Academic Program Description Form

University Name: University of Babylon
College/Institute: College of Engineering - Al-Musayyib
Program Name: Academic Program for obtaining an undergraduate degree, Bachelor of Science in Energy Engineering and Renewable Energies Engineering.
Final Degree Name: Bachelor of Science in Energy Engineering and Renewable Energies
Academic System: Semester-based + Bologna System
Description Preparation Date: 9/4/2023
File Completion Date: 14/9/2025

The file was prepared by the Academic Description Committee in the Department of Energy Engineering and Renewable Energies. The coordinator here is a committee, not an individual, which was formed by Administrative Order D/8/1446 on 11/5/2025. The committee consists of: (Assist. Prof. Dr. Hussein Ali Hassan – the head, and members: Assist. Engineer Ali Ghalib Hussein, Assist. Engineer Fatima Adeeb Mousa, Assist, Assist. Engineer Mohammed Karim Mohammed, Assist. Engineer Mustafa Abdul Karim Ahmed)
Signature of the Head of the Quality Assurance Committee in the Department of Energy Engineering and Renewable Energies

(Assist. Prof. Dr. Hussein Ali Hassan):
Date: 14/9/2025

File reviewed by the Quality Assurance and University Performance Unit in the College
Director of the Quality Assurance and University Performance Unit: Lecturer. Dr. Noor

Mohammad Jassim:
Date: 14/9/2025
Signature of the Department Head: Assist. Prof. Dr. Ali Jaber Abdulhamed:
Date: 14/9/2025
Signature of the Assistant Dean for Academic Affairs: Assist. Prof. Dr. Sana'a Abdul Razzaq Jassim:
Date: 14/9/2025
Signature
Endorsement by the Dean
Assist. Prof. Dr. Wissam Jaleel Khudayer
Date: 14/9/2025

1. The program Vision

Leadership in engineering education and learning in the field of energy and renewable energy engineering, with excellence in scientific research locally and globally, while providing community services and meeting the needs of the labor market.

2. The Program message

Active contribution to the advancement of energy and renewable energy engineering by preparing competent engineering graduates with high professional skills and ethics, supporting the labor market and society, and producing rigorous applied scientific research that serves and develops the field of specialization.

3. The Program Goals

1. Preparing Competent Engineers who possess both theoretical and practical knowledge and skills in the fields of conventional and renewable energy engineering, enabling them to practice the profession efficiently and meet labor market demands.
2. Contributing to Sustainable Development through conducting applied research, offering scientific and technical consultations, and collaborating with industrial and research institutions both locally and internationally.
3. Promoting Lifelong Learning and Professional Development through training, seminars, scientific courses, and encouraging scholarships and graduate studies to keep up with global advancements.
4. Integrating Modern Technology, particularly information systems, into curricula and research methodologies to enhance the quality of education and research to global standards.

4. Program accreditation

Does the program have program accreditation? From which side? The application for accreditation has already been submitted Iraqi Council for Accreditation of Engineering Education

5. Other external influences
Is there a sponsor for the program? Governmental support (Ministry of Higher Education and Scientific Research)

6. Program structure				
Program structure	Number of courses	Study unit	percentage	Program structure
Enterprise requirements	4	9	3.8%	comments *
College requirements	3	21	8.7%	core
Department requirements	42	210	87.5%	core
summer training	-	-	-	core
Other				-

* Notes may include whether the course is core or elective.

7. Program description				
Year/level	Course or course code	Name of the course or course	Credit hours	
			theoretical	practical
The first stage/ The first semester	UOBAB0301011	Engineering Drawing and Auto-CAD I	4	2
	UOBAB0301012	Electrical Circuits	3	2
	UOBAB0301013	Mathematics I	4	0
	UOBAB0301014	Physics	2	2
	UOBAB0301015	Fundamental of Computer	1	2
	UOBAB0301016	Arabic Language	2	0

Year/level	Course or course code	Name of the course or course	Credit hours	
			theoretical	practical
The first stage/ The second semester	UOBAB0301021	Engineering Drawing and Auto-CAD II	4	2
	UOBAB0301022	Engineering Mechanics	4	0
	UOBAB0301023	Mathematics II	4	0
	UOBAB0301024	Manufacturing Processes & Engineering Workshop	2	2
	UOBAB0301025	Chemistry	2	2
	UOBAB0301026	English Language I	2	0
Year/level	Course or course code	Name of the course or course	Credit hours	
			theoretical	practical
The second stage/ The first semester			4	0
	Em En Mai 201701 (3+0)	Engineering Mathematics I	2	2
	Em En Pe 201802 (2+2)	Electronic Circuits	2	0
	Em En Eci 201903 (2+0)	Material Science and Technology	3	0
	Em En Emi 202004 (2+0)	Thermodynamics I	3	0
	Em En Thi 202105 (1+2)	Principles of Energy Engineering I	2	2
	Em En Emi 202206 (1+2)	Fluid Mechanics I	1	2
	Em EnFmi 202307 (1+2)	Computer Programming (Matlab) III	3	0
	Em EnCpi 202408 (2+0)	Engineering Mechanics (Dynamic) II	4	0
Year/level	Course or course code	Name of the course or course	Credit hours	

			theoretical	practical
The second stage/ The second semester	Em En Maii 202509 (3+0)	Engineering Mathematics II	4	0
	Em En Peii 202610 (2+2)	Energy sources	2	0
	Em En Esii 202711 (2+0)	Strength of Materials	2	2
	Em En Thii 202812 (2+0)	Thermodynamics II	3	2
	Em En Smii 202913 (1+2)	Principles of Energy Engineering II	3	0
	In Flii 203014 (1+2)	Fluid Mechanics II	2	2
	Em En Cpii 203115 (2+0)	Human Rights, Freedom & democracy	2	0
	Em En Hrpii 203216 (1+2)	Mechanical Engineering Drawing I (Solid Works)	2	2
Year/level	Course or course code	Name of the course or course	Credit hours	
			theoretical	practical
The third stage/ The first semester	Em En Hti 303501 (2+2)	Heat and Mass Transfer I	3	2
	Em En Eai 303402 (2+0)	Engineering Analysis	3	0
	Em En Mdi 303503 (2+0)	Mechanical Element Design	3	0
	Em En Emi 303604 (2+2)	Electrical Machines	2	2
	Em En Fci 303705 (2+0)	Fuels and Combustion Energy	3	0
	Em En Epi 303806 (2+0)	Electrical Power Systems I	3	0
	Em En Wmi 303907 (2+0)	Waste Management and Energy Recovery	2	0
	Em En Wmi 304008 (2+0)	Energy Storage Systems	3	2

Year/level	Course or course code	Name of the course or course	Credit hours	
			theoretical	practical
The third stage/ The second semester	Em Ht Maii 304109 (2+2)	Heat and Mass Transfer II	3	2
	Em En Naii 304210 (2+0)	Numerical analysis	3	0
	Em En MDii 304311 (2+0)	Mechanical System Design	3	0
	Em In Seii 304412 (1+2)	Solar Energy	2	2
	Em In Icii 304513 (2+2)	Internal Combustion Engines	2	2
	Em En Epii 304614 (2+0)	Electrical Power Systems II	3	0
	Em En Nnii 304715 (2+0)	Nanomaterials and Nanotechnology	3	0
	Em En Heii 304816 (1+2)	Hydrogen Energy and Fuel Cell Technology	2	2
Year/level	Course or course code	Name of the course or course	Credit hours	
			theoretical	practical
The fourth stage/ The first semester	Em En Iei 404901 (2+2)	Instrumentation in Energy Systems	3	2
	Em En Eei 405002 (2+0)	Energy Management and Economics	2	0
	Em En Pei 405103 (2+2)	Power Electronics	3	2
	Em En Dri 405204 (2+0)	Design of Renewable Energy Systems I	3	0
	Em En Ppi 405305 (2+0)	Power Plants I	3	0
	Em In Bei 405406 (1+2)	Bioenergy	2	2
	Em En Nei 405507 (2+0)	Nuclear Engineering	3	0
	Em En Gpi 405608 (2+0)	Graduation Project I	2	0

Year/level	Course or course code	Name of the course or course	Credit hours	
			theoretical	practical
The fourth stage/ The second semester	Em En Csii 405709 (3+0)	Control in Energy Systems	3	2
	Em En Eeii 405810 (2+2)	Energy and Environment	2	0
	Em EnYes405911 (2+0)	Industrial Engineering	2	0
	Em In Drii 406012 (2+0)	Design of Renewable Energy Systems II	3	0
	Em En Ppii 406113 (1+2)	Power Plants II	3	1
	Em En Weii 406214 (1+2)	Wind Energy	2	2
	Em En Msii 406315 (2+0)	Modeling and Simulation of Energy Systems	2	2
	Em En Gpii 406416 (1+2)	Graduation Project II	2	0

8. Expected learning outcomes of the programme	
Knowledge	
The ability to analyze the performance of thermal and gas electrical power generation plants through the ability to distinguish, identify, define, formulate and solve engineering problems by applying the principles of engineering, science and mathematics.	Learning outcomes 1
Knowledge and familiarity with the most important technologies used in the design and manufacture of energy production systems through the ability to realize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile and apply it correctly.	Learning outcomes 6
Skills	
The ability to produce engineering designs that meet the required needs represented by the requirements	Learning outcomes 2

of international specifications for energy production and renewable energies, the requirements of the labor market and stakeholders within the restrictions of the type of use and other determinants through analysis and synthesis processes in the design process.	
The ability to evaluate power generation systems and renewable energies and their impact on the amount of environmental pollution through the ability to create and implement appropriate measurements and tests. The ability to evaluate control systems and their efficiency in power generation stations, as well as the student's knowledge of the work and design of these stations to ensure the achievement of quality requirements, analyze the results, and be able to judge them in engineering to reach conclusions.	Learning outcomes 3
The ability to effectively lead and manage work teams, set goals according to capabilities, properly plan to achieve them, adhere to completion dates, and manage risk and uncertainty.	Learning outcomes 7
Value	
The ability to communicate effectively orally with a group of people and in writing with various administrative levels and for various purposes.	Learning outcomes 4
The ability to recognize ethical and professional responsibilities in engineering issues and make sound judgments that take into account their consequences in the financial, environmental and societal fields on a global level.	Learning outcomes 5

9. Teaching and learning strategies
1- Method of giving lectures. 2- Student groups 3- workshops 4- Scientific trips to follow up on the practical reality of the nature of renewable energy production

5- E-learning on campus 6- Experiential learning

10. Evaluation methods
Exams, continuous assessment, reports, incentives, and feedback from students

11.education institution						
College members						
Preparing the teaching staff		Special requirements/skills (if any)		Specialization		Scientific rank
lecturer	Permanent staff			private	general	
	Permanent staff				general	Assistant Professor Maitham Hussein Rashid - Master's degree
	Permanent staff				general	Assistant Professor Wissam Jalil Khudair - Ph.D
	Permanent staff				general	Professor Wathiq Nasser Hussein - Ph.D
	Permanent staff				general	Assistant Professor Sanaa Abdul Razzaq Jassim - Ph.D
	Permanent staff				general	Assistant Professor Ali Jassim Hussein - Ph.D

	Permanent staff				general	Lecture Muhammad A. Muhammad-Ph.D
	Permanent staff				general	Assistant Professor Bashar Abed Hamza - Ph.D
	Permanent staff				general	Assistant Professor Ali Sabry Alo - Ph.D
	Permanent staff				general	Lecturer Ahmed Riyadh Radhi – Ph.D
	Permanent staff				general	Lecturer Ahmed Walid Hussein - Ph.D
	Permanent staff				general	Lecturer Aws Akram Mahmoud - Ph.D
	Permanent staff				general	Assistant professor., Rusul Dawood Salman – Master's degree
	Permanent staff				general	Lecturer Abdul Khaleq Ghali - Ph.D
	Permanent staff				general	Lecturer Mohamed Abdul Dayem – Master 's degree
	Permanent staff				general	Assistant Professor Ali Jaber Abdel Hamid - Ph.D

	Permanent staff				general	Lecturer Muhannad Jaber Yasser – Master's dregree
	Permanent staff				general	Assistant Lecturer Omar Ahmed Al-Kawak - Master’s drgree
	Permanent staff				general	Lecturer Ali Muhammad Miqdad - Ph.D
	Permanent staff				general	Assistant Lecturer Ahmed Saad Jassim – Master's degree
	Permanent staff				general	Lecturer Fouad Abdel Amir Khalaf - Ph.D
	Permanent staff				general	Assistant Lecturer Dhi Saadi Naji – Master's degree

Professional development
Orienting new College members
Submit New College members to a distinguished orientation program with the support of the university by holding training courses in which old, experienced College members lecture to realize their potential as professors, researchers, and innovators, enabling them to participate and communicate in a positive environment that helps them integrate into the university community, and introduces them to the university environment, including its characteristics, basic values, and responsibilities. related to rights and performance.
Professional development for College members

The teaching staff is subject to a group of activities, events, meetings, and scientific training provided by the relevant university entity to provide its employees in all programs with more knowledge, skills, and techniques related to the exercise of their professional roles (teaching, scientific research, community service).Under the heading of training and Professional development to improve the skills and knowledge of College members and academic leaders in all fields that enable them to carry out their assigned tasks to the fullest extent.

12.Acceptance standard

Central: A student who is accepted into universities is required to be:
1. Iraqi nationality.
2. Possessor of an Iraqi preparatory school certificate supported by certification from the General Directorate of Education in the governorate or an equivalent certificate.
3. The student must be born in 1995 onwards
4. Successful in the medical examination according to the conditions specific to each study, and the blind student (who meets the conditions for applying for appropriate humanitarian studies through central admission) will be able to apply.
5. Dedicated to study. It is not permissible to combine work and study (at the same time) in colleges and morning institutes. This includes employees of all government institutions. In order for them to continue studying in the morning, they must obtain study leave from their departments starting in accordance with the instructions in force. It is also not permissible to combine two studies. If it is proven otherwise, he must write to the Ministry to cancel his acceptance.
6. Of my graduates:
A- The current academic year.
B- The previous academic year of those who are not centrally accepted into any college or institute, and they are accepted according to the minimum limits for the year of their graduation.
7. Non-Iraqi students who hold an Iraqi preparatory certificate and are accepted centrally will be informed in writing to review the Central Admissions Department / Expatriates Division to state their exemption or claim for tuition fees in foreign currency according to the controls mentioned in Chapter Seven.

13.The most important sources of information about the program

The college and university website

University guide

The most important books and resources for the department

1. Control Engineering, Uday A. Bakshi and Varsha U. Bakshi, Technical Publications, Pune
2. Control Engineering, D. Ganesh Rao and K. Channa Venkatesh, Sanguine Technical Publishers, Bangalore

14.Program development plan

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

Program skills chart															
Learning outcomes required from the programme															
Value				Skills				Knowledge				core or elective?	Course Name	Course Code	Year/level
C4	C3	C2	C1	B4	B3	B2	B 1	A4	A3	A2	A1				
*	*			*	*	*	*			*	*	Core	Engineering Drawing and Auto-CAD I	UOBAB0301011	The first stage/Chapter One
		*	*		*	*		*	*	*	*		Electrical Circuits	UOBAB0301012	
*	*				*	*	*	*	*	*	*		Mathematics I	UOBAB0301013	
		*	*		*	*	*	*	*	*	*		Physics	UOBAB0301014	
		*	*		*	*	*	*	*	*	*		Fundamental of Computer	UOBAB0301015	

				*	*	*	*	*	*	*	*		Arabic Language	UOBAB0301016	
*	*			*	*	*	*			*	*	Core	Engineering Drawing and Auto-CAD II	UOBAB0301021	The first stage/Chapter II
		*	*		*	*	*	*	*	*	*		Engineering Mechanics	UOBAB0301022	
*	*				*	*	*	*	*	*	*		Mathematics II	UOBAB0301023	
*	*	*	*				*	*	*	*	*		Manufacturing Processes & Engineering Workshop	UOBAB0301024	
*	*	*	*	*	*	*		*	*	*	*		Chemistry	UOBAB0301025	
				*	*	*	*	*	*	*	*		English Language I	UOBAB0301026	
*	*				*	*	*	*	*	*	*	Core	Engineering Mathematics I	Em En Mai 201701 (3+0)	The second

*	*	*	*	*	*	*		*	*	*	*		Electronic Circuits	Em En Pe 201802 (2+2)	stage/Chapter One
		*	*		*	*		*	*	*	*		Material Science and Technology	Em En Eci 201903 (2+0)	
*	*			*	*	*	*			*	*		Thermodynamics I	Em En Emi 202004 (2+0)	
		*	*		*	*	*	*	*	*	*		Principles of Energy Engineering I	Em En Thi 202105 (1+2)	
		*	*		*	*	*	*	*	*	*		Fluid Mechanics I	Em En Emi 202206 (1+2)	
*	*	*	*				*	*	*	*	*		Computer Programming (Matlab) III	Em EnFmi 202307 (1+2)	
				*	*	*	*	*	*	*	*		Engineering Mechanics (Dynamic) II	Em EnCpi 202408 (2+0)	

*	*				*	*	*	*	*	*	*	Core	Engineering Mathematics II	Em En Maii 202509 (3+0)	The second stage/Chapter II
*	*	*	*	*	*	*		*	*	*	*		Energy sources	Em En Peii 202610 (2+2)	
		*	*		*	*		*	*	*	*		Strength of Materials	Em En Esii 202711 (2+0)	
*	*			*	*	*	*			*	*		Thermodynamics II	Em En Thii 202812 (2+0)	
		*	*		*	*	*	*	*	*	*		Principles of Energy Engineering II	Em En Smii 202913 (1+2)	
		*	*		*	*	*	*	*	*	*		Fluid Mechanics II	In Flii 203014 (1+2)	
*	*	*	*				*	*	*	*	*		Human Rights, Freedom & democracy	Em En Cpii 203115 (2+0)	
				*	*	*	*	*	*	*	*		Mechanical Engineering	Em En Hrpii 203216 (1+2)	

													Drawing I (SolidWorks)		
*	*				*	*	*	*	*	*	*	Core	Heat and Mass TransferI	Em En Hti 303501 (2+2)	third stage/Chapter One
*	*	*	*	*	*	*		*	*	*	*		Engineering Analysis	Em En Eai 303402 (2+0)	
		*	*		*	*		*	*	*	*		Mechanical Element Design	Em En Mdi 303503 (2+0)	
*	*			*	*	*	*			*	*		Electrical Machines	Em En Emi 303604 (2+2)	
		*	*		*	*	*	*	*	*	*		Fuels and Combustion Energy	Em En Fci 303705 (2+0)	
		*	*		*	*	*	*	*	*	*		Electrical Power Systems I	Em En Epi 303806 (2+0)	
*	*	*	*				*	*	*	*	*		Waste Management	Em En Wmi 303907 (2+0)	

													and Energy Recovery		
				*	*	*	*	*	*	*	*		Energy Storage Systems	Em En Wmi 304008 (2+0)	
*	*				*	*	*	*	*	*	*	Core	Heat and Mass Transfer II	Em Ht Maii 304109 (2+2)	third stage/Chapter II
*	*	*	*	*	*	*		*	*	*	*		Numerical analysis	Em En Naii 304210 (2+0)	
		*	*		*	*		*	*	*	*		Mechanical System Design	Em En MDii 304311 (2+0)	
*	*			*	*	*	*			*	*		Solar Energy	Em In Seii 304412 (1+2)	
		*	*		*	*	*	*	*	*	*		Internal Combustion Engines	Em In Icii 304513 (2+2)	

	*	*	*		*	*	*	*	*	*	*		Electrical Power Systems II	Em En Epii 304614 (2+0)	
*	*	*	*				*	*	*	*	*		Nanomaterials and Nanotechnology	Em En Nnii 304715 (2+0)	
				*	*	*	*	*	*	*	*		Hydrogen Energy and Fuel Cell Technology	Em En Heii 304816 (1+2)	
		*	*		*	*	*	*	*	*	*	Core	Instrumentation in Energy Systems	Em En Iei 404901 (2+2)	The fourth stage/Chapter One
*	*	*	*	*	*	*		*	*	*	*		Energy Management and Economics	Em En Eei 405002 (2+0)	

		*	*		*	*		*	*	*	*		Power Electronics	Em En Pei 405103 (2+2)	
*	*			*	*	*	*			*	*		Design of Renewable Energy Systems I	Em En Dri 405204 (2+0)	
		*	*		*	*	*	*	*	*	*		Power Plants I	Em En Ppi 405305 (2+0)	
		*	*		*	*	*	*	*	*	*		Bioenergy	Em In Bei 405406 (1+2)	
*	*	*	*				*	*	*	*	*		Nuclear Engineering	Em En Nei 405507 (2+0)	
				*	*	*	*	*	*	*	*		Graduation Project I	Em En Gpi 405608 (2+0)	
		*	*	*			*	*	*	*	*	Core	Control in Energy Systems	Em En Csii 405709 (3+0)	The fourth stage/Chapter II
*	*	*	*	*	*	*	*	*	*	*	*		Energy and Environment	Em En Eii 405810 (2+2)	

		*	*	*	*	*	*						Industrial Engineering	Em EnYes405911 (2+0)	
*	*	*	*				*	*	*	*	*		Design of Renewable Energy Systems II	Em In Drii 406012 (2+0)	
*	*	*	*	*			*			*	*		Power Plants II	Em En Ppii 406113 (1+2)	
*	*	*	*	*	*	*							Wind Energy	Em En Weii 406214 (1+2)	
*	*	*	*	*	*	*	*	*	*	*	*		Modeling and Simulation of Energy Systems	Em En Msii 406315 (2+0)	
*	*	*	*	*				*	*	*	*		Graduation Project II	Em En Gpii 406416 (1+2)	

- Please check the boxes corresponding to the individual learning outcomes from the program subject to evaluation

Course description form

First stage/2024

Module Title	Engineering Drawing and Auto-CAD I	Module Delivery
Module Type	Core	☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar
Module Code	UOBAB0301011	
ECTS Credits	6	
SWL (hr/sem)	150	

Module Level	UGI	Semester of Delivery	One
Administering Department	Energy 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		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. Develop proficiency in *technical communication* and production of mechanical engineering drawings.

Module Objectives أهداف المادة الدراسية	2. Develop skills in the preparation of working and assembly mechanical drawings. 3. *Develop an understanding of the properties, uses and production of materials used in the* manufacture of engineering components. 4. Provide knowledge of the different methods of production of engineering components. 5. *Develop skills in communicating technical information using illustrations, scaled models and working drawings* to solve engineering *design* problems. 6. Develop skills in applying and drawing principles to facilitate product development and manufacture. 7. Develop *proficiency* in the use of Computer-Aided Drafting (CAD) software, *instruments, media and reference materials* to produce engineering drawings. 8. Develop an interest in mechanical engineering as disciplines and careers. *9. Develop the capacity for critical and creative thinking, problem-solving, leadership and cooperative behaviors through authentic learning experiences.*

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Know the principles of Lettering and Dimensioning. 2. Know how to construct standard engineering curves. 3. Know how to construct a number of different geometrical constructions. 4. Know how to project solids in orthographic projection. 5. Know how to use Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”). 6. Know how to use Computer-Aided Drafting software to produce drawings (different two-dimensional figures “surfaces”).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.[150] • Drawing Instruments and Accessories. [12 hrs.] • Lettering and Dimensioning Practices. [12 hrs.] • Geometrical Constructions. [46 hrs.] • Orthographic Projections. [40 hrs.] • Computer-Aided Drafting software (two-dimensional figures). [40 hrs.]

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 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) الحمل الدراسي المنتظم للطالب خلال الفصل	95	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	55	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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
Formative assessment	Quizzes	4	5% (20)	5 and 10	LO #3, #4, #5, and #6
	Class Assignment	15	1.5% (22.5)	Continuous	All
	Home work	15	0.5% (7.5)	Continuous	LO #3, #5 and #6
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Drawing instruments and accessories, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures "different lines").

Week 2	Lettering and dimensioning practices, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 3	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 4	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 5	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 6	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 7	Geometrical constructions, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 8	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 9	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 10	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 11	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 12	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 13	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 14	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 15	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Drawing instruments and accessories, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 2	Lettering and dimensioning practices, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 3	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).

Week 4	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 5	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 6	Geometrical constructions, Computer-Aided Drafting software to produce drawings (user interface, one-dimensional figures “different lines”).
Week 7	Geometrical constructions, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 8	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 9	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 10	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 11	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 12	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 13	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 14	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).
Week 15	Orthographic projections, Computer-Aided Drafting software to produce drawings (different surfaces).

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Engineering drawing, Abdul Rasoul Al Khafaf, University of Technology, Baghdad, Iraq, 1990.	Yes
Recommended Texts	Handbook of engineering drawing and AutoCAD, Mohammad Abid Muslim Altufaily, University of Babylon, Iraq, 2007	Yes
Websites	https://youtu.be/zL1BA-mcjcc	

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	Electrical Circuits	Module Delivery	
Module Type	Core	☒ Theory	
Module Code	UOBAB0301012	☐ Lecture	
ECTS Credits	6	☒ Lab	
SWL (hr/sem)	150	☒ Tutorial	
		☐ Practical	
		☐ Seminar	
Module Level	UGI	Semester of Delivery	One
Administering Department	Type Dept. Code	College	Type College Code

Module Leader	Mohammed Ali Al-Shuraifi	e-mail	Msb.Mohammed.Ali@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	1. To study Ohm's law 2. To study electrical circuits; series, parallel, and series-parallel in d.c. 3. To apply a methods of analysis on d.c. circuits 4. To apply electrical theorems on d.c. circuits 5. To understand the sinusoidal waveforms in electrical circuits. 6. To understand the response of Capacitor, Inductor, and resistor. 7. To understand the complex numbers. 8. To perform conversion between time domain and phasor domain and vice versa. 9. To apply the methods of analysis in ac circuits 10. To apply the circuit theorems in ac circuits 11. To understand power in ac circuits

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Studying ohm's law 2. Studying types of circuits in d.c. and methods to analyze them. 3. Recognize ac components and their response; capacitor, inductor, and resistor. 4. List the various terms associated with ac electrical circuits. 5. Understand complex numbers in order to apply them in ac circuits 6. Discuss the average and the rms values. 7. Apply Kirchhoff's laws on ac circuits 8. Understand methods of analysis in ac circuits 9. Apply electrical theorems in ac circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Circuit Theory • studying d.c. electrical circuits. [12 hrs] • analyzing d.c. electrical circuits.[13 hrs] • Sinusoidal waveforms, average (dc) value, effective (rms) value [8 hrs] • Time domain and phasor domain. [8 hrs] • Complex numbers: rectangular and polar phorm [8 hrs] • Methods of circuit analysis and their applications on ac circuits; mesh and nodal methods. [12 hrs] • Electrical circuit theorems and their application on ac circuits: Superposition , Thevenin, And Norton. [12 hrs] • Power in ac circuits: power triangle, real power, reactive power, and apparent power; impedance triangle. [12 hrs]

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 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) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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
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	1hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Dc circuits; series , parallel , series-parallel
Week 2	Methods of analyzing d.c. circuits
Week 3	Electrical theorems
Week 4	Review of Kirchhoff's Laws on ac circuits

Week 5	Star delta and delta star conversion in ac circuits
Week 6	RLC circuits
Week 7	Mid-term Exam
Week 8	Series and parallel circuits
Week 9	Series – parallel circuits in ac circuits
Week 10	Methods of analysis in ac circuits I
Week 11	Methods of analysis in ac circuits II
Week 12	Electrical theorems in ac circuits I
Week 13	Electrical theorems in ac circuits II
Week 14	Power and power triangle
Week 15	Power , apparent power , reactive and real power
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: series-parallel dc circuits
Week 2	Lab 2: Norton's theorem
Week 3	Lab 3: RLC circuits
Week 4	Lab 4: Kirchhoff's laws
Week 5	Lab 5: mesh method
Week 6	Lab 6: superposition theorem

Week 7	Lab 7: Thevenin theorem

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Introductory circuit analysis by Boylestad	Yes
Recommended Texts	Introductory circuit analysis by Boylestad	Yes
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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	Mathematics I			Module Delivery	
Module Type	S			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOBAB0301013				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGI	Semester of Delivery		One
Administering Department			College		
Module Leader	Mohammed Abd Aldeem		e-mail	met.moh.abdaldaaem@uobabylon.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	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		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives	After completing the course, students should be able to:

أهداف المادة الدراسية	1) Enable the pupil to learn the concepts of mathematics and applications in his work. 2) To study the characteristics and properties of number sets, and obtain the number systems. 3) To understand the concept of function, to learn draw the graph of functions, to know the lists types of functions. 4) Study the meaning of limit and continuous function. 5) To understand the meaning of derivative function and applications. 6) Study the transcendental function. 7) Study the Unit vector, vector equation, cross product, dot product. 8) To knows the meaning of complex number.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	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 matrix and its operations and to know the determent of its. 7) Describe the Unit vector, vector equation, cross product, dot product. 8) To understands the meaning of complex number.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Type of sets, type of interval, Cartesians plain. The domain and rang of functions, even and odd functions. Drawing curved function, shifting the graph. limit from the left and right. [20 hr] • The concept of continuous function, Algebraic operations on continuous functions. Methods of derivation, the chain rule.

	Applications on derivatives. Kind of exponential functions. Types of trigonometric functions. The inverse of the trigonometric functions. Kind of Hyperbolic functions. [20 hr] • Types of matrices, operations on matrices. Use matrices in solving linear systems of equations. Meaning vector, algebraic properties of vectors. Vector equation, cross product, dot product. Properties of complex numbers, the representation of the complex number. [20 hr]

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) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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
Formative assessment	Quizzes	2	20% (20)	5 and 10	LO #1, #2 and #10, #11

	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7,#8
	Projects.				
	Report	1	10% (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	
	Material Covered
Week 1	System numbers.
Week 2	The functions and its kinds.
Week 3	The graph of the function.
Week 4	Limit function.
Week 5	Continuous functions.
Week 6	Derivatives.
Week 7	Applications on derivatives. (Mid-term Exam)
Week 8	Exponential functions.
Week 9	The inverse trigonometric functions.
Week 10	Hyperbolic functions.
Week 11	Matrices and their types.
Week 12	Solving systems of linear equations.
Week 13	Vectors.
Week 14	The operations on the Vector.

Week 15	Complex numbers.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	George B. Thomas Jr, Weir Joel R. Hass 'Calculus' (V.12), 2014.	Yes
Recommended Texts	1. Haward Anton" Calculus and analytic geometry". 2. Schoms series " Theory and problems of calculus".	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

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	Physics			Module Delivery	
Module Type	S			☒ Theory	
Module Code	UOBAB0301014			☐ Lecture	
ECTS Credits	5			☒ Lab	
SWL (hr/sem)	125			☐ Tutorial	
				☐ Practical	
				☐ Seminar	
Module Level	UGI		Semester of Delivery	One	
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 Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
	1. Analyze the atomic structure of matter at its most fundamental. 2. Recognize the state of matter and its properties.

Module Objectives أهداف المادة الدراسية	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	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 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 للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Total assessment	100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Some basic concepts and definitions
Week 2	Atomic structure and interatomic bonding
Week 3	Properties of matter
Week 4	State of matter
Week 5	Energy sources
Week 6	Kinetic Energy and work
Week 7	Potential energy (Mid-term Exam)
Week 8	Thermal properties of matter
Week 9	Heat and law of thermodynamics
Week 10	Fluids
Week 11	Electric field and potential
Week 12	Conductor and insulator materials
Week 13	Semiconductors
Week 14	Lights and optics
Week 15	Elements of solid-state physics
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	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	Fundamental of Computer			Module Delivery	
Module Type	B			☒ Theory	
Module Code	UOBAB0301015			☐ Lecture	
ECTS Credits	4			☒ Lab	
SWL (hr/sem)	100			☐ Tutorial ☐ Practical ☐ Seminar	
Module Level	UGI		Semester of Delivery	One	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	Omar Ahmed Naeem		e-mail	msb.omar.alkawak@uobabylon.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		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	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives	The computer science curriculum aims to introduce the student to computer science and the skills related to this subject. The main purpose of the course is to introduce the student to an idea about the computer and its components and how each of its parts works through an explanation of the input units, the central processing unit, the input units, the storage units,

أهداف المادة الدراسية	and the types of operating systems and programs Microsoft Office and how to connect to the Internet and identify and protect against virus risks.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Cognitive objectives A1- During the school year, the student learns the basics of computer science. A2- Enabling the student to know the main principles of the most prominent concepts of computer science, their sources and types, and the mechanisms used for their purpose. A 3- Enabling the student to know all the basics that he uses in the scientific subject A 4- Definition of computer, its development history and generations A 5- An explanation of the computer system with all its elements and systems A6- Introducing the student to the input unit, its principles of work, its types, and the work of the basic office programs A 7- The central processing unit, its parts, how each part works, the output unit, its working principles and types b- The skill objectives of the subject B1 - Familiarity with developments in the field of computers B2 - Familiarity with computer components B3 - Enabling the student to understand every part of the computer, how it works, and the work of the basic office programs B4- Giving the student an opportunity to explain a small part of the class to his classmates to enhance his self-confidence. B5- Solve a small part of the homework to urge the students to complete the solution, give class assignments, and make groups to solve these assignments.
Indicative Contents المحتويات الإرشادية	The students will be able to identify the values, trends and patterns of behavior that uphold the ethics of the profession and work to adhere to them after graduation. 1-Urging the student to understand the objective of studying the subject in general. 2-Urging the student to think about how to develop oneself in the field of computers. 3 -Making the student able to deal with the computers and how to use the programs in accordance with the rules and regulations of engineering.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	1. The teacher prepares lectures on the subject in soft electronic form and presents them to the students. 2. The teacher gives lectures in detail. 3. the teacher requests periodic reports and homework on the basic subjects of the subject. 4. Academic methods and lectures 5. Dialogue modalities 6. Use projectors 7. Providing the student with basic and secondary topics related to computer work 8. Translating theoretical topics and vocabulary related to computer technologies 9. Requiring the student to follow developments in computer science

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	49	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	51	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

تقييم المادة الدراسية Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3 and 15	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 15	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%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Computers: their generations, components: hardware and software
Week 2	(Input and output) (system software and application software).
Week 3	Windows operating system Windows concept, advantages, basic requirements
Week 4	Windows The concept of a window for any program and identifying its main components, folders, and files and how to deal with them
Week 5	Windows Learning about My Computer and Control Panel components
Week 6	Output devices such as (printer and ways to deal with it)
Week 7	Word (document building and formatting methods)
Week 8	Word (document building and formatting methods)
Week 9	Midterm Exam
Week 10	Excel program (data building, processing, and ways to extract it)
Week 11	Excel program (data building, processing, and ways to extract it)
Week 12	PowerPoint program (building and coordinating presentations)
Week 13	PowerPoint program (building and coordinating presentations)
Week 14	The concept of computer viruses: how to infect, types and treatment
Week 15	The Internet: a definition of how to deal with the Internet, Internet browsers, web searches and e-mail
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)المنهاج الاسبوعي للمختبر	
W	Material Covered
Week 1	Computers: their generations, components: hardware and software
Week 2	(Input and output) (system software and application software).
Week 3	Windows operating system Windows concept, advantages, basic requirements
Week 4	Windows The concept of a window for any program and identifying its main components, folders, and files and how to deal with them
Week 5	Windows Learning about My Computer and Control Panel components
Week 6	Output devices such as (printer and ways to deal with it)
Week 7	Word (document building and formatting methods)
Week 8	Word (document building and formatting methods)
Week 9	Midterm Exam

Week 10	Excel program (data building, processing, and ways to extract it)
Week 11	Excel program (data building, processing, and ways to extract it)
Week 12	PowerPoint program (building and coordinating presentations)
Week 13	PowerPoint program (building and coordinating presentations)
Week 14	The concept of computer viruses: how to infect, types and treatment
Week 15	The Internet: a definition of how to deal with the Internet, Internet browsers, web searches and e-mail
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Computer basics and office applications / 4 parts - Prof. Dr. Ghassan Hamid Abdel Majeed and Dr. Ziyad Muhammad Abboud and others.	No
Recommended Texts	1. William Stallings, Computer Organization & Architecture, Sixth edition, Person Education 2. Donald H. Sandersz, Computer today, Second edition, McGraw –hill 3. Lectures provided by the subject teacher 4. Books available in the college library	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

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	Arabic Language		Module Delivery	
Module Type	B		☒ Theory	
Module Code	UOBAB0301016		☐ Lecture	
ECTS Credits	2		☐ Lab	
SWL (hr/sem)	50		☐ Tutorial	
			☐ Practical	
			☐ Seminar	
Module Level	UGI	Semester of Delivery	One	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Noor Mohammed Jasim	e-mail	msb.noor.mohammed@uobabylon.edu.iq	
Module Leader's Acad. Title	Assist 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	1. اتقان 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. 2. 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. 3. 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. 4. 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. 5. 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. 6. 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.

7. التقييم والتقدم: قد تهدف أهداف الوحدة أيضًا إلى تقييم تقدم المتعلمين وتقديم ملاحظات حول مهاراتهم في اللغة العربية. يسمح هذا لكل من المتعلمين والمدربين بتقييم إنجازاتهم وتحديد مجالات التحسين	

1. الفهم السمعي: إظهار القدرة على فهم وفهم اللغة العربية المنطوقة عبر مجموعة من الموضوعات والسياقات ، بما في ذلك المحادثات والعروض التقديمية والتسجيلات الصوتية. 2. الفهم القرائي: إظهار القدرة على قراءة وفهم النصوص العربية المكتوبة بمستويات مختلفة من الصعوبة ، مثل المقالات والقصص والمواد الأصلية ، واستخراج المعلومات ذات الصلة. 3. 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. 4. 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. 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 وفقًا لذلك ، وإظهار الاحترام لوجهات النظر المتنوعة.	Module Learning Outcomes مخرجات التعلم للمادة الدراسية

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

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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. 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. 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. 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. 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. 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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50

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 الترقيم
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
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 الوصل
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	1- عليوي ، سعد حسن ، النحو الوسيط ، ط1 ، دار صفاء للنشر والتوزيع ، عمان – الاردن ، 2015. 2- النحوي ، ابن عقيل ، شرح ابن عقيل على الفية ابن مالك ، ط1 ، دار الكتب العلمية ، بيروت - لبنان ، 2006. ضيف ، شوقي ، تاريخ الادب العربي ، ط2، دار المعارف للطباعة ، القاهرة ، 2006.	Yes
Recommended Texts	أ) الانصاري ، ابن هشام ، شرح قطر الندى وبل الصدى ، ط1 ، دار الهلال للنشر والتوزيع ، بيروت – لبنان ، 2009. ب) السامرائي ، فاضل صالح ، معاني النحو ، دار ابن كثير للنشر والتوزيع ، بيروت – لبنان ، 2017.	No
Websites	وكيبيديا ، منتديات اللغة العربية	

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 Drawing and Auto-CAD II			Module Delivery	
Module Type	S			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	UOBAB0301021				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGI	Semester of Delivery		Two
Administering Department		Energy 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			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	1) Develop proficiency in *technical communication* and production of mechanical engineering drawings. 2) Develop skills in the preparation of working and assembly mechanical drawings. 3) *Develop an understanding of the properties, uses and production of materials used in the* manufacture of engineering components. 4) Provide knowledge of the different methods of production of engineering components. 5) *Develop skills in communicating technical information using illustrations, scaled models and working drawings* to solve engineering *design* problems. 6) Develop skills in applying and drawing principles to facilitate product development and manufacture. 7) Develop *proficiency* in the use of Computer-Aided Drafting (CAD) software, *instruments, media and reference materials* to produce engineering drawings. *8)* Develop an interest in mechanical engineering as disciplines and careers. *9) Develop the capacity for critical and creative thinking, problem-solving, leadership and cooperative behaviors through authentic learning experiences.*
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Know how to represent solids in pictorial projections. • Know how to produce working and assembly drawings. • Know how to use Computer-Aided Drafting software to produce drawings (different three-dimensional figures “solid figures”). • Know how to project auxiliary views. • Know how to prepare drawings with sectional views.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.[150] • Represent solids in pictorial projections. [20 hrs.] • Assembly drawings. [40 hrs.] • Project auxiliary views. [20 hrs.] • Prepare drawings with sectional views. [30 hrs.]

	• Computer-Aided Drafting software (three-dimensional figures). [40 hrs.]

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 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) الحمل الدراسي المنتظم للطالب خلال الفصل	80	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	70	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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
Formative assessment	Quizzes	4	5% (20)	5 and 10	LO #2, #4, and two in #5
	Class Assignment	15	1.5% (22.5)	Continuous	All
	Home work	15	0.5% (7.5)	Continuous	LO #3, #5 and #6
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Represent solids in pictorial projections, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 2	Represent solids in pictorial projections, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 3	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 4	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 5	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 6	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 7	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 8	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 9	Project auxiliary views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 10	Project auxiliary views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 11	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 12	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 13	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 14	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 15	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered

Week 1	Represent solids in pictorial projections, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 2	Represent solids in pictorial projections, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 3	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 4	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 5	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 6	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 7	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 8	Assembly drawings, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 9	Project auxiliary views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 10	Project auxiliary views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 11	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 12	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 13	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 14	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).
Week 15	Prepare drawings with sectional views, Computer-Aided Drafting software to produce drawings (three-dimensional).

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Engineering drawing, Abdul Rasoul Al Khafaf, University of Technology, Baghdad, Iraq, 1990.	Yes
Recommended Texts	Handbook of engineering drawing and AutoCAD, Mohammad Abid Muslim Altufaily, University of Babylon, Iraq, 2007	Yes

Websites	https://youtu.be/eIPHvDcMx-w

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 Mechanics	Module Delivery
Module Type	S	☒ Theory
Module Code	UOBAB0301022	☐ Lecture
ECTS Credits	6	☐ Lab
SWL (hr/sem)	150	☒ Tutorial ☐ Practical

			☐ Seminar	
Module Level	UGI	Semester of Delivery	Two	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Bashar Abid Hamza	e-mail	met.basher.abid@uobabylon.edu.iq	
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	
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	After completing the course, students should be able to 1. Describe the characteristics and properties of forces and moments, analyze the force system, and obtain the resultant and equivalent force systems, 2. State the conditions of equilibrium, draw free body diagrams (FBDs), analyze and solve problems involving rigid bodies in equilibrium, 3. Draw FBDs, analyze and solve structural and mechanical systems of rigid bodies in equilibrium, 4. Draw FBDs, analyze and solve structural and mechanical systems with distributed loads in equilibrium, 5. Describe the mechanism and characteristics of dry friction, draw FBDs, analyze and solve structural and mechanical systems with friction in equilibrium, 6. Describe the physical meanings of idealized problems in Statics and approximate real-life Situations to idealized problems 6- Describe the equation of kinematics and solve problems.

	7- Describe and analysis the equation of kinetics and solve problems.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- To understand Principle engineering mechanics 2- enable student to study and analyze force systems 3- enable student to Modeling of supports and free body diagram 4- Enable student to study equilibrium of force systems applied on bodies. 5- Enable student to locate the centroid of area. 6- Enable student to determine the moment of inertia of area. 7- Enable student to analyze and solve structural and mechanical systems with friction in equilibrium. 8- Enable student to compare between kinematics and kinetics of particles 9- Enable student to study and analysis kinematics (rectilinear/curvilinear motion). 10 - Enable student to study and analyze the kinetics of particles (equation of motion, work and energy , and impulse and momentum)
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction, perpendicular components of forces, moment and couple of forces and resultant of force system. [16hrs.] • Modeling of supports, Draw free body diagram. [5hrs.] • Determination Centroid of lines, area, and volume using integration. [5hrs.] • Determination Centroid of lines, area, and volume using tables. [3 hrs.] • Determination moment of inertia using integration. [3hrs.] • Determination moment of inertia using tables. [3hrs.] • Evaluation of friction forces.[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) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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
Formative assessment	Quizzes	2	5% (5)	2 and 4	LO #1 and #2
	Assignments	2	5% (5)	4 and 8	LO #1 - #5
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	30% (30)	4 and 8	LO #1 - #5
	Final Exam	3hr	40% (40)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Force 2D (perpendicular components)
Week 3	Force 2D (moment and couple)
Week 4	Force 2D (resultant)
Week 5	Equilibrium
Week 6	Centroid lines, area, and volume
Week 7	Centroid lines, area, and volume
Week 8	Moment of inertia
Week 9	Moment of inertia

Week 10	Friction
Week 11	Dynamics –Kinematics of particles –(1) –Rectilinear motion
Week 12	(2) Curvilinear Motion
Week 13	Kinetics of Particles –(1) Equation of Motion
Week 14	(2)- Work and Energy
Week 15	3- Impulse and Momentum.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	J. L. Meriam and L. G. Kraige, 'Engineering Mechanics: Statics (V.1), 7th edition, Wiley 2012.	Yes
Recommended Texts	R. C. Hibbeler, Engineering Mechanics: STATICS (SI Edition), 14th edition, Prentice Hall 2016.	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

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	Mathematic II			Module Delivery	
Module Type	S			☒ Theory	
Module Code	UOBAB0301022			☐ Lecture	
ECTS Credits	6			☐ Lab	
SWL (hr/sem)	150			☒ Tutorial ☐ Practical ☐ Seminar	
Module Level	UGI		Semester of Delivery	Two	
Administering Department			College		
Module Leader	Mohammed Abd Aldeem		e-mail	met.moh.abdaldaaem@uobabylon.edu.iq	
Module Leader's Acad. Title	Assist . Lecturer		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	Mathematic I	Semester	One
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	After completing the course, students should be able to: 1) Enable the pupil to learn the concepts of mathematics and applications in his work. 2) To study the Definite Integrals, Properties of definite integrals. 3) To understand methods of integrations: Integration by parts, by Tabular, by Partial Fractions. 4) Study the applications of the definite integral: 1- Area under the curve, 2- Area between two curves, 3-Area in polar co-ordinate. 5) To understand the Numerical methods for evaluating definite integrals: I-Trapezoidal rule, II- Simpson's rule. 6) Study the Sequences: convergent sequence: Limits that arise frequently. 7) Study the infinite series: converges series, diverges series, Kind of series: 1-Geometric Series, P-Series. 8) To knows the Tests for converges of series:1-Integral Test, 2-Ratio Test, 3-RootTest, Taylor and Maclaurin series.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) Describe the characteristics and Properties of definite integrals. 2) Describe and State the concept of methods of integrations: Integration by parts, by Tabular, by Partial Fractions. 3) To understands the applications of the definite integral: 1- Area under the curve, 2- Area between two curves, 3-Area in polar co-ordinate. 4) To knows the meaning of the Numerical methods for evaluating definite integrals: i) Trapezoidal rule, ii) Simpson's rule. 5) Describe the Sequences: convergent sequence: Limits that arise frequently. 6) Describe the Infinite series: converges series, diverges series, Kind of series: 1-Geometric Series, 2- P-Series. 7) Describe the Unit vector, vector equation, cross product, dot product. 8) To understands the Tests for converges of series: 1-Integral Test, 2-Ratio Test, 3-RootTest, To knows the meaning of Taylor and Maclaurin series.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Integration: Definite Integrals, Properties of definite integrals, Methods of integrations: Integration by parts, by Tabular, by Partial Fractions, Integration by reduction formulas, Integrating powers, Integration by Trigonometric Substitutions, Integration of irrational function, Integration of rational function of Trigonometric, Applications of the definite integral:1- Area under the curve, 2- Area between two curves, 3-Area in polar co-ordinate. [20 hr] • 4-Volumes By Disks: $i)$ around $x-axis$, $ii)$ around $y-axis$, 5- Volumes By Washers: $i)$ around $x-axis$, $ii)$ around $y-axis$, 6- Volumes By Cylindrical Shells: $i)$ about $x-axis$, $ii)$ about $y-axis$, Volume in polar co-ordinates system, Length of a plane curve, Area of a surface of revolution, Area of the surface in polar co-ordinates system. [20 hr] • Area of a surface of revolution, Area of the surface in polar co-ordinates system, Multiple Integrals: Double Integrals, Triple Integrals, Numerical methods for evaluating definite integrals: $i)$ Trapezoidal rule, $ii)$ Simpson's rule, Sequences: convergent sequence: Limits that arise frequently, Infinite series: converges series, diverges series, Kind of series:1-Geometric Series, P-Series, Tests for converges of series:1-Integral Test, 2-Ratio Test, 3-RootTest, Taylor and Maclaurin series. [20 hr]

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) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem)	150		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7,#8
	Projects.				
	Report	1	10% (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	
	Material Covered
Week 1	Integration: Definite Integrals, Properties of definite integrals.
Week 2	Methods of integrations.
Week 3	Methods of integrations.
Week 4	Methods of integrations.
Week 5	Applications of the definite integral.
Week 6	Volumes By Disks.
Week 7	Volumes By Washers. (mid-term Exam)
Week 8	Volumes By Cylindrical Shells.
Week 9	Volume in polar co-ordinates system, Length of a plane curve.
Week 10	Area of a surface of revolution, and in polar co-ordinates system.
Week 11	Multiple Integrals.
Week 12	Numerical methods for evaluating definite integrals.
Week 13	Sequences.
Week 14	Infinite series.
Week 15	Taylor and Maclaurin series.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	George B. Thomas Jr, Weir Joel R. Hass ‘Calculus’ (V.12), 2014.	Yes
Recommended Texts	1. Haward Anton" Calculus and analytic geometry". 2. Schoms series “Theory and problems of calculus" .	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

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	Manufacturing Processes & Engineering Workshop			Module Delivery	
Module Type	S			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	UOBAB0301024				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		UGI	Semester of Delivery		Two
Administering Department		Type Dept. Code	College	Type College Code	
Module Leader	Ahmed Saad Jasim		e-mail	ahmed.saad.jas@uobabylon.edu.iq	
Module Leader's Acad. Title		Assist. Lecture	Module Leader's Qualification		MSC
Module Tutor	None		e-mail	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 Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1) To study the machining operations and machine tools that include: turning and related operations, drilling and related operations, milling, grinding and other abrasive processes, and other machining operations. 2) To understand the bulk deformation processes in metal working that include: rolling and related operations, forging and related operations, extrusion, and wire and bar drawing and also study the sheet metal working / cutting operations, bending operations, and drawing. 3) Study the joining and assembly processes that include: fundamentals of welding, arc welding, resistance welding, oxyfuel gas welding, soldering, and brazing. 4) To learn the fundamentals of metal casting, and metal casting processes.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1.** Describe turning and related operations **2.** Learn drilling and related operations **3.** Give information about milling **4.** Define grinding and other abrasive processes **5.** Give information about other machining operations: shaping and planning, broaching, and sawing **6.** Know the rolling and related operations **7.** Learn about of forging and related operations **8.** Give information about extrusion **9.** Study wire and bar drawing **10.** Give information about sheet metal working / cutting operations, bending operations, and drawing **11.** Define fundamentals of welding **12.** Know the arc welding **13.** Define resistance welding, and ox fuel gas welding **14.** Study soldering, and brazing

	15. Give information about fundamentals of metal casting, metal casting processes.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Study the machining operations and machine tools that include: turning and related operations, drilling and related operations, milling, grinding and other abrasive processes, and other machining operations. [20 hr]. • Study the bulk deformation processes in metal working that include: rolling and related operations, forging and related operations, extrusion, and wire and bar drawing and also study the sheet metal working / (1) cutting operations, (2) bending operations, (3) drawing. [20 hr] • Study the joining and assembly processes that include: fundamentals of welding, arc welding, resistance welding, oxyfuel gas welding, soldering, and brazing. [16 hr] • study the fundamentals of metal casting, and metal casting processes. [4 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Teaching and learning strategies can include a range of whole class, group and individual activities to accommodate different abilities, skills, learning rates and styles that allow every student to participate and to achieve some degree of success. After considering students' needs, learning styles.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	5, 10, and14	LO #1- #4, #5 - #9 and #10 - #13
	Assignments	2	10% (10)	6 and 11	LO #1 - #5 and #6 - #10
	Report	1	5% (5)	13	All
	Practical	1	10% (10)	Continuous	All
Summative assessment	Midterm Exam	2hr	10% (10)	11	LO #1 - #10
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Turning and Related Operations
Week 2	Drilling and Related Operations

Week 3	Milling
Week 4	Grinding and Other Abrasive Processes
Week 5	Other Machining Operations: (1) shaping and planning, (2) broaching, and (3) sawing
Week 6	Rolling and Related Operations
Week 7	Forging and Related Operations
Week 8	Extrusion, Wire and Bar Drawing
Week 9	Wire and Bar Drawing
Week 10	Sheet Metal Working / (1) Cutting Operations, (2) Bending Operations, (3) Drawing
Week 11	Fundamentals of Welding – (mid-term Exam)
Week 12	Arc welding
Week 13	Resistance welding, Oxyfuel gas welding
Week 14	Soldering, Brazing
Week 15	Fundamentals of Metal Casting, Metal Casting Processes
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	A) The turning workshop consists of training its students on: 1) Listed work (adjusting the correct measurements for different diameters and lengths using a triangle turning pen).
Week 2	2) Make the arches (it should be on the same piece as the first exercise, after adjusting it and making sure of the measurements according to the drawing in the first exercise).
Week 3	3) Making different angles (introducing the student to the use of shaping pens (square pen, corner pen 55)).

Week 4	Exam: A test was conducted for the student on what he learned in the theoretical and practical aspects
Week 5	B) The filling workshop consists of training its students on: 1) Filling flat surfaces and filling straight and inclined angles
Week 6	2) Sawing and sawing process
Week 7	3) Hand Drills and Vertical Stationary Drills (How to Operate and Use)
Week 8	Exam: A test was conducted for the student on what he learned in the theoretical and practical aspects
Week 9	C) The welding workshop consists of training its students on various welding methods, such as: 1) Manual arc welding: a) Training on how the electric arc works and occurs between two electrodes.
Week 10	b) Training on how to make welding lines straight.
Week 11	c) Training on how to weld the construction exercise (increasing the thickness of the piece).
Week 12	2) Gas welding (oxy-acetylene)
Week 13	3) Electric arc welding protected by inert gas represented by gases such as argon and carbon dioxide, where argon gas is used with tungsten electrode welding machines (T.I.G) and CO2 gas with machines (M.I.G).
Week 14	4) Electrical resistance welding, specifically spot welding.
Week 15	Exam: A test was conducted for the student on what he learned in the theoretical and practical aspects
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	[1] Groover, Mikell P. *Fundamentals of modern manufacturing: materials, processes, and systems*. John Wiley & Sons, 2020.	No
Recommended Texts	None	No
Websites	[1]https://books.google.com/books?hl=ar&lr=&id=mB7zDwAAQBAJ&oi=fnd&pg=PA1&dq=FUNDAMENTALS+OF+MODERN+MANUFACTURING+Materi	

	als,Processes,andSystems+Fourth+Edition&ots=H1hck34oBY&sig=os2Xrjr-16zwPs6JVbGDcG4fuy8

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	Chemistry	Module Delivery	
Module Type	S		☒ Theory
Module Code	UOBAB0301025		☐ Lecture
ECTS Credits	4		☒ Lab
SWL (hr/sem)	100		☐ Tutorial ☐ Practical ☐ Seminar
Module Level	UGI	Semester of Delivery	Two

Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Ali Jassim Al-zuhairi	e-mail	met.ali.jassim@uobabylon.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1) To develop problem solving skills and understanding of the quantitative analytical methods. 2) To understand acids, basis and salts. 3) This course deals with the basic concept of buffers. 4) This is the basic subject for all physical chemistry concepts. 5) To understand ideal gas law. 6) To perform the thermochemistry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	10. The students will know the principle of analytical chemistry. 11. List the quantitative and qualitative analysis. 12. Summarize what is meant by acids, basis and salts. 13. Discuss the titration curves. 14. Describe the principle of organic chemistry in terms of alkan, alkenes and alkynes.

	15.Identify the basic hydrocarbons by its nomenclature and reactions. 16.Explain the Ideal gas law. 17.Identify the enthalpy of a chemical reaction.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction of Analytical Chemistry and its types, The principle of Volumetric analysis, Moler, Normal and formal concentration, Acid Base titrations, Buffers and Titration Curves, Oxidation-Reduction reactions, Precipitation reactions. [20 hrs] • Organic chemistry (Introduction), The Alkanes, Alkanes reactions and Alkenes. [15 hrs] • Alkenes reactions, Alkynes and Alkynes reactions. [15 hrs] • Ideal gas low, Boyle's law, Charles's law, thermochemistry, Energy sources. [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.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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
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	1hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Analytical Chemistry and its types
Week 2	The principle of Volumetric analysis
Week 3	Moler, Normal and formal concentration
Week 4	Acid Base titrations
Week 5	Buffers
Week 6	Review of Titration Curves
Week 7	Mid-term Exam
Week 8	Oxidation-Reduction reactions
Week 9	Alkanes reactions
Week 10	Alkenes reactions

Week 11	Alkynes reactions
Week 12	Aldehydes and aketons
Week 13	Carboxylic acids reactions
Week 14	Ideal gas low and Boyle's law
Week 15	Thermochemistry and Energy sources
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Acid- Base titration
Week 2	Lab 2: Reduction - Oxidation titration
Week 3	Lab 3: Precipitation titration
Week 4	Lab 4: Complex metric titration
Week 5	Lab 5: Determination the density of a liquid
Week 6	Lab 6: Determination of Calorimetric Constant
Week 7	Lab 7: Determination the Viscosity of a pure liquid

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	General Chemistry ;Darrell D. Ebbing; Steven D. Gammon	no
Recommended Texts		

Websites	https://books.google.iq/books?id=BnccCgAAQBAJ&printsec=frontcover&redir_esc=y#v=onepage&q&f=false

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	English language I	Module Delivery
Module Type	B	☒ Theory
Module Code	UOBAB0301026	

ECTS Credits	4	☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
SWL (hr/sem)	100	

Module Level	UGI	Semester of Delivery	Two
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Rusul Dawood Salman	e-mail	met.rusul.dawood@uobabylon.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	MSc
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	1) Developing skills of reading, writing, speaking and listening. 2) Providing a survey of theoretical perspectives concerning the student's learning and development. 3) Providing an overview of a variety of important issues in English language that help the students to communicate easily with others.

	4) Applying the theoretical issues in order to give the student the opportunity to practice language and encourage him to speak with foreign people. 5) Giving the students the ability to express their opinions and participating in discussion. 6) Using variety of digital devices and tools in order to interpret and create meaning.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The ability to understand the uses of language in the light of purposes. 2. Identifying the most important daily phrases to be applicable in life. 3. Development of evidence-based arguments. 4. Making the students aware of the correct usages of English grammar in writing and speaking. 5. Improving the students' ability in English in terms of fluency and comprehensibility. 6. Students will give oral presentation and receive feedback on their performance. 7. Improving the students' reading skills through the extensive reading. 8. Providing the students with a large repertoire of vocabulary. 9. Applying the grammatical forms in communicative contexts such as: class activities, reading & writing, and homework. 10. Strengthening the students' ability to write essays and academic papers. 11. Enhancing the students' competence in four important elements: Writing. speaking, reading and listening.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Focusing on four important issues in English language: Writing, speaking reading and listening [15 hrs] • Understanding the general topic or main idea, major points, important facts and details, vocabulary in context, and pronoun references. [15 hrs] • Comprehending the main idea, major points, and important details related to the main idea. [10 hrs] • Students should be able to speak successfully in and outside the classroom. [15 hrs] • [6 hrs]

	Part B - Analogue Electronics Fundamentals • Recognizing tenses choosing the correct form, arranging the sentences in the correct order, [15 hrs] • Covering aspects such as phonetics, semantics and pragmatics. [7 hrs] • 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]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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,.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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	1hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – Giving a general information about English Language
Week 2	Speaking (paired choice) asking about the general opinions about possible issues
Week 3	Speaking(campus announcement & general conversation) report on the speaker's opinion & explain why he/she feels that way
Week 4	Integrated speaking (Academic reading & Lecture) explaining the academic topics & describing the main points in it.
Week 5	Listening to engineering conversation to obtain a wide vocabularies
Week 6	Listening to various videos concerning the engineering fields as: (Mechanical engineering, electrical engineering in addition to renewable energies).
Week 7	Mid-term Exam
Week 8	Writing (learning students how to write essays on engineering field)
Week 9	Writing (enabling students to write their opinion about specific academic topic in general or write about engineering subject in particular).
Week 10	Speaking (making the students sum up the main points of the lecture that is delivered previously)
Week 11	Speaking (increasing the student' ability to speak fluency and increasing its rate)
Week 12	Listening (encourage the student to make inferences from what he/she heard before)
Week 13	Listening (ask the student what the speaker imply in his/her speech)
Week 14	Writing (ask student to write the essential information in the highlighted sentences in paragraph and make paraphrasing in to those sentences)
Week 15	Witting (encourage student to extract the most important issues in paragraph)

Week 16	Preparatory week before the final Exam

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
Recommended Texts	The Cambridge Encyclopedia of the English Language By David Crystal	No
Websites	https://www.cambridge.org./	

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.

The second stage/2024

Course description/ Resistance of materials II

1. Course Name
Strength of Materials
2. Course Code
Em En Esii 202711 (2+0)
3. Semester/year
Second semester|2023-2024
4. The date this description was prepared
5-9-2022
5. Available attendance forms
My presence
6. Number of study hours (total)/number of units (total)
120hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Assistant Professor Bashar Abed Hamza - Ph.D Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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	Objectives of the study subject

and graduation projects in the department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

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

10. Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Daily exams and homework	a lecture	Introduction, vertical stress	5%	8	1
Daily exams and homework	a lecture	Shear stress, bearing stress,	5%	8	2

		permissible stress			
Daily exams and homework	a lecture	Emotions and the relationship between stress and emotions	5%	8	3
Monthly exams	a lecture	Axial loads and thermal stresses	5%	8	4
Daily exams and homework	a lecture		7%	8	5
Daily exams and homework	a lecture	Torsion torque and calculation of the torsion angle of the flange	7%	8	6
Daily exams and homework	a lecture	Shear curves and bending curves	7%	8	7
Monthly exams	a lecture	The diligence of bending in admonition	7%	8	8
Daily exams and homework	a lecture	The jurisprudence of storytelling in admonition	8%	8	9
Daily exams and homework	a lecture	Diligence in tanks	8%	8	10
Daily exams and homework	a lecture	Complex jurisprudence	8%	8	11
Daily exams and homework	a lecture	Recycling jurisprudence	8%	8	12
Monthly exams	a lecture	Recycling of jurisprudence (Mohr circle)	8%	8	13
Daily exams and homework	a lecture	Bending in the cusp 1	7%	8	14

Daily exams and homework	a lecture	Bending in the cusp 2	5%	8	15
11.Course evaluation					
1- Exams					
12.Learning and teaching resources					
Mechanics of solids.		Required textbooks (methodology, if any)			
		Main references (sources)			
		Recommended supporting books and references (scientific journals, reports....)			
		Electronic references, Internet sites			

Course description/Fluid mechanics I

1. Course Name
Fluid mechanics I
2. Course Code
Em En Emi 202206 (1+2)
3. Semester/year
First semester|2023-2024
4. The date this description was prepared
1-6-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
30 hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Assistant Professor Sanaa Abdul Razzaq Jassim - Ph.D Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering.	Objectives of the study subject

• Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Discussion	Lectures (2 theoretical + 1 practical)	Properties of fluids: general definitions, Newton's law of viscosity, and kinematic viscosity	1	3	1
Discussion and feedback from the student	Lectures (2 theoretical + 1 practical)	Compressibility and surface tension	1	3	2
Tests	Lectures (2 theoretical + 1 practical)	Static fluids: definitions, pressure at a point, pressure change in a static fluid	1	3	3
Discussion and feedback from the student	Lectures (2 theoretical + 1 practical)	Hydrostatic laws, units and pressure gauges	3	3	4
Tests	Lectures (2 theoretical + 1 practical)	Manometers and pressure measuring devices	3	3	5
Discussion and feedback from the student	Lectures (2 theoretical + 1 practical)	Force on flat surfaces	3	3	6
Tests	Lectures (2 theoretical + 1 practical)	Force on curved surfaces	3	3	7

Discussion	Lectures (2 theoretical + 1 practical)	Buoyant force	4	3	8
Discussion	Lectures (2 theoretical + 1 practical)	Stability of floating and submerged bodies	4	3	9
Tests	Lectures (2 theoretical + 1 practical)	proportional balance (linear)	4	3	10
Discussion and reports	Lectures (2 theoretical + 1 practical)	Relative (rotational) balance	4	3	11
Discussion and reports	Lectures (2 theoretical + 1 practical)	Fluid flow theories and governing equations: definitions	6	3	12
Tests	Lectures (2 theoretical + 1 practical)	Continuity equation	6	3	13
Tests	Lectures (2 theoretical + 1 practical)	Euler's equation of motion along a streamline	6	3	14
Tests	Lectures (2 theoretical + 1 practical)	Bernoulli equation	6	3	15

11.Course evaluation

1. Continuous calendar
2. Exams
3. Practical evaluations
4. Project evaluation
5. Oral presentations and defense
6. Peer evaluation
7. Self-evaluation and reflective journaling
8. External quality assurance

12.Learning and teaching resources

Frank M. White, Fluid Mechanic, fifth ed., Text book.	Required textbooks (methodology, if any)
1.VL Streeter, Fluid mechanics, ninth ed. 2.Genick Bar–Meir, Basics of Fluid Mechanics, 2010. 3. Bernard Massey, mechanical fluid & solution manual, 2005.	Main references (sources)

https://testbook.com/question-answer/which-one-of-the-components-is-sometimes-called-l--5bff733e80df4a0c8d8d8734	Recommended supporting books and references (scientific journals, reports....)
https://en.wikipedia.org/wiki/fluid_mechanics_engineering	Electronic references, Internet sites

Course description/Fluid mechanicsII

1. Course Name
Fluid mechanics II
2. Course Code
In Flii 203014 (1+2)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-6-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45 hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Assistant Professor Sanaa Abdul Razzaq Jassim - Ph.D Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders.	Objectives of the study subject

• Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	
9. Teaching and learning strategies	
. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training	The strategy

6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	Hours	the week
Discussion	Lectures (2 theoretical + 1 practical)	Steady state energy equation	1	3	1
Discussion and feedback from the student	Lectures (2 theoretical + 1 practical)	Measuring greens using a Pitot tube	1	3	2
Tests	Lectures (2 theoretical + 1 practical)	Measuring flow using the nozzle	1	3	3
Discussion and feedback from the student	Lectures (2 theoretical + 1 practical)	Flow measurement using venture	3	3	4
Tests	Lectures (2 theoretical + 1 practical)	Measuring flow using a trumpet	3	3	5
Discussion and feedback from the student	Lectures (2 theoretical + 1 practical)	Flow and resistance to flow in closed and open channels	3	3	6
Tests	Lectures (2 theoretical + 1 practical)	Flow in pipes (stratified flow and turbulent flow)	3	3	7
Discussion	Lectures (2 theoretical + 1 practical)	Pipe losses (main and secondary losses)	4	3	8
Discussion	Lectures (2 theoretical + 1 practical)	Linear momentum conservation equations and their applications: open system	4	3	9
Tests	Lectures (2 theoretical + 1 practical)	Closed system and curved pipes	4	3	10

Discussion and reports	Lectures (2 theoretical + 1 practical)	Species Pumps And turbines And its applications	4	3	11
Discussion and reports	Lectures (2 theoretical + 1 practical)	Analysis Al-Baadi (Theory (π	6	3	12
Tests	Lectures (2 theoretical + 1 practical)	discussion preparation Non-dimensionality)number Reynolds , number Freud(	6	3	13
Tests	Lectures (2 theoretical + 1 practical)	discussion preparation Non-dimensionality)number Euler , number Weber , number Mach (	6	3	14
Tests	Lectures (2 theoretical + 1 practical)	General Review	6	3	15

11.Course evaluation

1. Continuous calendar
2. Exams
3. Practical evaluations
4. Project evaluation
5. Oral presentations and defense
6. Peer evaluation
7. Self-evaluation and reflective journaling
8. External quality assurance

12.Learning and teaching resources

Frank M. White ,Fluid Mechanic, fifth ed., Text book	Required textbooks (methodology, if any)
1.VL Streeter, Fluid mechanics, ninth ed. 2.Genick Bar–Meir, Basics of Fluid Mechanics, 2010. 3. Bernard Massey, mechanical fluid & solution manual, 2005	Main references (sources)
https://testbook.com/question-answer/which-one-of-the-components-is-sometimes-called-l--5bff733e80df4a0c8d8d8734	Recommended supporting books and references (scientific journals, reports....)
https://en.wikipedia.org/wiki/fluid_mechanics_engineering	Electronic references, Internet sites

Course description/ Electronic circuits

1. Course Name	
Electronic circuits	
2. Course Code	
Em En Pe 201802 (2+2)	
3. Semester/year	
First semester|2023-2024	
4. Date this description was prepared	
4-9-2022	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
45hour	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Lecturer Mohammed Ali Mohammed-Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational	Objectives of the study subject

process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
1) Ability on to understand Circles e Necessary And its applications in engineering energy. 2) Ability on analysis That Circles e And calculation Value required For currents And the effort. 3) Ability on fee shapes Waves Resulting For the current And the effort For applications required For circles e. 4) Ability on design some Species Circles e Self appearance specific from shapes The wave And level specific from the current And the effort 5) Ability on to understand the difference between This is amazing Circles in both Two cases: alternating and continuous	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Tests and tests	Lectures	Introduction to semiconductors and diodes	1	2	1
Tests and tests	Lectures	Series diodes and parallel circuits	2	2	2-3
Tests and tests	Lectures	Cutting circles	3	2	4-5
Feedback and formative assessment	Lectures and active learning	Clamping circuits	3	2	6-7
Feedback and formative assessment	Lectures and active learning	Half wave rectifier	3	2	8-9
homework	Lectures and active learning	Full wave rectifier	4	2	10-11
Interactive educational program	Lectures	Zener diodes	5	2	12-13
Report and seminar	Flipped classroom	Bipolar transistors and JFET	5	2	14-15

11.Course evaluation

1. Quizzes and exams

2. Interactive lessons 3. homework 4. Seminar report/evaluation 5. Student feedback and class participation
12.Learning and teaching resources

1. Handouts from different references Electronic devices and circuit theory; Robert Boylestad and Louis Nashelsky. Eleventh edition.	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Course description/ mathematics II

1. Course Name
Engineering Mathematics II
2. Course Code
Here I am 202509 (3+0)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-9-2022
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
30 hour
7. Name of the course administrator (if more than one name is mentioned)

Name: Lecturer Mohammed Ali Mohammed-Ph.D	Email:
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • Active contribution to the development of the engineering management system and scientific capabilities in the field of design, manufacturing, and	Objectives of the study subject

quality control through the production of scientific research and graduation projects in the department's field of specialization.

- Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly.
- Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback.
- Active contribution to community service activities.

9. Teaching and learning strategies

1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy

10. Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
the test	a lecture	Integrals: Definition of	2	4	1

		integration and its properties			
the test	a lecture	Integration methods	4	4	2
the test	a lecture	Integration methods	4	4	3
the test	Lecture and learning	Integration methods	4	4	4
the test	Lecture and learning	Applications of definite integrals	4	4	5
the test	Lecture and learning	Disk size	4	4	6
the test And reports	a lecture	Washer size	4	4	7
the test	a lecture	Cylindrical shell size	4	4	8
the test	a lecture	Size in polar coordinates- Length Curved	4	4	9
Testing and reporting	a lecture	Rotational volumes - polar coordinates	4	4	10
the test	a lecture	Double integrals	2	4	11
Testing and reporting	a lecture	Numerical methods for calculating definite integrals	2	4	12
the test	a lecture	Sequences	2	4	13
Testing and reporting	a lecture	Infinite series H	4	4	14
the test	a lecture	Tyler and McLaurin series	2	4	15
11.Course evaluation					
1. Continuous calendar 2. Exams 3. Practical evaluations: Participation and submission of assignments 4. Evaluation of Reports 5. Oral presentations and defense 6. Peer evaluation 7. Self-evaluation and reflective journaling 8. External quality assurance					

12.Learning and teaching resources	
George B. Thomas Jr, with Joel R. Hass 'Calculus' (V.12), 2014.	Required textbooks (methodology, if any)
1. Howard Anton" Calculus and analytic geometry" 2. Schoms series "Theory and problems of calculus"	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
https://en.wikipedia.org/wiki/applied-mathematics	Electronic references, Internet sites

Course description/ English

1. Course Name	
English	
2. Course Code	
Em En Ell 101616 (2+0)	
3. Semester/year	
Second semester|2023-2024	
4. Date this description was prepared	
1-9-2022	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30hour	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant professor Rusul Dawood Salman – Master's degree Email:	
8. Course objectives	
• Developing English reading, writing, speaking and listening skills.	Objectives of the study subject

• Providing a comprehensive theoretical study on how students learn and develop their skills. • Providing an overview of various important issues related to the English language that helps the student communicate easily with others. • Applying theoretical aspects by allowing the student to practice the language and encouraging him to speak with foreigners. • Giving students the ability to express their opinions and participate in discussions • Using digital means and tools to contribute to the formation and interpretation of meanings required.	

9. Teaching and learning strategies	
1. Lectures and seminars 2. Method Recordings the sounds 3. Assessment for learning 4. Learn the language of the community 5. Communicative language teaching	The strategy

10. Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Feedback	Lectures	Introduction – Giving general information about the English Language	1	2	1
Quizzes and Tests	Lectures	Speaking (paired choice) asking about the general opinions	1	2	2

		about possible issues			
Feedback and Formative Assessment	Lectures	Speaking(campus announcement & general conversation) report on the speaker's opinion & explain why he/she feels that way	1	2	3
Feedback and Formative Assessment	Lectures & discussions	Integrated speaking (Academic reading & Lecture) explaining the academic topics & describing the main points in it.	3	2	4
Observations	Lectures & oral practices	Listening to engineering conversations to obtain a wide vocabulary	3	2	5
Self-assessment	Lectures & Active Learning	Listening to various videos concerning the engineering fields such as: (Mechanical engineering, electrical engineering in addition to renewable energies).	3	2	6
Peer Assessment	Practicing Language	Mid-term Exam	3	2	7
Examinations		Writing (learning students how to	4	2	8

		write essays on the engineering field)			
Peer Assessment	Lecture and test	Writing (enabling students to write their opinion about specific academic topics in general or write about engineering subjects in particular).	4	2	9
Portfolios	Inquiry-Based Learning	Speaking (making the students sum up the main points of the lecture that is previously delivered)	4	2	10
Portfolios	Peer learning	Speaking (increasing the student's ability to speak fluency and increasing its rate)	4	2	11
Assignments and Projects	Reflective Learning & Experimental Learning	Listening (encourage the student to make inferences from what he/she heard before)	6	2	12
Assignments and Projects	Reflective Learning & Experimental Learning	Listening (ask the student what the speaker implies in his/her speech)	6	2	13
Rubrics and Criteria-Based Assessments	Reflective Learning & Experimental Learning	Writing (ask the student to write the essential information in the highlighted	6	2	14

		sentences in a paragraph and make paraphrasing in to those sentences)			
Examination		Final Examination	6	2	15

11.Course evaluation	
1.	
12.Learning and teaching resources	
TOEFL Practice Online The official practice test that can help you go anywhere	Required textbooks (methodology, if any)
The Cambridge Encyclopedia of the English Language By David Crysta	Main references (sources)
Ciedupress.com/journal/index.php/wjel	Recommended supporting books and references (scientific journals, reports....)
https://www.cambridge.org./ https://www.cambridge.org./ ps://www.cambridge.org. https://www.cambridge.org./	Electronic references, Internet sites

Energy sources

Course description form

1. Course Name
Energy sources
2. Course Code
Em En Peii 202610 (2+2)
3. Semester/year
Second semester|2023-2024

4. Date this description was prepared	
1-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant Lecturer Dhi Saadi Naji – Master's degree Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards	Objectives of the study subject

(Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
1. Lectures and seminars 2. Problem-based learning 3. Project-based learning 4. Workshops and practical exercises 5. Cooperative training and job training	The strategy

6. E-learning and blended learning 7. Experiential learning/experiential learning	

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
discussion	Lectures	Introduction to energy sources	1 &2	2	1
Discussion and feedback from the student	Lectures and discussion	The relationship between watts and watt-hours	1&2	2	2
Tests	Lectures and discussion	supplement	1	2	3
Tests	Lectures	Coal	3	2	4
Tests	Lectures and discussion	=	3	2	5
Discussion and feedback from the student	Lectures	Calculating the energy content of all types of coal	3	2	6
Discussion and reports	Lectures and discussion	=	3	2	7
Tests	Lectures	Oil	4	2	8
discussion	Lectures	Oil density meter	4	2	9
Discussion and feedback from the student	Lectures	Properties and derivatives of oil	4	2	10
Tests	Lectures and discussion	supplement	4	2	11
Tests	discussion	=	6	2	12
Tests	Lectures	Gas, its properties and types	5&6	2	13
Discussion and feedback from the student	Lectures	Other sources	6&7	2	14
Examinations		Final Examination	5,6	2	

11.Course evaluation	
1. Tests and examinations 2. Discussion 3.Homework 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
Energy Production, Conversion, Storage, Conservation, and Coupling by Yasar Dimirel	Required textbooks (methodology, if any)
Fundamentals of Chemical Conversion Processes and Applications 1st Edition - August 24, 20161 Author: Balasubramanian Viswanathan	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Course description/ThermodynamicsII

1. Course Name
ThermodynamicsII
2. Course Code
Em En Thii 202812 (2+0)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-9-2022
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45hour

7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant Professor Ali Jaber Abdel Hamid - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • Active contribution to the development of the engineering management system and	Objectives of the study subject

scientific capabilities in the field of design, manufacturing, and quality control through the production of scientific research and graduation projects in the department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

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

10. Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Feedback	a lecture	Some Concept and Definitions	1	3	1

Feedback	a lecture	Open System Unsteady State Steady Flow	1	3	2
Feedback	a lecture	Entropy	1	3	3
Exam	a lecture	Reversible Processes	3	3	4
Homework	a lecture	The 2nd law of thermodynamic in closed system	3	3	5
feedback	a lecture	The 2nd law of thermodynamic in open system	3	3	6
feedback	a lecture	Exergy	3	3	7
Semester exam	a lecture	Mid-term Exam	4	3	8
feedback	a lecture	Isentropic Efficiency of Turbine	4	3	9
feedback	a lecture	Isentropic Efficiency of Compressors, Pump, & Nozzle	4	3	10
Exam	a lecture	The Ideal Cycle for Gas-Turbine Engines (Brayton Cycle)	4	3	11
feedback	a lecture	Rankin Cycle “Steam Power Plant”	6	3	12
Homework	a lecture	The Ideal Reheat Rankin Cycle	6	3	13
Feedback	a lecture	The Ideal Regenerative RANKINE Cycle	6	3	14
Feedback	a lecture	Refrigerant cycles	6	3	15

11.Course evaluation

1- Exams

2- Continuous evaluation
3- Reports
4- Catalysts

Feedback from students

12.Learning and teaching resources	
Thermodynamics: an Engineering Approach / Yunus Cengel	Required textbooks (methodology, if any)
Fundamental of Classical Thermodynamics / Van Wylen	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Course description/ Principles of energy engineering

1. Course Name	
Principles of Energy Engineering II	
2. Course Code	
Em En Smii 202913 (1+2)	
3. Semester/year	
Second semester|2023-2024	
4. Date this description was prepared	
1-9-2022	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
45hour	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant Professor Wissam Jalil Khudair - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate	Objectives of the study subject

outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional	

knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

1. Lectures and Discussion 2. Problem-based learning 3. Project-based learning(student groups) 4. Workshops and scientific visits 5. The learning e-learning and blended learning 7) 6. Reports	The strategy

10. Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Tests	Lectures (2 theoretical + 1 discussion)	Introduction to energy engineering, principles and units, Concepts of energy, power and work	1 and 6	3	1
Discussion and feedback from the student	Lectures (2 theoretical + 1 discussion)	Law of conservation of matter/energy, forms of energy, and renewable and non-renewable energy sources	1, 4, 6 and 7	3	2
Tests	Lectures (2 theoretical + 1 discussion)	Definition of engineering calculations, units	1	3	3

		and dimensions, and the mole unit			
Discussion and feedback from the student	Lectures (2 theoretical + 1 discussion)	Unit systems and unit conversion factors	1, 4, and 7	3	4
Tests	Lectures (2 theoretical + 1 discussion)	Chemical equations	1 and 6	3	5
Discussion and feedback from the student	Lectures (2 theoretical + 1 discussion)	Balancing the material	1-4, 6 and 7	3	6
Discussion and reports	Lectures (2 theoretical + 1 discussion)	Solutions to matter balance problems for multiple systems	1-4	3	7
Discussion and feedback from the student	Lectures (2 theoretical + 1 discussion)	The accountsRecycle, By-pass, and Purge	1-4 and 7	3	8
Tests	Lectures (2 theoretical + 1 discussion)	The general energy balance equation for closed and open systems	1-3	3	9
Tests	Lectures (2 theoretical + 1 discussion)	Heat capacity and calculating enthalpy change without phase change, enthalpy change accompanying phase change	2 and 3	2	10
Tests	Lectures (2 theoretical + 1 discussion)	Reflexive processes and mechanical energy balance	3	2	11
Discussion and reports	Lectures (2 theoretical + 1 discussion)	Energy balance for physical and chemical processes	1-4, 6 and 7	2	12

Tests	Lectures (2 theoretical + 1 discussion)	Introduction to engineering Biochemical	1-3	2	13
Tests	Lectures (2 theoretical + 1 discussion)	Introduction to electrochemical engineering	1-3	2	14
Tests	Lectures (2 theoretical + 1 discussion)	Rates of electrochemical reactions in energy systems	1-3	2	15

11.Course evaluation

1.Tests and Exams
2.Discussion
Homework
3. Oral presentations and defense about reports or the proposed project
4. The Feedback from students

12.Learning and teaching resources

1. David M. Himmelblau, "Basic Principles and Calculations in Chemical Engineering", Fifth Edition, Prentice-Hall International Editions, 1989. 2. Albert PE Thumann, "Fundamentals of Energy Engineering" Prentice-Hall 1984 Introduction to Energy Engineering, Mihir Sen, Department of Aerospace and Mechanical Engineering, University of Notre Dame Notre Dame, IN 46556 December 2, 2015	Required textbooks (methodology, if any)
Colorado Energy Management Handbook, Sixth Edition, 2007, by The Fairmont Press, Colorado, USA	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)

	Electronic references, Internet sites

Course Description/Engineering Materials Science

1. Course Name
Material Science and Technology
2. Course Code
Em En Eci 201903 (2+0)
3. Semester/year
First semester 2023-2024
4. Date this description was prepared
1-6-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
30hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Assistant Professor Maitham Hussein Rashid - Master's degree Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders.	Objectives of the study subject

• Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly.	

• Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

1. Lectures and seminars . problem-based learning (PBL2 . project based learning (PrBL3 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 1) 8. Experiential learning/experiential learning	The strategy

10. Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Introduction of material science	1	2	1
Quizzes and Tests	Lectures	Classifications of engineering material	1	2	2
Feedback and Formative Assessment	Lectures	Crystal and non-crystal structures	1	2	3
Feedback and Formative Assessment	Lectures &Active Learning	Unit cell and atomic packing factor	3	2	4
Observations	Lectures &Active Learning	Direction of crystallography and millier indices	3	2	5

Self-Assessment	Lectures &Active Learning	Stress – strain curve, young modulus	3	2	6
Peer Assessment	Flipped Classroom	Mechanical properties of engineering material.	3	2	7
Examinations	Flipped Classroom	Tension – compression tests.	4	2	8
Peer Assessment	Flipped Classroom	Hardness test, types of hardness methods.	4	2	9
Portfolios	Inquiry-Based Learning	Metallurgy, metals and alloys, thermal equilibrium diagrams	4	2	10
Portfolios	Peer Learning	lever rule, applications on binary phase diagrams, Fe-C phase diagram	4	2	11
Assignments and Projects	Reflective Learning & Experimental Learning	(TTT) Diagrams.	6	2	12
Assignments and Projects	Reflective Learning & Experimental Learning	Heat treatments of steel.	6	2	13
Rubrics and Criteria-Based Assessments	Reflective Learning & Experimental Learning	Composite materials	6	2	14
Examinations		Nano-materials, plastics, ceramics and glass.	6	2	15
Quizzes and Tests	Lectures	Preparatory week before the final exam	1	2	

Quizzes and Tests	Lectures	Classifications of engineering material	1	2	
Feedback and	Lectures	Crystal and non-crystal structures	1	2	
		Unit cell and atomic packing factor			

11.Course evaluation
1. Continuous calendar 2. Exams 3. Practical evaluations 4. Project evaluation 5. Oral presentations and defense 6. Peer evaluation 7. Self-evaluation and reflective journaling

12.Learning and teaching resources	
1-The science and engineering of materials, Donald Askel and 2005l	Required textbooks (methodology, if any)
Materials Science and Engineering, William Callister, 2007	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
https://en.wikipedia.org/wiki/material	Electronic references, Internet sites

Course description/ Design of machine systems

1. Course Name
Computer-aided mechanical drawing (Soldwork)

2. Course Code
Em En Hrpii 203216 (1+2)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-9-2022
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Ahmed Walid Hussein - Ph.D Email:
8. Course objectives

• The student acquires the skill and experience to draw three-dimensional objects with the help of a computer and the process of assembling various mechanical parts	Objectives of the study subject

9. Teaching and learning strategies

1. Lectures and Discussion 2. Problem-based learning 3. Project-based learning(student groups) 4.SeminarsAndAndSpraying work and scientific visits 5. The learning e-learning and blended learning 8) 6. Reports	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Discussion	Lectures	Introduction to computer-aided design	1&2&3	3	1
Discussion and feedback from the student	Lectures	Introduction to the Soldork program	1&2&3	3	1

Tests	Lectures	2D drawing	1&2&3	3	3-5
Tests	Lectures	3D drawing	1&2&3	3	6-9
Tests	Lectures	Assembling various mechanical parts	1&2&3	3	10-13
Tests	Lectures	Extracting diagrams of various mechanical parts and systems	1&2&3	3	14-15

11.Course evaluation

1.Tests and Exams
2.Discussion
3. Oral presentations and defense about reports or the proposed project
4. The Feedback from students

12.Learning and teaching resources

SOLIDWORKS 2019 for Designers, 17th Edition, Prof. Sham Tickoo, Purdue University Northwest, US	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

The third stage/2024

Fuel and combustion

Course description form

1. Course Name
Fuel and combustion
2. Course Code
Em En Fci 303705 (2+0)
3. Semester/year
First semester|2023-2024
4. Date this description was prepared
1-6-2023
5. Available attendance forms

Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Lecturer Fouad Abdel Amir Khalaf - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • Active contribution to the development of the engineering management system and scientific capabilities in the field of design, manufacturing, and quality	Objectives of the study subject

control through the production of scientific research and graduation projects in the department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	
9. Teaching and learning strategies	
1. Interactive lectures: The professor can present the materials directly through lecture sessions. This method can be improved by mixing explanation with applied examples and opening the way for questions and discussions with students. 2. Projects and Research: You can direct students to conduct projects or research on specific topics in the Fuel and Combustion curriculum. This method encourages active and research learning and practical application of concepts. 3. Group discussions: Discussion sessions can be organized on specific topics in the curriculum. Students can share their views and engage in brainstorming and analysis. 4. Problem-based learning: Set complex challenges and problems related to curriculum concepts, then have students work on solving these problems using the concepts they have studied. 5. Practical experiments and laboratories: Practical experiments can be organized in the laboratory that help students apply theoretical concepts in a practical way and understand how chemical reactions occur. 6. Use of technology: Technological tools such as graphic patterns and digital simulations can be used to illustrate concepts and processes.	The strategy

7. Modeling and Simulation: Use modeling and simulation software to represent complex chemical processes and enable students to interact with them. 8. Flipped learning: Let students explore concepts in advance and come to class prepared to discuss and apply those concepts. 9. Practical activities: Provide activities that include practical matters such as a private combustion experiment, and analysis and interpretation of experimental results.	

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Introduction to Fuel and Combustion: Basics of combustion, types of fuels, and their importance in energy generation.	1	2	1
Quizzes and Tests	Lectures	Types of Fuels: Exploration of various types of fuels, including fossil fuels (coal, oil, natural gas) and alternative fuels (biofuels, hydrogen, etc.).	1	2	2
Feedback and Formative Assessment	Lectures	Chemistry of Combustion: Understanding the chemical reactions involved in combustion, including the oxidation of fuels and the production of combustion products.	1	2	3
Feedback and Formative Assessment	Lectures &Active Learning	Stoichiometry of Combustion: Study of the balanced	3	2	4

		chemical equations representing combustion reactions and the calculation of reactants and products.			
Observations	Lectures &Active Learning	Heat of Combustion and Calorimetry: Concepts related to measuring and calculating the heat released during combustion reactions and the use of calorimetry.	3	2	5
Self-Assessment	Lectures &Active Learning	Actual Cycle Engine & Working Principles	3	2	6
Peer Assessment	Flipped Classroom	Flame and Flame Structure: Examination of flame characteristics, types of flames, and factors influencing flame behavior.	3	2	7
Examinations	Flipped Classroom	Internal Combustion Engines: In-depth look into the principles of internal combustion engines, their types (spark-ignition, compression-ignition), and their efficiency.	4	2	8
Peer Assessment	Flipped Classroom	External Combustion Processes: Study of external combustion processes such as	4	2	9

		steam power generation, gas turbines, and their applications.			
Portfolios	Inquiry-Based Learning	Combustion Kinetics: Exploration of the rate of combustion reactions, factors affecting it, and how it impacts the efficiency of combustion processes.	4	2	10
Portfolios	Peer Learning	IC-Fuel and combustion Introduction	4	2	11
Assignments and Projects	Reflective Learning & Experimental Learning	Pollution and Emissions: Discussion of the environmental impact of combustion, including emissions of greenhouse gases, particulate matter, and methods to reduce pollutants.	6	2	12
Assignments and Projects	Reflective Learning & Experimental Learning	Energy Conversion and Efficiency: Understanding how combustion is used to convert chemical energy into mechanical work and the importance of efficiency in energy conversion.	6	2	13
Rubrics and Criteria-Based Assessments	Reflective Learning &	Advanced Combustion Techniques:	6	2	14

	Experimental Learning	Introduction to advanced combustion technologies such as fluidized bed combustion, lean-burn engines, and oxy-fuel combustion.			
Examinations		Final Examination	6	2	
Quizzes and Tests	Lectures	Combustion Modeling and Simulation: Overview of computational methods used to model and simulate combustion processes for optimization and pollution reduction.	1	2	
Quizzes and Tests	Lectures	Sustainable Energy Sources: Exploration of renewable energy sources as alternatives to traditional fossil fuels, including solar, wind, and biomass energy.	1	2	
Feedback and Formative Assessment	Lectures	Fuel Cells and Combustion: Introduction to fuel cells as an alternative energy conversion technology and their relationship to combustion processes.	1	2	
11.Course evaluation					

1. Written tests: Written tests can be conducted that cover the main concepts in the curriculum. Questions can be various such as optional questions, short answer questions and comprehensive questions.
2. Practical tests: They may include practical tests where students perform applied tasks such as calculating calorific values or analyzing the results of certain experiments.
3. Projects and practical work: Students can be assessed by submitting a project or practical work, such as designing an efficient combustion process or submitting a report on the impact of combustion on the environment.
4. Participation in class and discussion: Students' participation in group activities and discussions in class can be evaluated, and the extent to which they contribute to exchanging ideas and discussions.
5. Evaluating laboratory performance: You may evaluate the performance and practical skills of students as they conduct experiments in the laboratory.
6. Evaluating writing projects and reports: The quality of writing projects and reports completed by students on specific topics can be evaluated.
7. Oral assessment: Oral interviews can be organized with students to discuss curriculum concepts and evaluate their understanding and application abilities.
8. Evaluation of actual performance: Students can be evaluated while performing practical activities such as combustion experiments or interacting with simulators.
9. Summative assessment: This method may be used to assess the overall concept learned from the syllabus and students' progress over time.

12.Learning and teaching resources

Certainly, here are some recommended books that cover the topics related to fuel and combustion: 1."Introduction to Combustion". by Stephen R. Turns This is a comprehensive introductory textbook that covers the fundamentals of combustion processes, including chemical kinetics, thermodynamics, and various combustion technologies. 2."Combustion Engineering Issues for Solid Fuel Systems" by Bruce G. Miller This book focuses on solid fuel combustion processes, discussing the principles, technologies, and environmental considerations for burning solid fuels like coal and biomass.	Required textbooks (methodology, if any)

3."Internal Combustion Engine Fundamentals" by John Heywood While mainly focused on internal combustion engines, this book provides an excellent overview of combustion processes, thermodynamics, and engine performance. 4."Environmental Impact of Energy Consumption and Utilization: An Overview" by Stanislav Boldyryev and Yurij Kozar This book explores the environmental impact of energy consumption, including combustion-related pollution and the development of cleaner technologies. 5.."Introduction to Bioenergy". by Vaughn C. Nelson and Kenneth L. Starcher For those interested in biofuels, this book covers various aspects of bioenergy production, including feedstock selection, conversion processes, and sustainability. 6."Introduction to Renewable Energy.” by Vaughn C. Nelson and Kenneth L. Starcher This book provides insights into renewable energy sources such as solar, wind, geothermal, and hydropower, which are essential alternatives to traditional fuels. 7."Combustion Technology: Essentials of Flames and Burners." by A. A. Burluka, Alexander S. Rogachev, and Nickolai M. Rubtsov This book delves into the principles of combustion, including combustion theory, flame structure, and burner technologies. 8."Combustion Science and Engineering." by Kalyan Annamalai, Ishwar K. Puri, and Milind A. Jog This book covers a wide range of topics related to combustion, from the basics to advanced	

concepts, making it suitable for both beginners and those looking for more in-depth knowledge. 9."Advanced Combustion Science". edited by Kefa Cen and Guoqiang Wang This compilation of chapters from various authors provides insights into cutting-edge combustion research, including advanced combustion modes and technologies. 10."Introduction to Energy and the Environment" by John R. Fanchi and John J. Fanchi While not solely focused on combustion, this book offers a broader understanding of energy and its impact on the environment, including discussions on combustion-related issues.	
Internal Combustion Engine Fundamentals" by John Heywood While mainly focused on internal combustion engines, this book provides an excellent overview of combustion processes, thermodynamics, and engine performance	Main references (sources)
"Introduction to Combustion" by Stephen R. Turns This widely used textbook provides a comprehensive introduction to the principles of combustion, covering both the fundamentals and applications of combustion processes.	Recommended supporting books and references (scientific journals, reports....)
1.. American Institute of Chemical Engineers (AIChE). -Energy & Fuels Division: Website: [https://www.aiche.org/sbe/divisions/energy-fuels] (https://www.aiche.org/sbe/divisions/energy-fuels) AIChE provides resources, articles, and information about energy, fuels, and combustion from a chemical engineering perspective. 2..Combustion Institute.:	Electronic references, Internet sites

Website: [http://www.combustioninstitute.org/] (http://www.combustioninstitute.org/) The Combustion Institute is an international, non-profit, scientific and educational organization that promotes research and dissemination of combustion science. 3.. National Renewable Energy Laboratory (NREL): Website: [https://www.nrel.gov/] (https://www.nrel.gov/) NREL offers research, data, and insights on renewable energy technologies, including combustion-related aspects of bioenergy and other sustainable energy sources. 4.. US Department of Energy (DOE) - Energy Efficiency & Renewable Energy (EERE): Website: [https://www.energy.gov/eere] (https://www.energy.gov/eere) The EERE division of the DOE focuses on energy efficiency and renewable energy technologies, including clean combustion and alternative fuels. 5.. American Society of Mechanical Engineers (ASME) - Combustion, Fuels, and Emissions Committee.: Website: [https://www.asme.org/codes-standards/committees/codes-and-standards/Combustion-Fuels-Emissions] (https://www.asme.org/codes-standards/committees/codes- and-standards/Combustion-Fuels-Emissions) ASME's committee addresses standards and research related to combustion, fuels, and emissions. 6.. Air & Waste Management Association (AWMA): Website: [https://www.awma.org/] (https://www.awma.org/)	

AWMA focuses on environmental management and regulation, including air quality, emissions, and combustion-related pollution control. 7.. European Combustion Institute (ECI): Website: [https://www.europeancombustionmeeting.org/] (https://www.europeancombustionmeeting.org/) ECI organizes events and provides resources for researchers and professionals in the field of combustion. 8..International Flame Research Foundation (IFRF): Website: [https://ifrf.net/] (https://ifrf.net/) IFRF focuses on combustion research, providing resources, publications, and knowledge-sharing platforms. 9.. United Nations Framework Convention on Climate Change (UNFCCC): Website: [https://unfccc.int/] (https://unfccc.int/) UNFCCC addresses climate change and emissions reduction, offering insights into international efforts to mitigate the environmental impact of combustion processes.	

Design of machine parts

Course description form

1. Course Name
Mechanical Element Design
2. Course Code
Em En Mdi 303503 (2+0)
3. Semester/year
First semester 2023-20234

4. Date this description was prepared
1-9-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Ahmed Walid Hussein - Ph.D Email:
8. Course objectives

• To introduce the student to the analyzes and calculations necessary to design various mechanical parts that are under the influence of various static or dynamic loads..	Objectives of the study subject

9. Teaching and learning strategies	
1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits 5. E-learning and blended learning 6. Reports	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
discussion	Lectures	Review the basic stresses	1	3	1
Discussion and feedback from the student	Lectures	Review of combined stresses and Moore's circle	1	3	2
Tests	Lectures	Types of forces and classification of materials	2	3	3

Tests	Lectures	Failure of ductile materials under static loads	1 & 2	3	4-5
Tests	Lectures	Failure of brittle materials under static loads	1 & 2	3	6
Discussion and feedback from the student	Lectures	Fatigue and finding a bend SN for materials	1 & 2	3	7-8
Discussion and reports	Lectures	Failure of mechanical parts due to fatigue	1 & 2	3	9-11
Tests	Lectures	Design of axles under different loading conditions	3	3	12
Tests	Lectures	Design of columns under different loads	3	3	13
Discussion and feedback from the student	Lectures	Design of welded joints under different loading conditions	3	3	14-15

11.Course evaluation	
1. Tests and examinations 2. Discussion 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
Mechanical Engineering Design, J. Shigley, Eighth Edition, 2008 Machine design: an integrated approach, Norton, 3rd edition, 2006	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)

	Electronic references, Internet sites

Store energy

Course description form

1. Course Name	
Energy Storage Systems	
2. Course Code	
Em En Wmi 304008 (2+0)	
3. Semester/year	
First semester|2023-2024	
4. Date this description was prepared	
1-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Professor Wathiq Nasser Hussein - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for	Objectives of the study subject

engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional	

knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

1. Lectures and seminars 2. Problem-based learning 3. Project-based learning 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Experiential learning/experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
discussion	Lectures	Introduction to energy storage	1 &2	2	1
Discussion and feedback from the student	Lectures and discussion	Thermal storage	1&2	4	2
Tests	Lectures and discussion	Thermal storage	1	4	3
Tests	Lectures	Thermal storage	3	4	4
Tests	Lectures and discussion	Thermal storage	3	4	5
Discussion and feedback from the student	Lectures	Electrical storage	3	4	6
Discussion and reports	Lectures and discussion	Electrical storage	3	4	7

Tests	Lectures	Hydroelectric storage	4	4	8
discussion	Lectures	Mechanical storage	4	4	9
Discussion and feedback from the student	Lectures	Mechanical storage	4	4	10
Tests	Lectures and discussion	Bioenergy storage	4	4	11
Tests	discussion	Chemical energy storage	6	4	12
Tests	Lectures	Chemical energy storage	5&6	4	13
Discussion and feedback from the student	Lectures	Chemical energy storage	6&7	4	14
Examinations		Final Examination	5,6 and 7	2	

11.Course evaluation
. Tests and exams 2. Discussion 3.Homework 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students
12.Learning and teaching resources

1-Energy storage by Huggins R 2-Energy Production, Conversion, Storage, Conservation, and Coupling by Yasar Dimirel	Required textbooks (methodology, if any)
THERMAL ENERGYSTORAGE SYSTEMS AND APPLICATIONS, SECOND EDITION By Ibrahim Dincer	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Machine systems design

Course description form

1. Course Name
Mechanical System Design
2. Course Code
Em En MDii 304311 (2+0)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-9-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Ahmed Walid Hussein - Ph.D Email:
8. Course objectives

• To introduce the student to the analyzes and calculations necessary to design various mechanical parts that are under the influence of various static or dynamic loads..	Objectives of the study subject

9. Teaching and learning strategies	
1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits 5. E-learning and blended learning 6. Reports	The strategy
10.Course structure	

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week

discussion	Lectures	Design of bolt connections under different loads	1&2&3	3	1-3
Discussion and feedback from the student	Lectures	Design of springs under different loads	1&2&3	3	4-6
Tests	Lectures	Design of conveyor belts under different loads	1&2&3	3	7-8
Tests	Lectures	Gears, their types and uses	1&2&3	3	9
Tests	Lectures	Design of straight gears	1&2&3	3	10
Discussion and feedback from the student	Lectures	Inclined gear design	1&2&3	3	11
Discussion and reports	Lectures	Design of gear boxes (clutch system)	1&2&3	3	12
Tests	Lectures	Brake design	1&2&3	3	13-14
Tests	Lectures	Case study	1&2&3	3	15

11.Course evaluation	
1. Tests and examinations 2. Discussion 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
Mechanical Engineering Design, J. Shigley, Eighth Edition, 2008 Machine design: an integrated approach, Norton, 3rd edition, 2006	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)

	Electronic references, Internet sites

Internal combustion engines IC

Course description form

1. Course Name	
Internal combustion engines	
2. Course Code	
Em In Icii 304513 (2+2)	
3. Semester/year	
Second semester|2023-2024	
4. Date this description was prepared	
1-6-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Lecturer Fouad Abdel Amir Khalaf - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national	Objectives of the study subject

standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	
9. Teaching and learning strategies	
1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy
10.Course structure	

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the wee
Quizzes and Tests	Lectures	Introduction to IC engine and combustion technology	1	2	1
Quizzes and Tests	Lectures	Classification of convention External and Internal engines	1	2	2
Feedback and Formative Assessment	Lectures	Strokes in two and four stroke engine +main parts of IC engine	1	2	3
Feedback and Formative Assessment	Lectures &Active Learning	Air standard cycle Otto-cycle and Diesel-cycle	3	2	4
Observations	Lectures &Active Learning	Air standard cycle Duel-cycle and Bryton cycle	3	2	5
Self-Assessment	Lectures &Active Learning	Actual Cycle Engine & Working Principles	3	2	6
Peer Assessment	Flipped Classroom	Engine parameters + engine nomenclatures	3	2	7
Examinations	Flipped Classroom	Engine performance parameter I	4	2	8
Peer Assessment	Flipped Classroom	Engine performance parameter II	4	2	9
Portfolios	Inquiry-Based Learning	Engine with turbocharger performance	4	2	10
Portfolios	Peer Learning	IC-Fuel and combustion Introduction	4	2	11
Assignments and Projects	Reflective Learning & Experimental Learning	Fuel types + fuel classification	6	2	12
Assignments and Projects	Reflective Learning & Experimental Learning	Combustion stages ignition timing	6	2	13

Rubrics and Criteria-Based Assessments	Reflective Learning & Experimental Learning	Ic -Emissions and pollution	6	2	14
Examinations		Final Examination	6	2	
Quizzes and Tests	Lectures	Introduction to combustion technology engine classification	1	2	
Quizzes and Tests	Lectures	Air standard cycle +engine performance	1	2	
Feedback and Formative Assessment	Lectures	Fuel types +combustion stages	1		

11.Course evaluation

1. Continuous calendar
2. Exams
3. Practical evaluations
4. Project evaluation
5. Oral presentations and defense
6. Peer evaluation
7. Self-evaluation and reflective journaling
8. External quality assurance

12.Learning and teaching resources

Engineering Fundamentals of the Internal Combustion Engine" by Willard W. Pulkrabek. University of Wisconsin-·. Platteville IC Engines. Fourth Edition by V Ganesan. Professor Emeritus. Department of Mechanical Engineering. Indian Institute of Technology Madras Chennai.	Required textbooks (methodology, if any)
Fundamentals of internal combustion engine by gupta	Main references (sources)
https://testbook.com/question-answer/which-one-of-the-components-is-sometimes-called-l--5bff733e80df4a0c8d8d8734	Recommended supporting books and references (scientific journals, reports....)
https://en.wikipedia.org/wiki/Internal_combustion_engine	Electronic references, Internet sites

Electrical power systems

Course description form

1. Course Name	
Electrical power systems I	
2. Course Code	
Em En Epi 303806 (2+0)	
3. Semester/year	
First semester|2023-2024	
4. Date this description was prepared	
1-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
45hour	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant Professor Ali Sabry Alo - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula	Objectives of the study subject

and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly.	

• Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

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

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
feedback	a lecture	Electrical power generator	1	3	1
feedback	a lecture	Structure of electrical power system	1	3	2
feedback	a lecture	Location of power station	1	3	3
Exam	a lecture	Load curve and factors	3	3	4
Homework	a lecture	Power transmission	3	3	5
Feedback	a lecture	Conductor materials	3	3	6
Feedback	a lecture	Parameter of overhead transmission line	3	3	7
Semester exam	a lecture	Mid-term Exam	4	3	8
Feedback	a lecture	Mechanical design of transmission line	4	3	9
Feedback	a lecture	Distribution inside large building	4	3	10

Exam	a lecture	Constructor defiles of 33/11kV & 11/0.4 kV distribution systems	4	3	11
Feedback	a lecture	Emergency generators	6	3	12
Homework	a lecture	Unitrubtiptible power system (UPS)	6	3	13
Feedback	a lecture	Reactive power control in distribution network	6	3	14
Feedback	a lecture	Distribution system configuration	6	3	15

11.Course evaluation	
1- Exams 2- Evaluation Continuous 3- Reports 4- Stimuli 5- nutrition Feedback from students	
12.Learning and teaching resources	
Electrical power systems. {A.E. Guile, W. Paterson} Volume one 2- Elements of power system analysis. {William D. Stevenson, SR.} 3- A course in electrical power. {ML Soni and PV Gupta}.	Required textbooks (methodology, if any)
	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Transfer of mass and heat

Course description form

1. Course Name
Heat and mass transfer I
2. Course Code
Em En Hti 303501 (2+2)

3. Semester/year
First semester|2023-2024
4. Date this description was prepared
1-6-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
30 hours
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Aws Abdul Mahmoud - Ph.D Email:
8. Course objectives

• Introducing the student to the mechanisms of heat transfer and methods of calculating it • The student analyzes and calculates thermal loads for various engineering applications	Objectives of the study subject

9. Teaching and learning strategies	
1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits 5. E-learning and blended learning 6. Reports	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Weekly exams - pre and post questions	Theoretical lecture	Introduction heat transfer mechanisms	1	3	1
Weekly exams - pre and post questions	Theoretical lecture	Conduction heat transfer	1	3	2

Weekly exams - pre and post questions	Theoretical lecture	Introduction to convection heat transfer	1&2	3	3
Weekly exams - pre and post questions	Theoretical lecture	Examples	1&2	3	4
Weekly exams - pre and post questions	Theoretical lecture	Thermal resistance networks	1&2	3	5
		Exam	1&2	3	6
Weekly exams - pre and post questions	Theoretical lecture	Introduction to radiation heat transfer	1&2	3	7
Weekly exams - pre and post questions	Theoretical lecture	Radiation heat transfer	1&2	3	8
Weekly exams - pre and post questions	Theoretical lecture	Two-Dimensional Heat Transfer 1	1&2	3	9
Weekly exams - pre and post questions	Theoretical lecture	Two-dimensional heat transfer 2	1&2	3	10
		Exam	1&2	3	11
Weekly exams - pre and post questions	Theoretical lecture	Unsteady heat transfer	1&2	3	12
Weekly exams - pre and post questions	Theoretical lecture	Heat transfer with heat generation	1&2	3	13
		Exam	1&2	3	14
Weekly exams - pre	Theoretical lecture	Review	2		15

and post questions					

11.Course evaluation	
1. Tests and examinations 2. Discussion 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
Fundamental of heat and mass transfer, Incropira, 7th Ed	Required textbooks (methodology, if any)
Heat Transfer a practical approach, Yunis A. Cengel 3rd Ed	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Mass transfer and the heat

Course description form

1. Course Name
heat transfer and the mass II
2. Course Code
Em Ht Maii 304109 (2+2)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-6-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
30 hours
7. Name of the course administrator (if more than one name is mentioned)

Name: Lecturer Aws Abdul Mahmoud - Ph.D Email:	
8. Course objectives	
• Introducing the student to the mechanisms of heat transfer and methods of calculating it • The student analyzes and calculates thermal loads for various engineering applications • Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management	Objectives of the study subject

System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	
9. Teaching and learning strategies	
. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits 5. E-learning and blended learning 6. Reports	The strategy
10.Course structure	

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Weekly exams - pre and post questions	Theoretical lecture	Introduction to convection heat transfer	1	3	1
Weekly exams - pre and post questions	Theoretical lecture	Forced Convection Heat Transfer	1	3	2
Weekly exams - pre and post questions	Theoretical lecture	Internal flow convection heat transfer +examples	1&2	3	3
Weekly exams - pre and post questions	Theoretical lecture	External Flow heat transfer + examples	1&2	3	4
Weekly exams - pre and post questions	Theoretical lecture	Natural convection	1&2	3	5
		Exam	1&2	3	6
Weekly exams - pre and post questions	Theoretical lecture	Heat Exchangers 1	1&2	3	7
Weekly exams - pre and post questions	Theoretical lecture	Heat exchangers 2	1&2	3	8
Weekly exams - pre and post questions	Theoretical lecture	Two-Dimensional Heat Transfer 1	1&2	3	9
Weekly exams - pre and post questions	Theoretical lecture	Two-dimensional heat transfer 2	1&2	3	10
		Exam	1&2	3	11

Weekly exams - pre and post questions	Theoretical lecture	Boiling and condensation	1&2	3	12
Weekly exams - pre and post questions	Theoretical lecture	Cooling of electronic equipment	1&2	3	13
		Exam	1&2	3	14
Weekly exams - pre and post questions	Theoretical lecture	Review	2		15

11.Course evaluation
1. Tests and examinations 2. Discussion 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students
12.Learning and teaching resources

Fundamental of heat and mass transfer, Incropira, 7th Ed	Required textbooks (methodology, if any)
Heat Transfer a practical approach, Yunis A. Cengel 3rd Ed	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Engineering analyses

Course description form

1. Course Name
Engineering analyses
2. Course Code
Em En Eai 303402 (2+0)
3. Semester/year
First semester|2023-2024

4. Date this description was prepared	
1-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
45hour	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant Professor Bashar Abed Hamza - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards	Objectives of the study subject

(Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits 5. E-learning and blended learning	The strategy

6. Reports	

10.Course structure					
Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
discussion	Lectures	First order differential equations	1	3	1
Discussion and feedback from the student	Lectures	First order differential equations	1	3	2
Discussion and feedback from the student	Lectures	First order differential equations	1	3	3
Tests	Lectures	Second-order differential equations with constant coefficients	1 & 2	3	4
Tests	Lectures	Second-order differential equations with constant coefficients	1 & 2	3	5
Tests	Lectures	Second-order differential equations with constant coefficients	1 & 2	3	6
Tests	Lectures	Series differential equations	1 & 2	3	7
Tests	Lectures	Series differential equations	1 & 2	3	8
Discussion and feedback from the student	Lectures	Fourier series	1 to 3	3	9
Discussion and feedback	Lectures	Fourier series	1 to 3	3	10

from the student					
Tests	Lectures	Fourier series	1 to 3	3	11
Tests	Lectures	Partial differential equations and boundary value problems	1 to 4	3	12
Discussion and feedback from the student	Lectures	Partial differential equations and boundary value problems	1 to 4	3	13
Discussion and feedback from the student	Lectures	Partial differential equations and boundary value problems	1 to 4	3	14
Discussion and feedback from the student	Lectures	Partial differential equations and boundary value problems	1 to 4	3	15

11.Course evaluation
1. Tests and examinations 2. Homework 3. Discussion 4. Oral presentations and defense of reports or the proposed project 5. Feedback from students
12.Learning and teaching resources

Advanced engineering mathematics, C.RAY WYLIE. 5th edition, 1982.	Required textbooks (methodology, if any)
Advanced engineering mathematics, Kreyszig, 2006.	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Waste management and energy recovery

Course description form

1. Course Name	
Waste management and energy recovery	
2. Course Code	
Em En Wmi 303907 (2+0)	
3. Semester/year	
Second semester|2023-2024	
4. Date this description was prepared	
1-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Professor Wathiq Nasser Hussein - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as	Objectives of the study subject

well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find,	

evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
1. Lectures and seminars 2. Problem-based learning 3. Project-based learning 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Experiential learning/experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Discussion	Lectures	introduction	1 &2	2	1
Discussion and feedback from the student	Lectures and discussion	Types and Composition of Solid Wastes	1&2	2	2
Tests	Lectures and discussion	=	1	2	3
Tests	Lectures	Composition of solid wastes and their determination	3	2	4
Tests	Lectures and discussion	Composition of solid wastes and their determination	3	2	5
Discussion and feedback from the student	Lectures	Separation, processing and transformation of solid waste	3	2	6

Discussion and reports	Lectures and discussion	Separation, processing and transformation of solid waste+1st exam	3	2	7
Tests	Lectures	SANITARY AND BIOREACTOR LANDFILLS	4	2	8
Discussion	Lectures	SANITARY AND BIOREACTOR LANDFILLS	4	2	9
Discussion and feedback from the student	Lectures	Biogas Characteristics	4	2	10
Tests	Lectures and discussion	Biogas characteristic	4	2	11
Tests	discussion	Energy recovery comparison	6	2	12
Tests	Lectures	Energy waste in firing system	5&6	2	13
Discussion and feedback from the student	Lectures	Energy waste in firing system	6	2	14
Examinations		Final Examination	5,6	2	

11.Course evaluation	
1. Tests and examinations 2. Discussion 3.Homework 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
1.Waste Management by Er Sunil Kumar 2. Solid Waste Management; LECTURE NOTES 3. Solid wastes Problem and Benefits by Watheq N. Hussein	Required textbooks (methodology, if any)
1.Energy Production, Conversion, Storage, Conservation, and Coupling by Yasar Dimirel	Main references (sources)

2. Solid wastes Problem and Benefits by Wateq N. Hussein solid Waste Management; LECTURE NOTES	
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Solar energy

Course description form

1. Course Name
Solar energy
2. Course Code
Em In Seii 304412 (1+2)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-9-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Assistant Professor Ali Jaber Abdel Hamid - Ph.D Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	Objectives of the study s bjec
9. Teaching and learning strategies	
1. Method of giving lectures. 2. Student groups. 3. Workshops. 4. Scientific trips to follow up on the practical reality of relevant companies. 5. E-learning on and off campus. 6. Experiential learning	T e s rateg y

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	th w e
Feedback	a lecture	Solar radiation & solar time	1	3	1
Feedback	a lecture	Solar angle	1	3	2
Feedback	a lecture	Radiation on Horizontal and inclined plane	1	3	3
Exam	a lecture	Design of solar systems, Flat plate collector (FPC)	3	3	4
Homework	a lecture	Parabolic trough collector (PTC)	3	3	5
Feedback	a lecture	Receiver tube in PTC	3	3	6
Feedback	a lecture	Geometry analysis of PTC	3	3	7
Semester exam	a lecture	Mid-term Exam	4	3	8
Feedback	a lecture	Photovoltaic Panels PV	4	3	9
Feedback	a lecture	Design of PV array	4	3	1
Exam	a lecture	Basics of wind energy conversion	4	3	1
Feedback	a lecture	Design of wind generator system, Aerodynamics of wind turbines	6	3	1
Homework	a lecture	Rotor design	6	3	1
Feedback	a lecture	Measurement of wind	6	3	1
Feedback	a lecture	Wind electric generators	6	3	1

11.Course evaluation

1. Exams
2. Continuous evaluation
3. Reports
4. Motivators
5. Feedback from students

12.Learning and teaching resources

	Required textbooks (methodology, if any)
Solar Engineering of Thermal Processes, Photovoltaic and Wind	Main references (sources)

	Recommended supporting books and references (scientific journals, reports ...)
http://ndl.ethernet.edu.et/bitstream/123456789/87792/1/A.Duffie%205th%20edition_compressed.pdf	Electronic references Internet sites

Nanotechnology and nanomaterial

Course description form

1. Course Name	
Nanotechnology and Nanomaterials	
2. Course Code	
Em En Nnii 304715 (2+0)	
3. Semester/year	
Second semester|2023-2024	
4. Date this description was prepared	
1-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant Professor Wissam Jalil Khudair - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in	Objectives of the study subject

engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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	

department's field of specialization.

- Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly.
- Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback.
- Active contribution to community service activities.

9. Teaching and learning strategies

1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits 5. E-learning and blended learning 6. Reports	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
discussion	Lectures	Introduction to nanotechnology	1	2	1
Discussion and feedback from the student	Lectures	Classification of nanomaterials	3, 4, and 6	2	2-3
Tests	Lectures	Thin film deposition	2	2	4-5

Tests	Lectures	Manufacture of nanomaterials by physical vapor deposition methods	1 and 2	2	6-7
Tests	Lectures	Manufacture of nanomaterials by chemical vapor deposition methods	1 and 2	2	8-9
Discussion and feedback from the student	Lectures	Carbon nanotubes	1-4, and 6	2	10-11
Interactive discussion	Lectures	Methods for examining nanomaterials 1	1-4, and 6	2	12-13
Reports and presentations	Lectures	Methods for examining nanomaterials 2	1-4, and 6	2	14-15

11.Course evaluation	
1. Tests and examinations 2. Discussion 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
1.Handouts from different references 2.Introduction to Nanoscale Science and Technology", Edited by Massimiliano Di Ventra, Stephane Evoy, and James R. Heflin, Jr. (Springer, 2004), ISBN: 1-4020-7720-3	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Hydrogen energy and fuel cells

Course description form

1. Course Name	
Hydrogen energy and fuel cell technology	
2. Course Code	
Em En Heii 304816 (1+2)	
3. Semester/year	
First semester|2023-2024	
4. Date this description was prepared	
1-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
75hour	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant Professor Wissam Jalil Khudair - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for	Objectives of the study subject

engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Workshops and scientific visits 5. E-learning and blended learning 6. Reports 7. Conducting practical experiments in the laboratory	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Interactive discussion	Lectures (2 theoretical + 1 discussion + 2 practical)	Introduction to hydrogen energy and fuel cell technology	1	5	1
Discussion and feedback from the student	Lectures (2 theoretical + 1 discussion + 2 practical)	Principles of electrochemical engineering 1	2, 4, and 6	5	2
Tests	Lectures (2 theoretical + 1 discussion + 2 practical)	Principles of electrochemical engineering 2	2	5	3
Discussion and feedback from the student	Lectures (2 theoretical + 1 discussion + 2 practical)	Thermodynamics of fuel cells 1	2, 4, and 6	5	4
Tests	Lectures (2 theoretical + 1 discussion + 2 practical)	Thermodynamics of fuel cells 2	2	5	5
Discussion and feedback from the student	Lectures (2 theoretical + 1 discussion + 2 practical)	Reaction kinetics in fuel cells 1	2, 4, and 6	5	6
Tests	Lectures (2 theoretical + 1 discussion + 2 practical)	Reaction kinetics in fuel cells 2	2	5	7
Interactive discussion	Lectures (2 theoretical + 1 discussion + 2 practical)	Reaction kinetics in fuel cells 3	2	5	8
Tests	Lectures (2 theoretical + 1 discussion + 2 practical)	Transition phenomena in fuel cell systems 1	2, 4, and 6	3	9
Interactive discussion	Lectures (2 theoretical + 1 discussion + 2 practical)	Transition phenomena in fuel cell systems 2	2	2	10
Discussion and reports	Lectures (2 theoretical + 1 discussion + 2 practical)	Fuel cell evaluation	3, 4, and 6	2	11
Discussion and reports	Lectures (2 theoretical + 1 discussion)	Fuel cell applications	3, 4, and 6	2	12

Tests	Lectures (2 theoretical + 1 discussion)	Polymeric fuel cell	3	2	13
Tests	Lectures (2 theoretical + 1 discussion)	Storage, production, and transportation of hydrogen	1	2	14
Discussion and reports	Lectures (2 theoretical + 1 discussion)	Fuel cell design	7	2	15

11.Course evaluation	
1. Tests and examinations 2. Discussion 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
"Fuel Cell Engines", Matthew M. Mench, 2008 by John Wiley & Sons, Inc.	Required textbooks (methodology, if any)
Fuel Cell Handbook (http://www.seca.doe.gov/tutorial/pdf/FCHandbook6.pdf)	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Fourth Stage/ 2024

Electronic capacity

Course description form

1. Course Name

Power Electronics
2. Course Code
Em En Pei 405103 (2+2)
3. Semester/year
First semester|2023-2024
4. Date this description was prepared
1-9-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
75 hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Assistant Lecturer Ahmed Mohammed Merza– Master's degree Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for	Objectives of the study subject

engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback.	

• Active contribution to community service activities.	

9. Teaching and learning strategies	
1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Introduction to Power Electronics	1	5	1
Quizzes and Tests	Lectures	Classification of electronics switching and their uses	1	5	2
Feedback and Formative Assessment	Lectures	Single phase half wave rectifier (Uncontrolled)	1	5	3
Feedback and Formative Assessment	Lectures &Active Learning	Single phase half wave rectifier (Controlled)	3	5	4
Observations	Lectures &Active Learning	Single phase full wave rectifier (Uncontrolled)	3	5	5
Self-Assessment	Lectures &Active Learning	Single phase full wave rectifier (Controlled)	3	5	6
Peer Assessment	Flipped Classroom	Three phase half wave rectifier	3	5	7
Examinations	Flipped Classroom	Three phase full wave rectifier	4	5	8

Peer Assessment	Flipped Classroom	DC Converters/DC	4	5	9
Portfolios	Inquiry-Based Learning	Buck Converter	4	5	10
Portfolios	Peer Learning	Boost Converters	4	5	11
Assignments and Projects	Reflective Learning & Experimental Learning	Introduction to Inverters	6	5	12
Assignments and Projects	Reflective Learning & Experimental Learning	Single Phase inverters	6	5	13
Rubrics and Criteria-Based Assessments	Reflective Learning & Experimental Learning	Three Phase inverters	6	5	14
Examinations		Final Examination	6	5	15

11.Course evaluation

1. Continuous calendar
2. Exams
3. Practical evaluations
4. Project evaluation
5. Oral presentations and defense
6. Peer evaluation
7. Self-evaluation and reflective journaling
8. External quality assurance

12.Learning and teaching resources

Power Electronics, Daniel W. Hart	Required textbooks (methodology, if any)
Power Electronics, Rasheed Mohan	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Nuclear Energy

Course description form

1. Course Name
Nuclear Energy
2. Course Code
Em En Nei 405507 (2+0)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-9-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
30 hours
7. Name of the course administrator (if more than one name is mentioned)
Name: Assistant Professor Wissam Jalil Khudair - Ph.D Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the	Objectives of the study subject

educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-	

evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Introduction to nuclear energy	1	2	1
Quizzes and Tests	Lectures	Nuclear reactions and mechanism of nuclear fission	1	2	2
Feedback and Formative Assessment	Lectures	Types of reactors and chain decay	1	2	3
Feedback and Formative Assessment	Lectures &Active Learning	Construction of nuclear reactors	3	2	4
Observations	Lectures &Active Learning	Reactor shielding	3	2	5
Self-Assessment	Lectures &Active Learning	Reactor materials and nuclear fuel cycles	3	2	6
Peer Assessment	Flipped Classroom	Production of uranium	3	2	7
Examinations	Flipped Classroom	Other nuclear fuels	4	2	8

Peer Assessment	Flipped Classroom	Characteristics of spent fuel	4	2	9
Portfolios	Inquiry-Based Learning	Separation of reactor products	4	2	10
Portfolios	Peer Learning	Fuel elements	4	2	11
Assignments and Projects	Reflective Learning & Experimental Learning	Principles of isotopes separation	6	2	12
Assignments and Projects	Reflective Learning & Experimental Learning	Waste disposal and radiation protection	6	2	13
Rubrics and Criteria-Based Assessments	Reflective Learning & Experimental Learning	Safety and pollution control	6	2	14
Quizzes and Tests	Lectures	Radiation hazards	6	2	15
Examinations		Final examination	1	2	16

11.Course evaluation
1. Continuous calendar 2. Exams 3. Practical evaluations 4. Project evaluation 5. Oral presentations and defense 6. Peer evaluation 7. Self-evaluation and reflective journaling 8. External quality assurance
12.Learning and teaching resources

John R. Lamarsh, Introduction to Nuclear Engineering, Third Edition, 2006.	Required textbooks (methodology, if any)
Luis E. Echavarri, Nuclear Energy Today, Second Edition, 2019	Main references (sources)
https://www.nationalgeographic.org	Recommended supporting books and references (scientific journals, reports....)
https://www.iaea.org	Electronic references, Internet sites

Control systems

Course description form

1. Course Name
Control systems
2. Course Code
Em En Csii 405709 (3+0)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-9-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45 hours
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Ahmed Walid Hussein - Ph.D Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders.	Objectives of the study subject

• Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly.	

• Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

1-Method of giving lectures. 2- Strategy Critical thinking in learning 3- Strategy High thinking 4- Strategy Brainstorming 5- Student groups 6- Workshops 7- Scientific trips to follow up on the practical reality of the nature of the work of energy control systems 8-E-learning on campus 9-Experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
1- Exams	1- Method of giving lectures	Introduction: Definitions and concepts of autonomous control, classification of control systems	5%	3	1
2- Continuous evaluation	2- Critical strategy of thinking in learning	Open and closed control systems, feedback concepts, requirements for ideal control systems	5%	3	2
3- Reports	3- High strategy of thinking	Mathematical modeling, transfer function,	5%	3	3

		mechanical systems modeling, electrical systems, electromechanical systems, thermal systems, hydraulic systems, pneumatic systems, analogue systems: voltage, current			
4- Motivators	4- strategyBrainstorming	Notable diagrams and flow charts: diagram representation, block function, diagram reduction, notable flow diagrams, and Mason's gain formula.	5%	3	4
5- Feedback from students	5- TotalsStudents	Response analysisTransient stableAnd the constant: Introduction, standard test contributions, the concept of constant time and its importance in response speed, analysis of first order and second order systems, transient response specifications, system stability	7%	3	5

		analysis - Roth standard			
	6- Workshops	Frequency response analysis using Nyquist plots, polar plots	8%	3	6
	7-Scientific trips to follow up on the practical reality of the nature of the work of energy control systems	Nyquist stability criterion, stability analysis, relative stability, gain and phase edge, circuitsM&N	8%	3	7
	8-E-learning on campus	Frequency response analysis using chartsBudd, Budd Dilution Charts, Budd Use Stability Analysis Plots, Budd Simplified Charts, Gain Margin and Phase	8%	3	8
	9-Experiential learning	Engineering shop location plans: Definition of the engineering shop root, a general ruling in favor of building the engineering shop root, analysis of engineering shop location plans.	7%	3	9
		Function of control and compensation system: types of control devices - proportional-integral-relative-	7%	3	10

		relative-integral derivation			
		Proportional integral differentiable controllers (basic concept only), feedback compensation and series, are natural tools for system compensation.	7%	3	11
		Introduction and mathematical representation of the history of robots, types of robots and the numbering, position and orientation of a solid body.	7%	3	12
		Some properties of rotation matrices, successive cycles, Euler traps, fixed frames XYZ and ZYZ effect frame. Conversion between HS, homogeneous counterparts	7%	3	13
		Features A BT, types of joints: ball joint, cylindrical joint, rotary prismatic joint, representation of connections using	7%	3	14

		Dingt parameters: connection parameters for intermediate, first and last connections, connection transformation matrices.			
		Conversion matrices3R processor, PUMA560 processor, SCARA processor	7%	3	15

11.Course evaluation	
1-Exams 2-Continuous evaluation 3-Reports 4- Motivators 5-Feedback from students	
12.Learning and teaching resources	
1- Control Engineering, Uday A. Bakshi and Varsha U. Bakshi. 2- Control Engineering, D. Ganesh Rao and K. Channa Venkatesh.	Required textbooks (methodology, if any)
Feedback and Control Systems, Joseph J. Distefano, Allen R. Stubberud and Ivan J. Williams	Main references (sources)
1. Modern Control Engineering, Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., New Delhi	Recommended supporting books and references (scientific journals, reports....)
2. Control Systems Principles and Design, M. Gopal, Tata McGraw Hill Publishing Co. Ltd., New Delhi	Electronic references, Internet sites

Bioenergy Engineering

Course description form

1. Course Name
Bioenergy Engineering
2. Course Code
Em In Bei 405406 (1+2)
3. Semester/year
First semester|2023-2024
4. Date this description was prepared
4-9-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45 hours
7. Name of the course administrator (if more than one name is mentioned)
Name: Assistant Lecturer Dhi Saadi Naji – Master's degree Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through	Objectives of the study subject

applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's	

educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Some basic concepts and definitions	1	3	1
Quizzes and Tests	Lectures	Biomass types, advantages and drawbacks, characteristics	2	3	2
Feedback and Formative Assessment	Lectures	Biomass types, advantages and drawbacks, characteristics	2	3	3
Feedback and Formative Assessment	Lectures & Active Learning	Classification and assessment of biofuels	3	3	4
Observations	Lectures & Active Learning	Classification and assessment of biofuels	3	3	5
Self-assessment	Lectures & Active Learning	Production of biogas - phases, parameters, types, designs of biogas plants	4	3	6

Peer Assessment	Flipped Classroom	Production of biogas - phases, parameters, types, designs of biogas plants	4	3	7
Examinations	Flipped Classroom	Production of biogas - phases, parameters, types, designs of biogas plants	4	3	8
Peer Assessment	Flipped Classroom	Complete, partial, and perfect biofuel combustion	4.5	3	9
Portfolios	Inquiry-Based Learning	Complete, partial, and perfect biofuel combustion	4.5	3	10
Portfolios	Lectures & Active Learning	Pyrolysis - Types - process Typical yield rates.	5	3	11
Assignments and Projects	Lectures & Active Learning	Pyrolysis - Types - process Typical yield rates.	5	3	12
Assignments and Projects	Lectures & Active Learning	Types, comparisons, applications, performance and economics of gasification	6	3	13
Rubrics and Criteria-Based Assessments	Lectures & Active Learning	Types, comparisons, applications, performance and economics of gasification	6	3	14
Assignments and Projects	Lectures & Active Learning	Revision and project	7	3	15

11.Course evaluation
1. Continuous calendar 2. Exams 3. Practical evaluations 4. Project evaluation 5. Oral presentations and defense 6. Peer evaluation
12.Learning and teaching resources

Nelson, V. C., Starcher, K. L. (2017). Introduction to Bioenergy. United Kingdom: CRC Press.	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Power stations

Course description form

1. Course Name	
Power Plants II	
2. Course Code	
Em En Ppii 406113 (1+2)	
3. Semester/year	
Second semester|2023-2024	
4. Date this description was prepared	
1-6-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Lecturer Aws Abdul Mahmoud - Ph.D Email:	
8. Course objectives	
• Introducing the student to the types of power stations and the important principles for calculating their efficiency and design • The student will be able to analyze and calculate the efficiencies of	Objectives of the study subject

parts of gas stations and design their parts	

9. Teaching and learning strategies	
1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits 5. E-learning and blended learning 6. Reports	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Weekly exams - pre and post questions	Theoretical lecture	Introduction steam turbine	1	3	1
Weekly exams - pre and post questions	Theoretical lecture	Turbine types and blades design, velocity triangle	1	3	2
Weekly exams - pre and post questions	Theoretical lecture	Reaction turbine	1&2	3	3
Weekly exams - pre and post questions	Theoretical lecture	Impulse turbine	1&2	3	4
Weekly exams - pre and post questions	Theoretical lecture	Gas Turbine components	1&2	3	5
		Exam	1&2	3	6
Weekly exams - pre and post questions	Theoretical lecture	Compressor	1&2	3	7

Weekly exams - pre and post questions	Theoretical lecture	Turbine	1&2	3	8
Weekly exams - pre and post questions	Theoretical lecture	Construction and plant layout with auxiliaries	1&2	3	9
Weekly exams - pre and post questions	Theoretical lecture	Method of improving output and performance	1&2	3	10
	Theoretical lecture	Reheater and regenerators	1&2	3	11
Weekly exams - pre and post questions	Theoretical lecture	Examples	1&2	3	12
Weekly exams - pre and post questions	Theoretical lecture	Geothermal power plants	1&2	3	13
		Exam	1&2	3	14
Weekly exams - pre and post questions	Theoretical lecture	Review	2		15

11.Course evaluation	
1. Tests and examinations 2. Discussion 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
1. Power plants engineering, R. K. 2015	Required textbooks (methodology, if any)
Applied thermodynamics for engineering technologies, Eastop, 5th ED	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Measurement systems

Course description form

1. Course Name
Instrumentation in Energy Systems
2. Course Code
Em En Iei 404901 (2+2)
3. Semester/year
First semester|2023-2024
4. Date this description was prepared
23-5-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Ahmed Walid Hussein - Ph.D Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders.	Objectives of the study subject

• Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	
9. Teaching and learning strategies	
1-Method of giving lectures. 2- Strategy Critical thinking in learning 3- Strategy High thinking 4- Strategy Brainstorming 5- Student groups	The strategy

6- Workshops 7- Scientific trips to follow up on the practical reality of the nature of the work of energy control systems 8-E-learning on campus 9-Experiential learning	

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
		Characteristics of measuring devices: Classifications of measuring devices	5%	3	1
		Characteristics of static and kinetic measuring devices	5%	3	2
		Experimental error analysis - systematic and random	5%	3	3
		Statistical analysis – inaccuracy	5%	3	4
		Experimental planning and selection of measuring instruments	7%	3	5
		Reliability on devices	8%	3	6
		Unit Two: Measures of natural quantities: Thermometer - natural properties	8%	3	7
		Temperature measuring devices	8%	3	8
		Pressure and flow measuring devices	7%	3	9
		Unit Three: - Advancing metrics techniques: tangent graphing	7%	3	10
		Internal magnetic forces	7%	3	11

		Schileren	7%	3	12
		Accelerometer Laser Doppler	7%	3	13
		Hot wire speed meter	7%	3	14
		Standards Telemetry	7%	3	15

11.Course evaluation	
1-Exams 2-Continuous evaluation 3-Reports 4- Motivators 5-Feedback from students	
12.Learning and teaching resources	
Engineering Metrology, R. K. Jain, Khanna Publishers, 1994. Mechanical Measurements, Beckwith Marangoni and Lienhard, Pearson Education, 6th Ed., 2006.	Required textbooks (methodology, if any)
1. Engineering Metrology, IC Gupta, Dhapat Rai Publications, Delhi. 2. Mechanical Measurements, R. K. Jain 3. Industrial Instrumentation, Alsutko, Jerry. D. Faulk, Thompson Asia Pvt. Ltd.2002.	Main references (sources)
Mechanical Measurements, Beckwith Marangoni and Lienhard, Pearson Education, 6th Ed., 2006.	Recommended supporting books and references (scientific journals, reports....)
1- Control Systems Principles and Design, M. Gopal, Tata McGraw Hill Publishing Co. Ltd., New Delhi Copyright Year: 2020, dissidents. 2- https://archive.nptel.ac.in/courses/112/106/112106139/	Electronic references, Internet sites

Power stations

Course description form

1. Course Name
Power Plants I

2. Course Code
Em En Ppi 405305 (2+0)
3. Semester/year
First semester|2023-2024
4. Date this description was prepared
1-6-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
30 hours
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Aws Abdul Mahmoud - Ph.D Email:
8. Course objectives

• Introducing the student to the types of power stations and the important principles for calculating their efficiency and design • The student will be able to analyze and calculate the efficiencies of parts of gas stations and design their parts	Objectives of the study subject

9. Teaching and learning strategies	
1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits 5. E-learning and blended learning 6. Reports	The strategy
10.Course structure	

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week

Weekly exams - pre and post questions	Theoretical lecture	Introduction steam power plants	1	3	1
Weekly exams - pre and post questions	Theoretical lecture	Type of cycles	1	3	2
Weekly exams - pre and post questions	Theoretical lecture	Improving the efficiency of steam power plants	1&2	3	3
Weekly exams - pre and post questions	Theoretical lecture	Open feed water heater	1&2	3	4
Weekly exams - pre and post questions	Theoretical lecture	Close feed water heater	1&2	3	5
		Exam	1&2	3	6
Weekly exams - pre and post questions	Theoretical lecture	Regenerative cycles	1&2	3	7
Weekly exams - pre and post questions	Theoretical lecture	Condensers	1&2	3	8
Weekly exams - pre and post questions	Theoretical lecture	Boilers	1&2	3	9
Weekly exams - pre and post questions	Theoretical lecture	Method of improving boilers performance	1&2	3	10
	Theoretical lecture	Pumps	1&2	3	11
Weekly exams - pre	Theoretical lecture	Examples	1&2	3	12

and post questions					
Weekly exams - pre and post questions	Theoretical lecture	Valves	1&2	3	13
		Exam	1&2	3	14
Weekly exams - pre and post questions	Theoretical lecture	Review	2		15

11.Course evaluation	
1. Tests and examinations 2. Discussion 3. Oral presentations and defense of reports or the proposed project 4. Feedback from students	
12.Learning and teaching resources	
Power plants engineering, R. K. 2015	Required textbooks (methodology, if any)
Applied thermodynamics for engineering technologies, Eastop, 5th ED	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Design of renewable energy systems I

Course description form

1. Course Name
Design of renewable energy systems I
2. Course Code
Em En Dri 405204 (2+0)

3. Semester/year
First semester|2023-2024
4. Date this description was prepared
1-9-2023
5. Available attendance forms
Weekly
6. Number of study hours (total)/number of units (total)
45hour
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Ali Muhammad Miqdad - Ph.D Email:
8. Course objectives

• Ability to establish a basis for the design and development of sustainable energy systems. • Understand the construction, operation and use of concentrated solar panels and collectors. • Demonstrate a strong understanding of mathematical modeling of energy systems. • To learn about how a solar water system works and uses additional energy to increase performance. • Learn how to select and design an appropriate power system for an application. • Understand how a hybrid energy system can be applied to achieve multiple goals.	Objectives of the study subject

9. Teaching and learning strategies	
1. Lectures and discussion 2. Problem-based learning 3. Project-based learning (student groups) 4. Seminars, workshops and scientific visits	The strategy

5. E-learning and blended learning 6. Reports	

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
discussion	Lectures	Introduction to energy systems	1	3	1
Discussion and feedback from the student	Lectures	Design and operation of solar collectors	2	6	2-3
Tests	Lectures	Solar water heating system	3-4	9	4-6
Tests	Lectures	Auxiliary power system, piping system	5	6	7-8
Tests	Lectures	Temperature control and measurement	4	6	9-10
Discussion and feedback from the student	Lectures	Energy storage system	5	6	11-12
Discussion and reports	Lectures	Geothermal system, solar space heating system	6	6	13-14
Tests	Lectures	Review and project	6	3	15

11.Course evaluation

1. Tests and examinations
2. Discussion
3. Oral presentations and defense of reports or the proposed project
4. Feedback from students

12.Learning and teaching resources

Salameh, Z. (2014). Renewable energy system design. Academic press.	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)

	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Nuclear engineering

Course description form

1. Course Name	
Nuclear engineering	
2. Course Code	
Em En Nei 405507 (2+0)	
3. Semester/year	
First semester|2023-2024	
4. Date this description was prepared	
1-6-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Lecturer Muhannad Jaber Yasser – Master's dregree Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering.	Objectives of the study subject

• Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization.	

• Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies

1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Atomic and nuclear physics	1	2	1
Quizzes and Tests	Lectures	Mass and energy	1	2	2
Feedback and Formative Assessment	Lectures	Binding energy	1	2	3

Feedback and Formative Assessment	Lectures &Active Learning	Interaction of radiation with matter	3	2	4
Observations	Lectures &Active Learning	Neutron attenuation	3	2	5
Self-Assessment	Lectures &Active Learning	Problem set_1	3	2	6
Peer Assessment	Flipped Classroom	Neutron diffusion and moderation	3	2	7
Examinations	Flipped Classroom	The equation of continuity	4	2	8
Peer Assessment	Flipped Classroom	Diffusion length	4	2	9
Portfolios	Inquiry-Based Learning	Problem set_2	4	2	10
Portfolios	Peer Learning	Nuclear reactor theory	4	2	11
Assignments and Projects	Reflective Learning & Experimental Learning	Reactor geometries	6	2	12
Assignments and Projects	Reflective Learning & Experimental Learning	One-group critical equation	6	2	13
Rubrics and Criteria-Based Assessments	Reflective Learning & Experimental Learning	Thermal reactors	6	2	14
Examinations		Final Examination	6	2	
11.Course evaluation					
1. Continuous calendar 2. Exams 3. Practical evaluations 4. Project evaluation 5. Oral presentations and defense 6. Peer evaluation					

7. Self-evaluation and reflective journaling 8. External quality assurance	
12.Learning and teaching resources	
Introduction to Nuclear Engineering John R. Lamarsh Anthony J. Baratta Third Edition. Nuclear Engineering Handbook, Frank Kreith & Roop Mahajan - Series Editors.	Required textbooks (methodology, if any)
Introduction to Nuclear Engineering John R. Lamarsh Anthony J. Baratta Third Edition.	Main references (sources)
Introduction to Nuclear Engineering - UNSW Handbook	Recommended supporting books and references (scientific journals, reports....)
https://www.amazon.com/Introduction-Nuclear-Engineering-John-Lamarsh/dp/0201824981	Electronic references, Internet sites

Energy and environment

Course description form

1. Course Name
Energy and environment
2. Course Code
Em En Eeii 405810 (2+2)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared
1-9-2023
5. Available attendance forms
weekly
6. Number of study hours (total)/number of units (total)

30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Lecturer Muhannad Jaber Yasser – Master's dregree Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001).	Objectives of the study subject

• 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	
9. Teaching and learning strategies	
1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy
10.Course structure	

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Introduction to environmental pollution	1	2	1
Quizzes and Tests	Lectures	Material balance and energy fundamentals	1	2	2
Quizzes and Tests	Lectures	Classification of pollution	2	2	3
Quizzes and Tests	Lectures	Air pollution and control methods	3	2	4
Quizzes and Tests	Lectures	Sources and effects of air pollutants	3	2	5
Quizzes and Tests	Lectures	Sampling measurement and analysis of air pollutants	3	2	6
Quizzes and Tests	Lectures	Solid waste management: sources and classification	3	2	7
Examinations	Lectures	Solid waste disposal options	4	2	8
Quizzes and Tests	Lectures	Toxic waste management	4	2	9
Quizzes and Tests	Lectures	Water pollution: sources of water pollutants	4	2	10
Quizzes and Tests	Lectures	Classification and effects of water pollutants	4	2	11
Quizzes and Tests	Lectures	Water pollution laws and standards	6	2	12
Quizzes and Tests	Lectures	Environment for comfortable living and working	6	2	13

Quizzes and Tests	Lectures	Natural and artificial lightning	6	2	14
Examinations	Lectures	Noise pollution	6	2	15

11.Course evaluation
1. Continuous calendar 2. Exams 3. Practical evaluations 4. Project evaluation 5. Oral presentations and defense 6. Peer evaluation 7. Self-evaluation and reflective journaling 8. External quality assurance

12.Learning and teaching resources	
Gilbert M. Masters, Introduction to Environmental Engineering and Science, Third edition, 2014	Required textbooks (methodology, if any)
Lee CC, Environmental Engineering Dictionary, Fourth Edition, 2005	Main references (sources)
Lawrence, K. Wang, Handbook of Environmental Engineering, 2004	Recommended supporting books and references (scientific journals, reports....)
https://sciencedirect.com	Electronic references, Internet sites

Design of renewable energy systems II

Course description form

1. Course Name
Design of Renewable Energy Systems II
2. Course Code
Em In Drii 406012 (2+0)
3. Semester/year

Second semester|2023-2024	
4. Date this description was prepared	
4-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
45hour	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Lecturer Ali Muhammad Miqdad - Ph.D Email:	
8. Course objectives	
• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national standards for laboratories and knowledge and awareness of professional	Objectives of the study subject

specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises	The strategy

5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Thermal modeling	1	3	1
Quizzes and Tests	Lectures	Thermal modeling	2	3	2
Feedback and Formative Assessment	Lectures	Solar space heating system	1.2	3	3
Feedback and Formative Assessment	Lectures & Active Learning	Solar space heating system	3,4	3	4
Observations	Lectures & Active Learning	Solar space heating system	3.4	3	5
Self-assessment	Lectures & Active Learning	Solar distillation system	1.5	3	6
Peer Assessment	Flipped Classroom	Solar distillation system	1.5	3	7
Examinations	Flipped Classroom	PV solar cell	3	3	8
Peer Assessment	Flipped Classroom	PV solar cell	3	3	9
Portfolios	Inquiry-Based Learning	PV system	4	3	10
Portfolios	Lectures & Active Learning	PV system	4	3	11
Assignments and Projects	Lectures & Active Learning	Battery thermal management systems	5	3	12

Assignments and Projects	Lectures & Active Learning	Battery thermal management systems	5	3	13
Rubrics and Criteria-Based Assessments	Lectures & Active Learning	Solar dryer system	6	3	14
Assignments and Projects	Lectures & Active Learning	Revision and project	7	3	15

11.Course evaluation
1. Continuous calendar 2. Exams 3. Practical evaluations 4. Project evaluation 5. Oral presentations and defense 6. Peer evaluation 7. Self-evaluation and reflective journaling 8. External quality assurance

12.Learning and teaching resources	
Salameh, Z. (2014). Renewable energy system design. Academic press.	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Wind energy engineering

Course description form

1. Course Name
Wind energy engineering
2. Course Code
Em En Weii 406214 (1+2)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared

4-9-2023
5. Available attendance forms
weekly
6. Number of study hours (total)/number of units (total)
30 hours
7. Name of the course administrator (if more than one name is mentioned)
Name: Lecturer Fouad Abdel Amir Khalaf - Ph.D Email:
8. Course objectives

• Teaching and training students to obtain a bachelor's degree in engineering sciences in energy engineering. • Preparing competent engineers in the field of energy engineering who meet the requirements for graduate outcomes included in the local specialized standards (national standards for engineering accreditation) and international standards (standards ABET) as well as the requirements of stakeholders. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and good educational laboratory standards (GLP) and national	Objectives of the study subject

standards for laboratories and knowledge and awareness of professional specifications standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001, and Energy Management System ISO 50001). • 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 department's field of specialization. • Participating in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the necessity of continuing self-development of professional knowledge and how to find, evaluate, compile, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-	

evaluation and benefiting from feedback. • Active contribution to community service activities.	

9. Teaching and learning strategies	
1. Lectures and seminars 2. Problem-based learning (PBL) 3. Project-based learning (PrBL) 4. Workshops and practical exercises 5. Cooperative training and job training 6. E-learning and blended learning 7. Assessment for learning 8. Experiential learning/experiential learning	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and Tests	Lectures	Some basic concepts and definitions	1	2	1
Quizzes and Tests	Lectures	Wind data analysis and resources	2	2	2
Feedback and Formative Assessment	Lectures	Wind data analysis and resources	2	2	3
Feedback and Formative Assessment	Lectures & Active Learning	Wind resource assessment and prediction	3	2	4
Observations	Lectures & Active Learning	Wind resource assessment and prediction	3	2	5
Self-assessment	Lectures & Active Learning	Momentum theory and Betz limit, ideal horizontal axis wind turbines	4	2	6
Peer Assessment	Flipped Classroom	Momentum theory and Betz limit, ideal horizontal axis wind turbines	4	2	7

Examinations	Flipped Classroom	Wind turbine aerodynamics, momentum and blade element theory, blade shape	4	2	8
Peer Assessment	Flipped Classroom	Wind turbine aerodynamics, momentum and blade element theory, blade shape	4	2	9
Portfolios	Inquiry-Based Learning	HAWT rotor design procedure, Optimum performance calculation	5	2	10
Portfolios	Lectures & Active Learning	HAWT rotor design procedure, Optimum performance calculation	5	2	11
Assignments and Projects	Lectures & Active Learning	System analysis and control algorithms, integration and operation of wind farms	5	2	12
Assignments and Projects	Lectures & Active Learning	System analysis and control algorithms, integration and operation of wind farms	5.6	2	13
Rubrics and Criteria-Based Assessments	Lectures & Active Learning	Wind energy economic assessment	6	2	14
Assignments and Projects	Lectures & Active Learning	Revision and project	7	2	15
11.Course evaluation					
1. Continuous calendar 2. Exams 3. Practical evaluations 4. Project evaluation 5. Oral presentations and defense 6. Peer evaluation 7. Self-evaluation and reflective journaling 8. External quality assurance					
12.Learning and teaching resources					

Understanding Wind Power Technology: Theory, Deployment and Optimization. (2014). Germany: Wiley.	Required textbooks (methodology, if any)
Handouts from different references	Main references (sources)
	Recommended supporting books and references (scientific journals, reports....)
	Electronic references, Internet sites

Energy system modeling and simulation

Course description form

1. Course Name	
Energy system modeling and simulation	
2. Course Code	
Em En Msii 406315 (2+0)	
3. Semester/year	
Second semester|2023-2024	
4. Date this description was prepared	
1-6-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
120 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Lecturer Sabah Odeh Abdel Amir- Ph.D	Email:
8. Course objectives	
• Teaching and training students to obtain a Bachelor of Engineering Science degree in Energy Engineering.	Objectives of the study subject

• Preparing qualified engineers in the field of energy engineering who meet the requirements for graduate outcomes included in specialized local standards (National Standards for Engineering Accreditation) and international standards (Standards for Engineering Accreditation).ABET) as well as stakeholder requirements. • Applying educational quality standards in preparing curricula and other requirements of the educational process through applying national standards for engineering accreditation, specialized international standards, and educational laboratory quality standards (GLP) and national laboratory standards and knowledge and awareness of professional standards (Occupational Safety and Health Management System ISO 45001, Environmental Management System ISO 14001 and Energy Management System ISO 50001). • Effective 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 department's field of specialization. • Participation in spreading engineering awareness, holding scientific courses, field visits to manufacturing laboratories, and the ability to recognize the need to continue self-development of professional knowledge and how to find, evaluate, collect, and apply it correctly. • Continuous improvement in all aspects of the department's educational program is achieved by applying the principle of self-evaluation and benefiting from feedback. • Effective contribution to community service activities.	

9. Teaching and learning strategies	
1.Lectures:Traditional classroom lectures can provide a structured introduction to basic concepts, theories, and methodologies. Lectures can be supplemented with multimedia presentations, info graphics and real-world examples to enhance understanding. 2. Studies the condition: Analyzing case studies of real energy systems can help students apply theoretical knowledge to practical scenarios. Discussing the challenges encountered and solutions implemented in these cases can deepen understanding. 3. Workshops the operation: Organizing practical workshops where students can work with simulation software (example, MATLAB and Pythonand specialized energy simulation tools) to create models and analyze energy systems. 4. Speakers Guests: Invite guest speakers from the energy industry or academia to share their expertise and real-world experiences. This can provide students with insight into industry practices and current trends.	The strategy Teaching Methods

5. Discussions the group: Engage students in group discussions to explore topics in more depth. Encourage them to analyze energy systems more closely monetary, and discuss the positives and the negatives, and suggest solutions. 6. Offers Interactivity :Use demonstrations or interactive experiments to demonstrate the principles of a system energy, Such as how different energy sources work or the behavior of energy storage systems. 7. Solution sessions the problems: Conduct sessions where students work through complex energy system problems as a group or individually. This encourages critical thinking and application of concepts. 8. Resources via Internet: Use online resources such as videos, podcasts, and interactive simulations to supplement traditional teaching methods. Online resources can cater to different learning styles. 1. Study Independent: Encourage students to read relevant textbooks, research papers, and articles. This promotes self-directed learning and deeper engagement with the subject matter. 2. Exercises practical: Assign simulation exercises and programming tasks to allow students to apply theoretical concepts practically. This builds skills in modeling and analysis. 3. Projects the group :Assign group projects where students collaborate to create comprehensive models of the energy system. This helps them develop teamwork skills and apply knowledge to real-world scenarios. 4. Learn from Peers: Organize peer review sessions where students provide feedback on each other's projects, models, or presentations. This encourages critical evaluation and communication skills. 5. Solution-based learning the problems: Presenting real-world energy challenges to students and guiding them to research, analyze, and propose solutions. This approach enhances problem-solving skills. 6.Offers:Assign students topics or case studies and have them present their findings to the class. This enhances communication skills and deepens understanding through peer learning.	Learning methods

7. Simulation Interactivity :Integrate interactive simulations and virtual laboratories to allow students to experiment with energy system models and observe their behavior. 8. Field trips and visits Field: If so possible, Organize visits to power generation facilities, storage sites or distribution centers. This provides a realistic context and promotes experiential learning.	

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Quizzes and tests	Lectures	Unit 1: Introduction to energy systems and modeling • Overview of power systems and their components • Energy sources and their characteristics • The importance of modeling and simulation in energy analysis	1	2	1
Quizzes and tests	Lectures	Unit 2: Mathematical and computational tools • Differential equations and their role in energy system modeling • Numerical methods for solving differential equations • Introduction to optimization techniques in power systems • Programming languages and power system simulation tools	1	2	2
Feedback and formative assessment	Lectures	Unit 3: Modeling of power generation technologies • Modeling renewable energy sources (energysolar,energywind,energyaquatic,etc) • Modeling conventional energy sources (fossil and nuclear fuels)	1	2	3

		• Case studies of power generation technologies			
Feedback and formative assessment	Lectures and active learning	Unit 4: Modeling energy conversion and storage • Thermodynamic modeling of energy conversion processes • Modeling of energy storage systems (batteries,Storagethermal,etc) • Dynamic behavior and transient analysis of energy storage systems	3	2	4
Notes	Lectures and active learning	Unit 5: Energy Distribution and Integration • Modeling of energy transmission and distribution systems • Integration of multiple energy sources and technologies • Control strategies for efficient power system operation	3	2	5
self-evaluation	Lectures and active learning	Unit 6: Environmental and Economic Analysis • Energy systems life cycle assessment (LCA) • Economic modeling and cost analysis • Sustainability considerations and environmental impact assessment	3	2	6
Peer evaluation	Flipped classroom	Unit 7: Dynamic Simulation and Transient Analysis • Dynamic simulation of energy systems • Transient analysis of system behavior • Case studies of system response to changing conditions	3	2	7
Tests	Flipped classroom	Unit 8: Advanced Topics and Emerging Trends	4	2	8

		• Stochastic modeling and uncertainty analysis • Model validation and verification techniques • Multi-objective optimization in power system design • Emerging trends in energy modeling and simulation			
Peer evaluation	Flipped classroom	Unit 9: Case studies and real-world applications • In-depth analysis of real power system case studies • Grid integration simulation for renewable energy sources • Energy system modeling for policy analysis and decision making	4	2	9
Governor	Inquiry-based learning	Unit 10: Student projects and practical exercises • Practical simulation exercises using relevant software • Small-scale energy system modeling projects with real-world relevance • Presentation and discussion of student projects	4	2	10
Governor	Peer learning	Unit 11: Communication and presentation skills • Effective communication of simulation results and results • Presentation skills to convey complex technical information	4	2	11
Tasks and projects	Reflective learning and experiential learning	Unit 12: Review and final evaluation • Review the main concepts and methodologies covered in the course • Preparing for the final assessment (presentations the project, exams ,etc.)	6	2	12

Tasks and projects	Reflective learning and experiential learning	• Assignments and quizzes throughout the course (20%) • Practical exercises and simulation tasks (15%) • Midterm exam (20%) • Group projects and presentations (25%) • Class participation and communication skills (10%) • Final project and presentation (10%)	6	2	13
Tests		final exam	6	2	

11.Course evaluation

Assessment methods are essential to assess students' understanding, skills and progress in a course. For a course on “Modeling and Simulation of Energy Systems" ,a combination of assessment methods can provide a comprehensive view of students' abilities. Here are some evaluation methods that can be used:

1. Duties and tests:
- Regular assignments and tests can assess students' understanding of theoretical concepts and mathematical foundations.
- Assigning programming tasks related to energy system modeling to evaluate practical skills.
- Quizzes can be used to test specific topics covered in lectures or readings.

2. practical exercises :
- Assign simulation exercises where students create energy system models and analyze their behavior using simulation software.
- Evaluating the accuracy of its models, the suitability of its simulations, and its ability to explain the results.

3.Tests:
- The midterm and/or final examination can evaluate students' understanding of the basic concepts, theories and principles covered in the course.
- Design questions that require critical thinking and problem-solving skills rather than just memorization.

4. Projects the group:

Assign group projects where students work together to develop comprehensive energy system models based on real-world scenarios.
- Evaluate their ability to integrate components different, and improve performance the system, and present their findings.

5.Offers:
- Have students present their simulation results, project results, or case study analyzes to the class.
- Evaluation of communication skills they have ,the ability to explain concepts complex, and their ability to present data effectively.

6. class participation
- Evaluate student participation in class discussions, workshops, and peer review sessions.
Active participation can demonstrate their understanding and willingness to engage with the topic.

7. The project final:
- Design a comprehensive final project that requires students to apply their knowledge of energy system modeling to solve a complex problem.
- Assess their ability to create accurate models, analyze scenarios, and provide meaningful results.

8. review Peers:
- Incorporating peer evaluation into projects collective, students provide feedback on each other's work.
- This can encourage critical evaluation and enhance collaboration and communication skills.

9. Written Reports :
- Asking students to submit written reports on assignments, projects, or simulations.
- Assess their ability to convey their analyses, results, and conclusions clearly and accurately.

10. Tests or discussions via Internet:
- Use online platforms to conduct tests or discussions to facilitate continuous assessment.
- These platforms can provide immediate feedback and encourage ongoing engagement.

11. Exams the operation:

- Conduct practical tests where students demonstrate their ability to create and run simulations in real time.
- Evaluate their proficiency in using simulation programs and applying modeling techniques.

12.Learning and teaching resources

Required textbooks (methodology, if any)	
1.."Introduction to Modeling and Analysis of Complex Systems" by Hiroki Sayama. This book provides a general introduction to systems modeling complex, including systems energy, it covers different modeling techniques and approaches. 2.."Energy Systems Engineering: Evaluation and Implementation" by Francis Vanek, Louis Albright, and Largus Engineer. - Provides a comprehensive overview of the systems energy, Including modeling, analysis and implementation. It covers both conventional and renewable energy sources. 3.."Energy Systems Analysis and Management" by Francis Vanek and Louis Albright. - Focuses on systems analysis and management energy, it covers modeling energy, and improvement ,and sustainability aspects. 4.."Modeling and Simulation of Dynamical Systems" by Robert L. Woods and Kent L. Lawrence. - This textbook provides a solid foundation in dynamic system modeling and techniques simulation, Which is highly applicable to power system analysis.	

5..“Renewable Energy Systems: A Smart Energy Systems Approach to Selecting and Modeling 100% Renewable Solutions” by Henrik Lund. - Covers modeling and analysis of renewable energy systems and their integration into the energy mix. 6..“Energy Systems: A New Approach to Thermodynamic Engineering” by Peter W. Bridgman. - Provides an engineering perspective on energy systems, thermodynamics and conversion processes energy, which provides a strong basis for modeling. 7..“Energy Conversion” by Dr. Yogi Goswami and Frank Krith. - Focuses on conversion principles energy ,including modeling and simulation of various energy conversion technologies. 8..“Introduction to Energy and the Environment” by Vincenzo Bianco and Paolo Ciano. - Covers the basics of energy systems, energy sources and their environmental impact. It includes modeling aspects related to sustainability. 9..“Energy Economics: Concepts, Issues, Markets and Governance” by Subhes C. Bhattacharyya. While this book focuses primarily on...Economy, Explores energy system modeling in the context of economic analysis. 10..“Applied Energy: An Introduction” by Muhammad Omar Abdullah.	

- Provides an introduction to various energy sources, conversion technologies, and modeling techniques for energy systems.	
"Energy Systems and Sustainability: Energy for a Sustainable Future" by Bob Everett, Godfrey Boyle and Stephen Beck This reference covers various aspects of energy systems, sustainability and modeling approaches.	Main references (sources)
"Applied Mathematical Methods for Engineers" by Louis A. Pipes and Lawrence R. Harvill An in-depth resource for mathematical methods and techniques commonly used in energy system modeling.	Recommended supporting books and references (scientific journals, reports....)
1.. International Energy Agency (IEA). - [Website] (https://www.iea.org/) The IEA provides a wealth of data, reports and analyzes related to energy systems, including renewable energy, energy efficiency and energy technology roadmaps. 2. US Energy Information Administration (EIA). - [Website] (https://www.eia.gov/) The EIA provides comprehensive data on energy production, consumption and trends, as well as analyzes and reports on energy markets and policies. 3..National Renewable Energy Laboratory (NREL). - [Website] (https://www.nrel.gov/) The NREL website offers a range of resources on energy technologies renewable, including research papers, reports and simulation tools.	Electronic references, Internet sites

4..European Commission Joint Research Center (JRC). - [Website] (https://ec.europa.eu/jrc/en) - The JRC provides research, data and modeling tools related to energy and environmental issues within the European Union. 5..Energy Information Exchange (EiX). - [Website] (https://energyinformatics.eu/) EiX is a platform that provides energy-related datasets, tools and resources for energy research and education. 6..Energy Plus. - [Website] (https://energyplus.net/) Energy Plus is a building energy simulation software that can be used to model and analyze the energy consumption and thermal performance of buildings. 7..Homer Energy. - [Website] (https://www.homerenergy.com/) HOMER is software to improve small and distributed energy system design and decision making. 8..System Advisor Model (SAM). - [Website] (https://sam.nrel.gov/) SAM is a performance and financial model designed to facilitate decision making for renewable energy projects. 9..PLEXOS® integrated energy model. - [Website] (https://www.energyexemplar.com/plexos/) PLEXOS is a software widely used for market simulation and analysis energy,	

including the integration of different energy sources. 10..MIT Open Course Ware (OCW) - Energy Cycles. - [Website] (https://ocw.mit.edu/index.htm) - MIT OCW provides free access to course materials from various related courses with energy ,including lectures, assignments and readings. 11..Power Courses Coursera and EDX. - [Coursera] (https://www.coursera.org/) | [edX] (https://www.edx.org/) - Offering online platforms such as Coursera AndedXA group of related training courses with energy, some of which provide free access to course materials. 12..The world of renewable energy. - [Website] (https://www.renewableenergyworld.com/) - This site provides news, articles and insights related to renewable energy technologies, policies and trends.	

English Language

Course description form

1. Course Name
English
2. Course Code
Em En EIV 101616 (2+0)
3. Semester/year
Second semester|2023-2024
4. Date this description was prepared

1-9-2023	
5. Available attendance forms	
Weekly	
6. Number of study hours (total)/number of units (total)	
30 hours	
7. Name of the course administrator (if more than one name is mentioned)	
Name: Assistant professor Rusul Dawood Salman – Master's degree Email:	
8. Course objectives	
• Developing reading, writing, speaking and listening language skills English. • Presentation theoretical study comprehensive information about how the student learns and develops his skills. • Providing an overview of various important issues related to the English language that helps the student communicate easily with others. • Application of theoretical aspects and that by allowing the student to practice the language and encouraging him to speak with foreigners. • • Giving students the ability to express their opinions and participate in discussions • Using digital means and tools to contribute to the formation and interpretation of meanings required.	Objectives of the study subject
9. Teaching and learning strategies	

1. Lectures and seminars 2. Audio recording method 3. Assessment for learning 4. Learn the language of the community 5. Communicative language teaching	The strategy

10.Course structure

Evaluation method	Learning method	Name of the unit or topic	Learning Outcomes required	hours	the week
Feedback	Lectures	Introduction – Giving general information about the English Language	1	2	1
Quizzes and Tests	Lectures	Speaking (paired choice) asking about the general opinions about possible issues	1	2	2
Feedback and Formative Assessment	Lectures	Speaking (campus announcement & general conversation) report on the speaker's opinion & explain why he/she feels that way	1	2	3
Feedback and Formative Assessment	Lectures & discussions	Integrated speaking (Academic reading & Lecture) explaining the academic topics & describing the main points in it.	3	2	4
Observations	Lectures & oral practices	Listening to engineering conversations to	3	2	5

		obtain a wide vocabulary			
Self-assessment	Lectures & Active Learning	Listening to various videos concerning the engineering fields such as: (Mechanical engineering, electrical engineering in addition to renewable energies).	3	2	6
Peer Assessment	Practicing Language	Mid-term Exam	3	2	7
Examinations		Writing (learning students how to write essays on the engineering field)	4	2	8
Peer Assessment	Lecture and test	Writing (enabling students to write their opinion about specific academic topics in general or write about engineering subjects in particular).	4	2	9
Portfolios	Inquiry-Based Learning	Speaking (making the students sum up the main points of the lecture that is previously delivered)	4	2	10
Portfolios	Peer learning	Speaking (increasing the student's ability to speak fluency	4	2	11

		and increasing its rate)			
Assignments and Projects	Reflective Learning & Experimental Learning	Listening (encourage the student to make inferences from what he/she heard before)	6	2	12
Assignments and Projects	Reflective Learning & Experimental Learning	Listening (ask the student what the speaker implies in his/her speech)	6	2	13
Rubrics and Criteria-Based Assessments	Reflective Learning & Experimental Learning	Writing (ask the student to write the essential information in the highlighted sentences in a paragraph and make paraphrasing in to those sentences)	6	2	14
Examinations		Final Examination	6	2	15

11.Course evaluation	
12.Learning and teaching resources	
New Headway Plus The author: John & Liz Soars TOEFL Practice Online The official practice test that can help you go anywhere	Required textbooks (methodology, if any)
The Cambridge Encyclopedia of the English Language by David Crystal	Main references (sources)
Ciedupress.com/journal/index. Php / wjel	Recommended supporting books and references (scientific journals, reports....)
https://www.cambridge.org./	Electronic references, Internet sites