



## Course Specifications

<b>Course Title:</b>	<b>Energy and Environment</b>
<b>Course Code:</b>	<b>ENS 205</b>
<b>Program:</b>	Environmental Sciences Program
<b>Department:</b>	Environmental Sciences Department
<b>College:</b>	Faculty of Meteorology, Environment and Arid Land Agriculture
<b>Institution:</b>	King Abdulaziz University

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## A. Course Identification

<b>1. Credit hours:</b> 2 h			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered:</b> 4 <sup>th</sup> Level / 2 <sup>nd</sup> Year			
<b>4. Pre-requisites for this course (if any):</b> ENS 100			
<b>5. Co-requisites for this course (if any):</b> None			

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	70%
2	Blended	-	-
3	E-learning (computer assisted instruction)	-	30%
4	Correspondence	-	-
5	Other	-	-

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	-
2	Laboratory/Studio	-
3	Tutorial	-
4	Others (specify)	-
	<b>Total</b>	-
<b>Other Learning Hours*</b>		
1	Study	-
2	Assignments	-
3	Library	-
4	Projects/Research Essays/Theses	-
5	Others (specify)	-
	<b>Total</b>	-

\* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

### 1. Course Description:

This course covers the following topics:

1. Global patterns in energy production and consumption.
2. Fundamentals of electricity generation.
3. Fossil fuel current reserves.
4. The main pollutants from fossil fuels and the current status of technology to reduce their emissions from power plants and cars.
5. Nuclear power plants and their environmental effects.
6. Energy flow of the Earth.
7. Alternative sources of energy:  
Solar power, Wind power, Hydroelectric power, Tidal power, Wave power, Ocean thermal energy conversion, Geothermal power, Biomass, Energy crops and Hydrogen combustion and fuel cells.
8. The operating principle, current status of the technology and environmental impact of alternative energy sources.

### 2. Course Main Objective

At the end of this course it is expected that students will be able to explain the physical and technological principles of energy supply systems based on fossil, nuclear and renewable sources, and discuss the environmental problems associated with energy use and how they might be resolved by technological measures.

The course lectures can be partially posted in the of form of PDF or power point presentations on the website of faculty member responsible for the course that could be accessed by the students enrolled in the course.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge:</b>	
<b>1.1</b>	<b>Define Fundamentals of electricity generation.</b>	
<b>1.2</b>	<b>Explain the environmental effects of fossil fuel combustion.</b>	
<b>1.3</b>	<b>Define the environmental effects of nuclear energy.</b>	
<b>1.4</b>	<b>Outline alternative energy sources.</b>	
<b>2</b>	<b>Skills :</b>	
<b>2.1</b>	<b>Explain the physical and technological principles of energy supply systems.</b>	
<b>2.2</b>	<b>Interpret the environmental problems associated with energy use.</b>	
<b>2.3</b>	<b>Outline technological measures for environmental problems</b>	

CLOs		Aligned PLOs
	associated with energy use.	
2.4	Analyze problems in energy and environment.	
3	Competence:	
3.1	Demonstrate independent role and as part of a team.	
3.2	Assess resources, time and cooperate with the other members of the group.	
3.3	Show results of work to others.	
3.4	Operate computational tools	
3.5	Evaluate and criticize reports	

### C. Course Content

No	List of Topics	Contact Hours
1	Global patterns in energy production and consumption.	2
2	Fundamentals of electricity generation.	2
3	Fossil fuel current reserves.	2
4	The main pollutants from fossil fuels and the current status of technology to reduce their emissions from power plants and cars.	8
5	Nuclear power plants and their environmental effects.	4
6	Energy flow of the Earth.	2
7	Alternative sources of energy: Solar power, Wind power, Hydroelectric power, Tidal power, Wave power, Ocean thermal energy conversion, Geothermal power, Biomass, Energy crops and Hydrogen combustion and fuel cells.	6
8	The operating principle, current status of the technology and environmental impact of alternative energy sources.	4
Total		30

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		
1.1	Define Fundamentals of electricity generation.	<ul style="list-style-type: none"> <li>• Explanations and examples given for each topic in class lectures.</li> <li>• Homework assignments</li> </ul>	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>Midterm and final exams</li> </ul>
1.2	Explain the environmental effects of fossil fuel combustion.	<ul style="list-style-type: none"> <li>• Explanations and examples given for each topic in class lectures.</li> <li>• Homework</li> </ul>	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>• Midterm and final exams</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		assignments	
1.3	Define the environmental effects of nuclear energy.	<ul style="list-style-type: none"> <li>• Explanations and examples given for each topic in class lectures.</li> <li>• Homework assignments</li> </ul>	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>Midterm and final exams</li> </ul>
1.4	Outline alternative energy sources.	<ul style="list-style-type: none"> <li>• Explanations and examples given for each topic in class lectures.</li> <li>• Homework assignments</li> </ul>	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>Midterm and final exams</li> </ul>
1.5	Describe basic principles of control technologies.	<ul style="list-style-type: none"> <li>• Explanations and examples given for each topic in class lectures.</li> <li>• Homework assignments</li> </ul>	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>• Midterm and final exams</li> </ul>
2.0	<b>Skills</b>		
2.1	Explain the physical and technological principles of energy supply systems.	<ul style="list-style-type: none"> <li>• Homework assignments</li> </ul> Problem solving.	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>• Midterm and final exams</li> </ul>
2.2	Interpret the environmental problems associated with energy use.	<ul style="list-style-type: none"> <li>• Homework assignments</li> </ul> Problem solving.	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>• Midterm and final exams</li> </ul>
2.3	Outline technological measures for environmental problems associated with energy use.	<ul style="list-style-type: none"> <li>• Homework assignments</li> <li>• Problem solving.</li> </ul>	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>• Midterm and final exams</li> </ul>
2.4	Analyze problems in energy and environment.	<ul style="list-style-type: none"> <li>• Homework assignments</li> <li>• Problem solving.</li> </ul>	<ul style="list-style-type: none"> <li>• In class short quizzes</li> <li>• Midterm and final exams</li> </ul>
3.0	<b>Competence</b>		
3.1	Demonstrate independent role and as part of a team.	<ul style="list-style-type: none"> <li>• Writing group reports.</li> </ul> Solving problems in groups.	<ul style="list-style-type: none"> <li>• Grading homework assignments</li> <li>Discussing results</li> </ul>
3.2	Assess resources, time and cooperate with the other members of the group.	<ul style="list-style-type: none"> <li>• Writing group reports.</li> </ul> Solving problems in groups.	<ul style="list-style-type: none"> <li>• Grading homework assignments</li> <li>Discussing results</li> </ul>
3.3	Show results of work to others.	<ul style="list-style-type: none"> <li>• Writing group</li> </ul>	<ul style="list-style-type: none"> <li>• Grading</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		reports. Solving problems in groups.	homework assignments Discussing results
3.4	Operate computational tools	<ul style="list-style-type: none"> <li>• Writing reports for case studies.</li> <li>• Incorporating the use and utilization of computational tools in the course requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Checking the problems solved in the homework assignments.</li> <li>• Evaluation of case studies reports.</li> </ul>
3.5	Evaluate and criticize reports	<ul style="list-style-type: none"> <li>• Writing reports for case studies.</li> <li>• Incorporating the use and utilization of computational tools in the course requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Checking the problems solved in the homework assignments.</li> <li>• Evaluation of case studies reports.</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class activities (in class quizzes, and homework)	Biweekly	40%
2	Midterm exam	8	20%
3	Final exam	16	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Office hours 4 h / week

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Efstathios E. Michaelides (2018) “Energy, the Environment, and Sustainability CRC press. Taylor & Frances group.
Essential References	<ul style="list-style-type: none"><li>• Tester, J.W. E. M. Drake, M.W. Golay, M.J. Driscoll, and W.A. Peters. (2005) “Sustainable Energy - Choosing Among options”, MA: MIT Press. ISBN: 0262201534.</li><li>• Ahmed Rateb Al Anoushy. (2012) Energy and Environment.</li></ul>
Electronic Materials	Websites on the internet that are relevant to the topics of the course
Other Learning Materials	Multi media associated with the text book and the relevant websites

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room with max 30 seats
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Illustration tools relevant to the course material

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course contents covering	Students (direct through meetings, or indirect using the central online questionnaires	Online questionnaire and Students- faculty meetings (advisory committee) <b>1- Departmental council discussions</b> <b>2- Internal discussions between the department members teaching the course.</b>
Quality of teaching	Students (direct through meetings, or indirect using the central online questionnaires	Online questionnaire and Students- faculty meetings (advisory committee) - <b>Attending workshops</b>



Evaluation Areas/Issues	Evaluators	Evaluation Methods
		<p>given by experts on the teaching and learning methodologies.</p> <ul style="list-style-type: none"> <li>- Periodical departmental revisions of its methods of teaching</li> </ul>
Office hours commitment	-	Online questionnaire and Students- faculty meetings (advisory committee)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

#### H. Specification Approval Data

Council / Committee	END Dept. Council and Faculty Academic Accreditation Committee
Reference No.	
Date	April, 2021