of feedback, requirements of an ideal control system. [5 hrs]

Mathematical Modeling: Transfer function, modeling of mechanical systems, electrical systems, electromechanical systems, thermal systems, hydraulic and pneumatic systems, and Analogous systems: Force voltage, Force current. [5 hrs]

Block Diagrams and Signal Flow Graphs: Block diagram representation, functional block, block diagram reduction, Signal flow graphs, and Mason's gain formula. [5 hrs]

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. [10 hrs]

Frequency Response Analysis using Nyquist Plots: Polar plots

Nyquist Stability Criterion, Stability Analysis, Relative stability concepts, phase and gain margin, M & N circles. [5 hrs]

Frequency Response Analysis using Bode Plots: Bode attenuation diagrams, Stability Analysis using Bode plots, and Simplified Bode Diagrams, phase and gain margin.

Root locus plots: Definition of root loci, general rules for constructing root loci, Analysis using root locus plots. [15 hrs]

Control Action and System Compensation: Types of controllers – Proportional, Integral, Proportional Integral, Proportional Derivative [5 hrs]

Proportional Integral Derivative controllers (Basic concept only), Series and feedback compensation, Physical devices for system compensation. [5 hrs]

Introduction and Mathematical Representation of Robots History of Robots, Types of Robots, Notation, Position and Orientation of a Rigid Body. [5 hrs]

Some Properties of Rotation Matrices, Successive Rotations, Euler Angles For fixed frames X-Y-Z and moving frame ZYZ. Transformation between coordinate system, Homogeneous coordinates. [10 hrs]

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم



MODULE DESCRIPTION FORM

<b>Strategies</b>	Type something Like the main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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**Student Workload (SWL)**

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	89	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	6
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	61	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل			<b>150</b>

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	<b>Assignments</b>	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	All
	<b>Report</b>	1	10% (10)	13	LO #5, #8 and #10
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	LO #1 - #7
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>		100% (100 Marks)			

MODULE DESCRIPTION FORM

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: Definitions and concept of automatic controls, classification of control system.
Week 2	Open and closed loop systems, concepts of feedback, requirements of an ideal control system.
Week 3	Mathematical Modeling
Week 4	Block Diagrams and Signal Flow Graphs
Week 5	Transient and Steady State Response Analysis
Week 6	Frequency Response Analysis using Nyquist Plots: Polar plots
Week 7	<b>Midterm Exam</b> + Nyquist Stability Criterion, Stability Analysis, Relative stability concepts
Week 8	Phase and gain margin, M & N circles.
Week 9	Frequency Response Analysis using Bode Plots
Week 10	Root locus plots
Week 11	Control Action and System Compensation: Types of controllers – Proportional, Integral, Proportional Integral, Proportional Derivative
Week 12	Proportional Integral Derivative controllers (Basic concept only), Series and feedback compensation, Physical devices for system compensation.
Week 13	Introduction and Mathematical Representation of Robots History of Robots, Types of Robots, Notation, Position and Orientation of a Rigid Body.
Week 14	Some Properties of Rotation Matrices, Successive Rotations, Euler Angles For fixed frames X-Y-Z and
Week 15	Moving frame ZYZ. Transformation between coordinate system, Homogeneous coordinates.
Week 16	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	Material Covered

MODULE DESCRIPTION FORM

Week 1	Lab 1: Determination of modulus of elasticity of a mild steel specimen using strain gauge
Week 2	Lab 2: using Optical Projector
Week 3	Lab 3: Toolmaker Microscope
Week 4	Lab 4: alignment using Autocollimator / Roller set
Week 5	Lab 5: Frequency Response of RC Automobiles Control Systems
Week 6	Lab 6: Measurements of Surface roughness, Using Tally Surf/Mechanical Comparator
Week 7	Lab 7: using of LVDT

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Modern Control Engineering, Katsuhiko Ogata, 5th Edition, Prentice Hall of India Pvt. Ltd., New Delhi	Yes
Recommended Texts	Control Systems Principles and Design, M. Gopal, Tata McGraw Hill Publishing Co. Ltd., New Delhi Copyright Year: 2020, dissidents.	No
Websites	<a href="https://www.wolframalpha.com/examples/science-and-technology/engineering/control-systems">https://www.wolframalpha.com/examples/science-and-technology/engineering/control-systems</a>  <a href="https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering</a>	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

MODULE DESCRIPTION FORM

<b>Fail Group</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
<b>(0 – 49)</b>	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Automobiles Vibration</b>		<b>Module Delivery</b>	
<b>Module Type</b>	<b>S</b>		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
<b>Module Code</b>	<b>UOBAB0302083</b>			
<b>ECTS Credits</b>	<b>6</b>			
<b>SWL (hr/sem)</b>	<b>150</b>			
<b>Module Level</b>	<b>U</b>	<b>Semester of Delivery</b>	<b>8</b>	
<b>Administering Department</b>	Type Dept. Code	<b>College</b>	Type College Code	
<b>Module Leader</b>	Name	<b>e-mail</b>	E-mail	
<b>Module Leader's Acad. Title</b>	Professor	<b>Module Leader's Qualification</b>	Ph.D.	
<b>Module Tutor</b>	Name (if available)	<b>e-mail</b>	E-mail	
<b>Peer Reviewer Name</b>	Name	<b>e-mail</b>	E-mail	
<b>Scientific Committee Approval Date</b>	01/06/2023	<b>Version Number</b>	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

<b>Prerequisite module</b>	None	<b>Semester</b>	
<b>Co-requisites module</b>	None	<b>Semester</b>	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Aims</b>	
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MODULE DESCRIPTION FORM

<p>أهداف المادة الدراسية</p>	<p>Providing the student with a cognitive skill about the general concepts of vibration mechanics, which includes the vibrational movements of mechanical systems and the analysis of the dynamic forces of those systems, which will be the basis for designing structures and analyzing the dynamic stresses of structures that can be used either practically by an engineer or in postgraduate studies.</p>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> <li>1. Learn about Two degree of freedom vibrational systems</li> <li>2. Learn about Two degree of freedom vibrational systems</li> <li>3. Learn about Two degree of freedom methods of analytical solution</li> <li>4. Learn about Two degree of freedom methods of analytical solution</li> <li>5. Learn about Two degree of freedom methods of analytical solution</li> <li>6. Learn about Two degree of freedom methods of analytical solution</li> <li>7. Learn about Two degree of freedom methods of analytical solution</li> <li>8. Learn about Two degree of freedom methods of analytical solution</li> <li>9. Learn about Two degree of freedom methods of analytical solution</li> <li>10. Learn about Two degree of freedom methods of analytical solution</li> <li>11. Learn about Two degree of freedom methods of analytical solution</li> <li>12. Learn about Two degree of freedom methods of analytical solution</li> <li>13. Learn about Two degree of freedom methods of analytical solution</li> <li>14. Learn about Two degree of freedom methods of analytical solution</li> <li>15. Learn about Two degree of freedom methods of analytical solution</li> </ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

<p><b>Strategies</b></p>	<p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.</p>
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**Student Workload (SWL)**

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<p><b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل</p>	<p>89</p>	<p><b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا</p>	<p>6</p>
<p><b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل</p>	<p>61</p>	<p><b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا</p>	<p>4</p>
<p><b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل</p>	<p>150</p>		

MODULE DESCRIPTION FORM

**Module Evaluation**

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1-10
	Assignments	2	10% (10)	2, 12	LO # 3-10
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5-15
Summative assessment	Midterm Exam	2 hrs	10% (10)	7	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

	Material Covered
Week 1	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 coordinial coupling and semi definite system with some examples
Week 2	Mode shapes - Study the mode shapes for different system of two Degree of freedom with examples
Week 3	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
Week 4	Dynamic absorber (undamped) - Study and formulate the eq. of dynamic absorber and its characteristic without damping in addition to some examples
Week 5	- Study and formulate the eq. of dynamic absorber and its characteristic with damping in addition to some examples
Week 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
Week 7	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
Week 8	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
Week 9	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 equivalent of stepped shaft and Gear shaft
Week 10	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 equivalent of stepped shaft and Gear shaft
Week 11	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

MODULE DESCRIPTION FORM

Week 12	Vibration of continuous system - Studying and formulating the eq. for continuous system for different end Boundary condition and constrains with. - examples
Week 13	Vibration of continuous system - Studying and formulating the eq. for continuous system for different end Boundary condition and constrains with. - examples
Week 14	Rayleigh method for estimation the fundamental natural frequency - Studying Rayleigh eq. to estimate the fundamental natural freq . of a system with examples
Week 15	Three degree of freedom - Study and analyze the equation of motion for 3- Degree system. Estimating the natural frequencies and their mode shapes.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Free vibration of an undamped two degree of freedom system
Week 2	Lab 2: Free vibration viscous damped two degree of freedom system
Week 3	Lab 3: Equivalent springs and dampers
Week 4	Lab 4: Forced vibration of two degree of freedom
Week 5	Lab 5: Forced vibration for constant force
Week 6	Lab 6: Forced Vibration for sinusoidal force
Week 7	Lab 7: Free vibration of an undamped three degree of freedom system

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Theory_of_Vibration with Application by William T. Thomson, published by Chapman & Hall in 1993.	Yes
Recommended Texts	Mechanical_Vibrations, by Singiresu S. Rao mechVib theory and applications-Graham Kelly, Den Hartog - Mechanical vibrations.	No
Websites	<a href="https://www.routledge.com/Engineering-Vibrations/Bottega/p/book/9781439830352">https://www.routledge.com/Engineering-Vibrations/Bottega/p/book/9781439830352</a>	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

MODULE DESCRIPTION FORM

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

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

**Module Information**

معلومات المادة الدراسية

Module Title	<b>Hybrid Vehicles</b>		Module Delivery	
Module Type	S		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	<b>UOBAB0302084</b>			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UC	Semester of Delivery		
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Name	e-mail	E-mail	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	Name (if available)	e-mail	E-mail	
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0	

**Relation with other Modules**

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	<p>Module Aims:</p> <p>1. Develop a comprehensive understanding of hybrid electric vehicle technology, including its principles, components, and operation.</p>
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## MODULE DESCRIPTION FORM

2. Familiarize students with different hybrid vehicle architectures and their advantages and disadvantages.
3. Provide in-depth knowledge of the various components and systems used in hybrid vehicles, such as electric motors, batteries, internal combustion engines, power electronics, and transmission systems.
4. Explore the energy management strategies and control systems employed in hybrid vehicles for optimal power distribution and energy efficiency.
5. Analyze the environmental impact of hybrid vehicles and evaluate their benefits in terms of reduced emissions and improved fuel economy.
6. Develop practical skills in designing, operating, and maintaining hybrid vehicles through laboratory sessions and hands-on experience.
7. Foster critical thinking and problem-solving abilities in addressing challenges related to hybrid vehicle technology and its implementation.
8. Stay updated with the latest advancements and future trends in hybrid vehicle technology, including emerging technologies and regulations.

### Module Learning Outcomes:

Upon successful completion of this module, students will be able to:

1. Explain the fundamental concepts and principles of hybrid electric vehicle technology, including the integration of electric and internal combustion power sources.
2. Identify and describe the different hybrid vehicle architectures and compare their characteristics, advantages, and limitations.
3. Demonstrate a comprehensive understanding of the components and systems used in hybrid vehicles, such as electric motors, batteries, power electronics, and transmission systems.
4. Analyze and apply energy management strategies and control systems to optimize power distribution and improve energy efficiency in hybrid vehicles.
5. Evaluate the environmental impact of hybrid vehicles, including their contribution to reduced emissions and improved fuel economy compared to conventional vehicles.
6. Apply theoretical knowledge to practical aspects of hybrid vehicle design, operation, and maintenance through laboratory sessions and hands-on activities.
7. Employ critical thinking skills to identify and address challenges and limitations associated with hybrid vehicle technology.
8. Stay informed about the latest advancements and emerging trends in hybrid vehicle technology, including regulations and policies influencing its development and implementation.

### Indicative Contents:

- . Introduction to Hybrid Vehicles:1
  - Definition and classification of hybrid vehicles
  - Historical background and evolution of hybrid vehicle technology
  - Comparison of hybrid vehicles with conventional vehicles
  - Environmental impact and sustainability considerations

### Module Learning Outcomes

مخرجات التعلم للمادة  
الدراسية

### Indicative Contents

المحتويات الإرشادية

## MODULE DESCRIPTION FORM

### . Hybrid Vehicle Architectures:2

- Series, parallel, and series-parallel hybrid architectures
  - Powertrain configurations and layouts
- Advantages and disadvantages of different hybrid architectures

### . Hybrid Vehicle Components:3

- Electric motors and generators: types, characteristics, and performance
  - Battery technologies and energy storage systems: types, construction, and management
- Internal combustion engines: role and optimization in hybrid systems
  - Power electronics and inverters: functions and control mechanisms
  - Transmission systems and drivetrains: designs and efficiency considerations

### . Energy Management Strategies:4

- Energy flow and power distribution in hybrid vehicles
  - Control strategies for optimal energy management
  - Regenerative braking and energy recovery systems
- Hybrid vehicle control algorithms and optimization techniques

### . Hybrid Vehicle Control Systems:5

- Hybrid vehicle control architecture and integration of subsystems
- Control strategies for powertrain components: electric motors, engine, and battery
  - On-board diagnostics and fault detection systems
  - Safety considerations and reliability assessment

### . Environmental Impact and Regulations:6

- Environmental benefits of hybrid vehicles: reduced emissions and improved fuel economy
  - Emissions and fuel economy standards and regulations
- Life cycle analysis and environmental impact assessment of hybrid vehicles
  - Future trends and advancements in hybrid vehicle technology

### . Practical Applications and Case Studies:7

- Laboratory sessions to demonstrate hybrid vehicle operation and control
  - Case studies of successful hybrid vehicle implementations
- Evaluation and comparison of hybrid vehicle models in the market

### . Emerging Technologies and Future Trends:8

- Introduction to emerging technologies in hybrid vehicle systems
  - Advances in battery technology and energy storage
  - Integration of hybrid systems with renewable energy sources
- Impact of autonomous driving and connected technologies on hybrid vehicles

MODULE DESCRIPTION FORM

**Learning and Teaching Strategies**

استراتيجيات التعلم والتعليم

**Strategies**

Strategies for Teaching Hybrid Vehicles:

1. Lecture-based Instruction:

- Provide comprehensive lectures to introduce and explain the fundamental concepts and principles of hybrid vehicle technology.
- Use visual aids such as slides, diagrams, and animations to enhance understanding.
- Encourage active student participation through discussions and questions.

2. Case Studies and Real-World Examples:

- Present case studies of successful hybrid vehicle implementations, highlighting their design considerations, challenges, and outcomes.
- Discuss real-world examples of hybrid vehicles in various applications (e.g., passenger cars, buses, commercial vehicles) to provide practical insights.

3. Laboratory Sessions and Hands-on Experience:

- Conduct laboratory sessions where students can gain practical experience with hybrid vehicle components, systems, and control strategies.
- Allow students to assemble and disassemble hybrid vehicle components to understand their functioning and integration.

4. Group Projects and Presentations:

- Assign group projects related to hybrid vehicle design, optimization, or control.
- Encourage students to research and present their findings, fostering collaboration and critical thinking skills.

5. Guest Lectures by Industry Experts:

- Invite guest speakers from the automotive industry or research institutions to share their expertise and provide real-world insights.
- Offer students the opportunity to interact with professionals working in the hybrid vehicle field.

6. Simulation and Modeling:

- Utilize computer-based simulations or modeling software to simulate hybrid vehicle operation and analyze performance.
- Guide students in using simulation tools to optimize hybrid vehicle control strategies and evaluate energy management algorithms.

7. Field Visits and Industry Exposure:

- Organize visits to hybrid vehicle manufacturing plants, research facilities, or automotive conferences/exhibitions to expose students to the industry's latest developments and practices.

8. Continuous Assessment and Feedback:

- Conduct regular assessments, including quizzes, assignments, and examinations, to

## MODULE DESCRIPTION FORM

gauge student understanding and progress.

- Provide timely feedback to students to help them improve their knowledge and skills.

### 9. Stay Updated with the Latest Developments:

- Stay abreast of the latest advancements in hybrid vehicle technology, regulations, and industry trends to ensure the course content remains current and relevant.
- Share relevant research papers, articles, and resources with students to enhance their understanding of recent developments.

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	75	Structured SWL (h/w)	5
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	75	Unstructured SWL (h/w)	5
الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)			
الحمل الدراسي الكلي للطالب خلال الفصل	150		

### Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5, 10	LO #1-10
	<b>Assignments</b>	4	10% (10)	2, 12	LO # 3-10
	<b>Projects / Lab.</b>	3	10% (10)	Continuous	All
	<b>Report</b>	2	10% (10)	13	LO # 5-15
<b>Summative assessment</b>	<b>Midterm Exam</b>	2 hrs	10% (10)	7	LO # 1-7
	<b>Final Exam</b>	3 hrs	50% (50)	16	All
<b>Total assessment</b>		100% (100 Marks)			

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Material Covered	
<b>Week 1</b>	Introduction to Hybrid Vehicles Definition and classification of hybrid vehicles

MODULE DESCRIPTION FORM

	<b>Historical background and evolution of hybrid vehicle technology</b>
<b>Week 2</b>	<b>Hybrid Vehicle Architectures</b> Series, parallel, and series-parallel hybrid architectures Powertrain configurations and layouts
<b>Week 3</b>	<b>Hybrid Vehicle Components</b> Electric motors and generators: types, characteristics, and performance Battery technologies and energy storage systems: types, construction, and management
<b>Week 4</b>	<b>Hybrid Vehicle Components (contd.)</b> Internal combustion engines: role and optimization in hybrid systems Power electronics and inverters: functions and control mechanisms
<b>Week 5</b>	<b>Hybrid Vehicle Components (contd.)</b> Transmission systems and drivetrains: designs and efficiency considerations
<b>Week 6</b>	<b>Energy Management Strategies</b> Energy flow and power distribution in hybrid vehicles Control strategies for optimal energy management
<b>Week 7</b>	<b>Energy Management Strategies (contd.)</b> Regenerative braking and energy recovery systems Hybrid vehicle control algorithms and optimization techniques
<b>Week 8</b>	<b>Hybrid Vehicle Control Systems</b> Hybrid vehicle control architecture and integration of subsystems Control strategies for powertrain components: electric motors, engine, and battery
<b>Week 9</b>	<b>Hybrid Vehicle Control Systems (contd.)</b> On-board diagnostics and fault detection systems Safety considerations and reliability assessment
<b>Week 10</b>	<b>Environmental Impact and Regulations</b> Environmental benefits of hybrid vehicles: reduced emissions and improved fuel economy Emissions and fuel economy standards and regulations
<b>Week 11</b>	<b>Environmental Impact and Regulations (contd.)</b> Life cycle analysis and environmental impact assessment of hybrid vehicles
<b>Week 12</b>	<b>Practical Applications and Case Studies</b> Laboratory sessions to demonstrate hybrid vehicle operation and control Case studies of successful hybrid vehicle implementations
<b>Week 13</b>	<b>Emerging Technologies and Future Trends</b> Introduction to emerging technologies in hybrid vehicle systems Advances in battery technology and energy storage Integration of hybrid systems with renewable energy sources
<b>Week 14</b>	<b>Revision and Exam Preparation</b> Review of key concepts, principles, and applications covered in the course Practice exercises and exam-style questions
<b>Week 15</b>	<b>Stay Updated with the Latest Developments:</b> Stay abreast of the latest advancements in hybrid vehicle technology, regulations, and industry trends to ensure the course content remains current and relevant.
<b>Week 16</b>	<b>Preparatory week before the final Exam</b>

**Delivery Plan (Weekly Lab. Syllabus)**

المنهاج الاسبوعي للمختبر

	<b>Material Covered</b>
<b>Week 1</b>	<b>Lab 1: Introduction to Hybrid Vehicle Components</b>

MODULE DESCRIPTION FORM

	<p><b>Familiarization with electric motors and generators used in hybrid vehicles</b>  <b>Hands-on experience in testing motor performance and characteristics</b></p>
Week 2	<p><b>Lab 2: Battery Technology and Energy Storage Systems</b> Examination of different battery types and their properties Practical exercises involving battery management and charging techniques</p>
Week 3	<p><b>Lab 3: Integration of Internal Combustion Engines in Hybrid Systems</b>  <b>Demonstration of hybrid powertrain components and their interaction with an internal combustion engine</b> Hands-on activities related to engine optimization and control strategies</p>
Week 4	<p><b>Lab 4: Power Electronics and Inverters</b> Practical exercises on power electronics devices and their role in hybrid vehicle control Experimentation with inverter circuits and control algorithms</p>
Week 5	<p><b>Lab 5: Transmission Systems and Drivetrains</b> Investigation of various transmission systems used in hybrid vehicles Hands-on exercises involving transmission efficiency and control techniques</p>
Week 6	<p><b>Lab 6: Energy Management Strategies in Hybrid Vehicles</b> Simulation-based activities to analyze energy flow and power distribution in hybrid vehicles Optimization exercises for energy management algorithms</p>
Week 7	<p><b>Lab 7: Regenerative Braking and Energy Recovery Systems</b>  <b>Hands-on experiments to explore regenerative braking and energy recovery mechanisms</b>  <b>Analysis of energy regeneration efficiency</b></p>
Week 8	<p><b>Lab8: Hybrid Vehicle Control Systems</b> Practical exercises on hybrid vehicle control architecture and integration of subsystems Implementation of control strategies for powertrain components</p>
Week 9	<p><b>Lab9: Hybrid Vehicle Performance Analysis</b> Laboratory experiments to evaluate hybrid vehicle performance, including acceleration, energy consumption, and emissions Data collection and analysis for performance assessment</p>
Week 10	<p><b>Lab10: Hybrid Vehicle Diagnostics and Fault Detection</b>  <b>Hands-on activities to diagnose and troubleshoot hybrid vehicle faults</b>  <b>Utilization of diagnostic tools and techniques for fault detection</b></p>

**Learning and Teaching Resources**

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	<p>Textbooks and Reference Materials:                      "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives" by Chris Mi                      "Hybrid and Electric Vehicles: Principles and Applications" by John G. Hayes                      "Advanced Electric Drive Vehicles" by Ali Emadi</p>	Yes

MODULE DESCRIPTION FORM

	"Electric and Hybrid Vehicles: Design Fundamentals" by Iqbal Husain Research papers and articles on hybrid vehicle technology from reputable journals and conferences	
<b>Recommended Texts</b>	"Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives" by Chris Mi This book provides a comprehensive overview of hybrid electric vehicle technology, covering topics such as hybrid powertrain architecture, energy management strategies, control systems, and practical implementation. It includes case studies and practical perspectives to enhance understanding. "Hybrid and Electric Vehicles: Principles and Applications" by John G. Hayes This textbook offers a comprehensive introduction to hybrid and electric vehicles, covering the principles, components, and control systems. It discusses the environmental impact, energy storage technologies, and emerging trends in the field of electric and hybrid vehicles.	No
<b>Websites</b>	(https://www.hybridcars.com)	

**Grading Scheme**

مخطط الدرجات

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

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

**Module Information**

معلومات المادة الدراسية

<b>Module Title</b>	<b>Professional ethics</b>	<b>Module Delivery</b>
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MODULE DESCRIPTION FORM

Module Type	B		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	UOBAB0302085		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	U	Semester of Delivery	8
Administering Department	Type Dept. Code	College	Type College Code
Module Leader			e-mail
Module Leader's Acad. Title			Module Leader's Qualification
Module Tutor			e-mail
Peer Reviewer Name			e-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
<b>Module Objectives</b> أهداف المادة الدراسية	<p>Module Objectives for the Professional Ethics Course:</p> <ol style="list-style-type: none"> <li>1. Familiarize students with the fundamental concepts, theories, and frameworks of ethics and their application to professional practice.</li> <li>2. Enable students to recognize and analyze ethical issues and dilemmas that commonly arise in their chosen profession.</li> <li>3. Develop students' skills in ethical decision-making, allowing them to apply ethical frameworks and principles to resolve complex ethical problems.</li> <li>4. Help students understand and adhere to professional codes of conduct and ethical standards specific to their field of study or profession.</li> <li>5. Enhance students' ability to communicate effectively and ethically in professional contexts, considering the impact of language and communication methods on ethical decision-making and relationships.</li> <li>6. Encourage students to reflect on their personal values, biases, and beliefs, fostering self-awareness and an understanding of their potential influence on ethical decision-making.</li> <li>7. Cultivate students' capacity to engage in ethical discussions and debates, promoting the ability to articulate and defend ethical viewpoints and consider alternative perspectives.</li> <li>8. Foster students' awareness of their ethical responsibilities towards clients, colleagues, stakeholders, and society, including considerations of social impact and</li> </ol>



## MODULE DESCRIPTION FORM

- corporate social responsibility.
9. Equip students with the skills to navigate ethical dilemmas and make informed, morally sound decisions in professional settings, taking into account legal, cultural, and organizational factors.
  10. Cultivate professionalism and ethical leadership qualities in students, encouraging the modeling of ethical behavior, promotion of ethical conduct, and fostering of an ethical work environment.
  11. Enable students to apply ethical principles and considerations to address global challenges and societal issues within their chosen profession, taking into account cultural diversity and social justice.
  12. Instill a sense of continuous learning and professional development in the area of professional ethics, encouraging students to stay informed about emerging ethical issues and advancements in ethical standards.

### Module Learning Outcomes for the Professional Ethics Course:

Upon completion of the Professional Ethics course, students should be able to:

1. Understand Ethical Principles: Demonstrate a solid understanding of ethical principles, theories, and frameworks relevant to professional ethics.
2. Identify Ethical Issues: Identify and recognize ethical issues and dilemmas that commonly arise in professional practice within their chosen field.
3. Apply Ethical Decision-Making: Apply ethical decision-making models and strategies to analyze and resolve complex ethical problems encountered in professional contexts.
4. Adhere to Professional Codes of Conduct: Understand and adhere to professional codes of conduct and ethical standards specific to their chosen field, recognizing the importance of upholding professional integrity.
5. Communicate Ethically: Communicate effectively and ethically, considering the impact of language and communication methods on ethical decision-making and interpersonal relationships in professional settings.
6. Reflect on Personal Values: Reflect on personal values, biases, and beliefs, recognizing their potential influence on ethical decision-making and professional behavior.
7. Engage in Ethical Discussions: Engage in ethical discussions and debates, demonstrating the ability to articulate and defend ethical viewpoints and consider alternative perspectives.
8. Ethical Responsibility and Social Impact: Recognize the ethical responsibilities professionals have towards clients, colleagues, stakeholders, and society, including considerations of social impact and corporate social responsibility.
9. Navigate Ethical Dilemmas: Develop the skills to navigate ethical dilemmas and make informed, morally sound decisions in professional settings, considering legal, cultural, and organizational factors.
10. Professionalism and Ethical Leadership: Demonstrate professionalism and ethical leadership qualities by modeling ethical behavior, promoting ethical conduct, and fostering an ethical work environment.

### Module Learning Outcomes

مخرجات  
التعلم للمادة  
الدراسية

## MODULE DESCRIPTION FORM

11. Apply Ethical Principles Globally: Apply ethical principles and considerations to address global challenges and societal issues within the chosen profession, taking into account cultural diversity and social justice.

12. Continuous Learning and Ethical Development: Recognize the importance of continuous learning and professional development in the area of professional ethics, staying informed about emerging ethical issues and advancements in ethical standards.

These module learning outcomes are designed to equip students with the necessary knowledge, skills, and ethical awareness to make informed decisions, uphold professional integrity, and navigate ethical challenges in their chosen field of practice.

### Introduction to Professional Ethics

Definition and importance of professional ethics

Ethical theories and frameworks: deontology, consequentialism, virtue ethics

Ethical reasoning and moral decision-making

Ethical Issues in the Chosen Profession

Analysis of ethical challenges and dilemmas in specific professional contexts

Confidentiality, privacy, and data protection

Conflict of interest, professional integrity, and honesty

Professional Codes of Conduct and Ethical Standards

Study and interpretation of professional codes of ethics and conduct

Understanding and adhering to ethical guidelines in the chosen field

Ethical responsibilities towards clients, colleagues, and society

Ethical Decision-Making Models

Frameworks for ethical decision-making: principles-based, rights-based, consequentialist

Case studies and ethical analysis exercises to develop decision-making skills

Ethical considerations in the context of technological advancements and innovation

Ethical Leadership and Organizational Culture

Ethical leadership styles and their impact on organizational culture

Creating an ethical work environment and fostering ethical behavior

Ethical challenges in diverse and multicultural workplaces

Professionalism and Ethical Communication

Effective communication in ethical contexts

Ethical dimensions of professional communication: honesty, transparency, respect

Communicating and resolving ethical conflicts within professional teams

Social Responsibility and Ethical Engagement

Environmental sustainability and social justice considerations in professional practice

Ethical responsibilities towards stakeholders and the wider community

Corporate social responsibility and ethical business practices

Global and Societal Ethical Challenges

Ethical considerations in a globalized world: cultural relativism, human rights, fair trade

Ethical implications of emerging technologies and scientific advancements

Ethical dimensions of social media, artificial intelligence, and data analytics

### Indicative Contents

المحتويات  
الإرشادية

## MODULE DESCRIPTION FORM

### Ethical Reflection and Personal Values

Reflecting on personal values and their influence on professional ethics  
Developing moral sensitivity and self-awareness as a professional  
Ethical decision-making in complex and ambiguous situations  
Ethical Professionalism and Continuous Learning

Ethical responsibilities towards professional development and lifelong learning  
Ethics in research and intellectual property rights  
Ethical challenges and opportunities in a rapidly changing professional landscape

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

#### Strategies

**Interactive Discussions:** Encourage students to actively participate in class discussions to explore ethical issues, analyze case studies, and engage in ethical debates. Create a safe and respectful environment for students to express their opinions and challenge ideas.

**Case Studies and Real-Life Examples:** Use real-life case studies and examples from the students' chosen profession to illustrate ethical dilemmas and challenges. Analyze these cases collectively, allowing students to apply ethical theories and decision-making frameworks.

**Guest Speakers and Industry Experts:** Invite professionals from various fields to share their experiences and perspectives on professional ethics. This provides students with real-world insights and diverse viewpoints, enhancing their understanding of ethical issues in different professional contexts.

**Role-Playing and Simulations:** Organize role-playing activities or simulations where students can experience ethical decision-making in a controlled setting. This allows them to practice resolving ethical dilemmas and develop their ethical reasoning skills.

**Ethical Codes and Standards:** Introduce students to professional codes of conduct and ethical standards relevant to their field. Discuss the principles and guidelines outlined in these codes and how they apply to real-world scenarios.

**Ethical Decision-Making Frameworks:** Teach students various ethical decision-making frameworks, such as the principles-based, rights-based, or consequentialist approaches. Guide them in applying these frameworks to analyze and resolve ethical problems.

**Critical Reflection and Self-Assessment:** Encourage students to reflect on their own values, beliefs, and biases. Help them understand how personal values may influence ethical decision-making and challenge them to think critically about their own ethical responsibilities as professionals.

**Collaborative Learning:** Foster a collaborative learning environment where students can work together in groups to discuss ethical scenarios, share insights, and collectively solve ethical dilemmas. This promotes teamwork, communication skills, and a deeper understanding of ethical issues.

**Ethical Leadership Development:** Provide opportunities for students to develop ethical leadership skills. Encourage them to identify and address ethical issues within organizations, consider the impact of their decisions on stakeholders, and promote ethical behavior in their professional roles.

**Reflective Assignments and Portfolios:** Assign reflective writing tasks or create portfolios where students can document their ethical reflections, ethical dilemmas encountered, and strategies for

## MODULE DESCRIPTION FORM

ethical decision-making. This encourages self-reflection, self-awareness, and continuous learning.

**Ethical Research and Presentations:** Assign research projects or presentations on ethical topics related to the students' field of study. This promotes independent thinking, research skills, and the ability to communicate ethical concepts effectively.

**Professionalism and Ethical Conduct Modeling:** Model ethical behavior and professionalism in your interactions with students. Emphasize the importance of integrity, respect, and ethical conduct in the classroom and professional settings.

It is important to adapt these strategies to the specific needs and characteristics of the student cohort, as well as the chosen field of study. Regularly assess and provide feedback on students' progress to facilitate their understanding and application of professional ethics principles.

### Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	88	Structured SWL (h/w)	6
الحمل الدراسي المنتظم للطلاب خلال الفصل		الحمل الدراسي المنتظم للطلاب أسبوعيا	
Unstructured SWL (h/sem)	62	Unstructured SWL (h/w)	4
الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem)			١٥٠
الحمل الدراسي الكلي للطلاب خلال الفصل			

### Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (20)	5 and 10	LO #3, #4, #6, and #7
	Lab.	1	10% (10)	Continuous	All
	Projects	1	10% (10)	12	LO #1 - #11
Summative assessment	Midterm Exam	2hr	10% (10)	8	LO #1 - #8
	Final Exam	hr٣	50% (50)	16	All
<b>Total assessment</b>			100%		

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction in Air-condition
Week 2	Air and Humidity Calculations
Week 3	Psychrometric Chart
Week 4	Air-Conditioning Processes
Week 5	Heat transfer cross wall
Week 6	Heat load
Week 7	Cooling load
Week 8	Mid-term Exam
Week 9	Duct Design
Week 10	Refrigerant Systems, Carnot Cycle,
Week 11	Ideal single stage Cycles
Week 12	Liquid Sub cooling & Vapour Superheating Cycles

MODULE DESCRIPTION FORM

Week 13	Compressor Work
Week 14	Volumetric Efficiency
Week 15	Maintenance of an automobile air-conditioning system
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Performance study of Air-conditioning units.
Week 2	Lab 2: Performance study of cooling tower units.
Week 3	Lab 3: Performance study of heat pump units.
Week 4	Lab 4: Performance study of electrical refrigerator.
Week 5	Lab 5: Performance study of an Automobile Air-conditioning units
	Lab Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Refrigeration of Air-conditioning / R.S. Khurmi & J.K. Gupta	Yes
Recommended Texts	Automotive Heat and Air-Conditioning System / K. Mitchell (1989)	No
	Environmental Engineering Analysis and Practice / B.H. Jennings (1970)	No
Websites	<a href="https://www.amazon.com/Heating-Ventilating-Conditioning-Analysis-Design/dp/0471470155">https://www.amazon.com/Heating-Ventilating-Conditioning-Analysis-Design/dp/0471470155</a>	

Grading Scheme

مخطط الدرجات

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

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

Code	Course/Module Title	ECTS	Semester
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MODULE DESCRIPTION FORM

UOBAB0302086	Graduation Project (Related to Automobiles)	3	8
<b>Class (hr/w)</b>	<b>Prac.</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2	1	44	31
<b>Description</b>			
<p>Students will be exposed to lecture modules on project and thesis work followed by assignment of individual projects involving manufacturing/design an Automobile component. An industrial project may also be undertaken by the student to be supervised jointly by industry personnel and the teacher</p>			