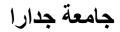
# Jadara University





# **COURSE DESCRIPTIONS**

Faculty	Engineering					
Department	Renewable Energy Engineering			NQF level 7		
Course Title	Energy Resources	Code	703539 <b>Prerequisite</b> 70343		703434	
Credit Hours	3	Theory	Theory <b>Practical</b> none		none	
Course Leader	Dr. Jamal Alsadi	email	j.alsadi@jadara.edu.jo			
Lecturers	Dr. Amer Al-Canaan	emails	a.alcanaan@jadara.edu.jo			
Lecture time	11:00-12:15	Classroom	Attendand		On campus	
Semester	Summer 2021/2022	Production	2021 <b>Updated</b> 2022		2022	

#### **Short Description**

This course will cover the types of most common conventional fuels and the basic principles to energy. Survey of energy technologies including: biomass energy, biofuels and fuel cells. Topics in this course include understanding the uses of Geothermal Energy in Heating, cooling, generating electricity, hydroelectric, nuclear, solar and wind energy, Heat transfer and energy conversion, solar radiation energy and thermal technologies including: wind energy and Nuclear energy. The course also provides an overview of solar thermal technologies and characteristics of sunlight, PV photovoltaic systems.

# **Course Objectives**

- 1. Get acquainted with the various sources of energy: hydrocarbon, nuclear, solar, biomass, geothermal, tidal, ..etc.
- 2. Gain understanding of the physical principles underlying energy production, storage, transport and usage.
- 3. Understand the operation of the direct generating energy methods such as wind energy, solar and nuclear.
- 4. Describe energy sources and maximise available energy.
- 5. Gain ability to recognise ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.

# **Learning Outcomes**

# A. Knowledge - Theoretical Understanding

a.1 Learn/understand the basic characteristics of energy resources and their units. (K1)

#### **B. Knowledge - Practical Application**

**a.2** Compare between different energy resources in terms of several criteria including applications, conversion efficiency, cost, storage, technology and efficiency. (K2)

#### C. Skills - Generic Problem Solving and Analytical Skills

**b.1 Calculate** various quantities related to energy conversion, power consumption and other values related to energy resources. (S1)

# **D.** Skills - Communication, ICT, and Numeracy

**b.3** Conduct group work, write technical reports related to energy resources and perform oral presentations. (S3)

# E. Competence: Autonomy, Responsibility, and Context

#### **Teaching and Learning Methods**

E-learning (Blackboard), Engaged learning, Problem based learning (PBL), and Project based learning:

#### **Assessment Methods**

Class Participation and Assignments

Term Project/Presentation

HW

Quizzes

Midterm Exam

Final Exam

	Course Contents					
Week	Hours	CLOs	Topics	Teaching & Learning Methods	Assessmen t Methods	
1.	5	al	<ul><li>1-1-Principles of energy resources, Energy classification,</li><li>1-2 introductions</li></ul>	Lectures, presentations		
2.	5	a1	2-2-Energy Basics, resources of non- renewable energy Basic Thermal Energy Heat transfer	Lectures, presentations		
3.	4.5	a2, b1, b3	Fossil Fuels Hydrogen, fuel cells, batteries, super capacitors,	Lectures, presentations	Group work #1	

			and hybrids		Quiz #1
4.	4	a1, a2, b1	Oil shale Forms of Energy Energy Conversion <b>Midterm exam</b>	Lectures, presentations	Midterm exam
5.	4.5	a1, a2, b1	Solar energy	Lectures, presentations	Quiz #2
6.	5	a1, a2, b1, b3	wind energy Fuel cell	Lectures, presentations	Group work #2
7.	5	a1, a2, b1	Energy storage	Lectures, presentations	
8.	2	a1, a2, b1	Energy storage Review Final Exam	Lectures	Final exam

Infrastructure					
Textbook	<ol> <li>Renewable Energy Resources, John Twidell and Tony Weir, 3<sup>rd</sup> edition, 2015, ISBN 9781315766416.</li> <li>Understanding Renewable Energy Systems, Volker Quaschning, 2<sup>nd</sup> edition, 2016, ISBN: 9781315769431</li> </ol>				
	<ul> <li>Introduction to Nuclear Engineering, John R. Lamarsh and Anthony J. Baratta, Third edition, Prentice-Hall, Inc., 2011</li> </ul>				
	□ Reactor Physics, IAEA 2004				
	<u>http://www-ns.iaea.org/tutorials/reactor-physics/chapitres/chapters.pdf</u>				
References	□ Fusion				
	http://www-pub.iaea.org/books/iaeabooks/8879/Fusion- Physics				
	□ Additional Reference:				
	http://www.ucsusa.org/clean_energy/our-energy- choices/renewable-energy/environmental-impacts-of.html				

Required reading	Energy Economics: Concepts, Issues, Markets and Governance by Bhattacharyya, Subhes C
Electronic materials	BB learn presentation and handout
Other	

Course Assessment Plan							
Assessment Method		Grade	CLOs				
			a1	a2	b1	b3	
First (Midterm)		30%	10	12	8		
Second (if applicable)							
Final Exam		50%	11	11	17	11	
Coursework		20%					
Coursework assessment methods	Assignments						
	Case study						
	Discussion and interaction						
	Group work activities						
	Lab tests and assignments						
	Presentations/report					10	
	Quizzes		5		5		
Total		100%	26	22	30	21	

#### Plagiarism

Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).

Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.