



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Renewable Energy		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	RE 402			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	4	Semester of Delivery		7
Administering Department	PM	College	TEMO	
Module Leader	Firas Aziz Ali		e-mail	firasaziz@ntu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.	
Module Tutor	Name (if available)		e-mail	
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date	01/6/2023	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	The main purpose of this course is to introduce students with renewable energy resources availability, potential and suitability as a substitute for conventional energy resources in future energy demand. Having completed the courses, the student should have Knowledge: Advanced knowledge about different renewable energy resources. Advanced knowledge about potential of using renewable energy technologies as a complement to and to the extent possible, replacement for conventional technologies, and possibilities to combine renewable and non-renewable energy technologies in hybrid systems. Knowledge about strategies for enhancing the use of renewable energy resources for future demand. Skills: Analysis on importance of renewable energy solutions for sustainable development.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. demonstrate an ability to use critical thinking and problem-solving skills to evaluate business energy use and how and when to apply renewable energy solutions 2. demonstrate an understanding of, and assess the obstacles associated with implementation of renewable energy systems 3. evaluate the advantages, limitations and potential of various clean energy sources for buildings and businesses 4. demonstrate an understanding and familiarity with engineering and financial aspects of projects 5. demonstrate an understanding and familiarity with the regulatory aspects of renewable energy projects
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A -</u> Energy Sources and Environmental Effects [15 hrs] Solar Photovoltaics: o Solar Power Systems - Electrical o Solar Power Systems - Thermal [15 hrs] Wind Power Fundamentals o Wind Power Systems o Wind Turbine Control [15 hrs] Biomass Technologies, Geothermal Power Generation [6hrs] <u>Part B –</u> Fundamentals to understand the class project based on technology to be selected o Generators [15 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The major approach used to offer this module will be to promote student engagement in the exercises while also enhancing and broadening their critical thinking abilities. This will be accomplished through lectures, interactive tutorials, and the consideration of various sorts of easy experiments incorporating some engaging sampling exercises for the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	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 8	LO #1, #2 and #5
	Assignments	2	10% (10)	3 and 14	LO #3 and #4
	Projects / Lab.	14	20% (20)	Continuous	All
	Report				
Summative assessment	Midterm Exam	3hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		



Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Renewable energy, definition and Resources
Week 2	Solar energy, solar constant, and Solar radiation at earth`s surface
Week 3	Solar energy, solar constant, and Solar radiation at earth`s surface
Week 4	Global Radiation (Beam and Diffuse) Radiation Components
Week 5	Absorbed Solar Energy
Week 6	Concentrating collectors, part A
Week 7	Concentrating collectors, part B
Week 8	Solar Space Heating Systems
Week 9	Solar Space Cooling Systems
Week 10	Hydro-electric power plant
Week 11	Types of Hydraulic Turbines
Week 12	Introduction to Wind turbines
Week 13	Classification of Wind Turbines
Week 14	Introduction to Geothermal Energy
Week 15	Ocean Energy Conversion Technologies (Waves, Currents, and Tides)

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction solar radiation measurement instruments
Week 2	Estimating the useful heat or heat gain using solar water heater
Week 3	Estimating the useful heat or heat gain using solar air heater
Week 4	Estimating the amount of Distilled water using solar distillation unit
Week 5	Estimating the useful heat or heat gain using solar chimney device
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Renewable Energy: Law, Policy and Practice (American Casebook Series) 2nd Edition, 2021	No
Recommended Texts	Solar Energy Engineering Processes and Systems Second Edition, 2014	No
Websites	https://www.linquip.com/ Linquip Content Management Team	

Grading Scheme

مخطط الدرجات

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

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

Code	Course/Module Title	ECTS	Semester
RE 402	Renewable Energy	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	72
Description			
A course on Renewable energy . Includes the following sections: Worldwide, increased focus on sustainable development has led to sharp rise in development of solar power projects. As solar power is a clean and renewable energy option, countries are promoting its large-scale usage wherever possible. Technology improvements, mass manufacturing and innovative financing mechanisms have made solar power achieve grid parity in many countries. Thus, with reduced solar power prices and dependable electricity storage options, large-scale integration of solar power to the grid has been planned. This has opened up numerous job opportunities worldwide. In this course, students will be engaged to help them acquire technical and commercial knowledge and skills associated with solar power development and management. Classroom activities will be designed to encourage students to play an active role in the construction of their own knowledge and in the design of their own learning strategies. We will combine traditional lectures with other active teaching methodologies, such as group discussions, cooperative group solving problems, quizzes, presentations, etc. Class participation is a fundamental aspect of this course. Students will be encouraged to actively take part in all group activities and to give an oral group presentation. Students will be expected to interact with media resources, such as, web sites, YouTube videos, blogs, and newspapers articles.			