Course Specification
(Bachelor)

Course Title:	**Renewable Energy**
Course Code:	**CHM 1442**
Program:	**Bachelor of Science in Chemistry**
Department:	**Chemistry**
College:	**Science**
Institution:	**Imam Mohammed Ibn Saud Islamic University**
Version:	024 v **1**
Last Revision Date:	**14 October 2024**

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A. General information about the course:

1. Course Identification

1. Credit hours: 2 (2, 0, 0)					
2(2 Lectures, 0 Tutorials, 0 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: Level 7 / 4th year					
4. Course general Description:					
Renewable Energy, an overview, fundamental of Renewable Energy Supply. Utilization of passive solar technology, solar thermal heat utilization, solar thermal power plants. Photovoltaic power generation, wind power generation, renewable energy generation in power system. Impact of renewable energy on frequency control and reliability, frequency response service from renewable energy. Renewable energy and electricity market, future towards a sustainable electric supply system.					
5. Pre-requirements for this course (if any)**:**					
Electrochemistry and Corrosion- CHM 1343					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					

At the end of the course, Students should be able:

- **To understand the concept of renewable energies (in the history of mankind renewable energies have for a long time been the primary possibility of generating energy).**
- **To be aware of environmental, climate-friendly and social acceptable, alternatives suitable to cover the energy demand has become increasingly important.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**30**	**100%**
2	E-learning	**0**	**0**
3	Hybrid • Traditional classroom • E-learning	**0**	**0**
4	Distance learning	**0**	**0**

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**0**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify)**	**0**
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To recognize the concept of renewable energies.**	**K1, K2, K3**	• Two hours are weekly, containing lectures. • A Private study including work on the home exam.	• Quizzes • Assignments • Oral Discussion • Participation.
1.2	**To list the side effects of fossil fuel use.**	**K1, K2, K3**	• Two hours are weekly containing lectures with group discussion. • Group discussion	• Assignments. • Quizzes. • Final exam.
1.3	**To describe environmental, climate-friendly, and socially acceptable alternatives suitable to cover the energy demand has become increasingly important.**	**K1, K3, K4**	• Group discussions. • A Private study, including work on homework.	• Midterms. • Assignments. • Oral test • Quizzes. • Final exam.
2.0	**Skills**			
2.1	**To evaluate the benefits of renewable energy economically and environmentally.**	**S1, S2, S3**	• Lectures activity	• Questions in Lectures. • Short Quizzes and Exams.

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
				Participation through Classwork and Homework.
2.3	**To demonstrate skills to participate in class by asking questions and giving answers.**	**S3**	• Group discussions	• Questions in Lectures. • Short Quizzes and Exams. • Participation. • Oral Discussion and Homework
2.4	**To develop oral and network communication and technical writing skills through writing and oral presentation of mini reports, and to operate electronic mail and Network in communicating with others.**	**S1; S3; S4**	• Encourage students to exchange their chemical thinking, and cooperatively with their peers to develop individual skills.	• Questions in Lectures. • Short Quizzes and Exams. • Oral Presentation Participation
3.0	**Values, autonomy, and responsibility**			
3.1	**To illustrate teamwork, and create awareness to maintain scientific integrity during different assessments, projects, and mini reports.**	**V1, V2**	• Group discussion, • Assignments and homework	• Oral tests, • Assignments and homework marks

C. Course Content

No	List of Topics	Contact Hours
1.	Renewable Energy, an overview, fundamental of Renewable Energy Supply.	4
2.	Utilization of passive solar technology, solar thermal heat utilization, solar thermal power plants.	8
3	Photovoltaic power generation, wind power generation, renewable energy generation in power system.	6
4	Impact of renewable energy on frequency control and reliability, frequency response service from renewable energy.	6

	Renewable energy and electricity market, future towards a sustainable electric supply system.	6
	Total	30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Midterm Exam 1**	**6th week**	**20 %**
2.	**Midterm Exam 2**	**12th week**	**20 %**
3.	**Quizzes, Home Works, class participation, and mini projects**	**During the semester**	**20 %**
4.	**Final Exam**	**16-17th week**	**40 %**
5.	**Total**		**100%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• **Renewable Energy in Power Systems'**, Leon Freris, David Infield: ', Wiley 2008. ISBN: 978-0-470-01749-4
Supportive References	• **Renewable Energy:** Technology, Economics and Environments', Martin Kaltschmitt, Wolfgang Streicher, Andreas Wiese: Springer 2007. ISBN-13: 978-3540709473
Electronic Materials	Blackboard
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Each of the class room should be equipped with a whiteboard and a projector, with a maximum of 20 students.
Technology equipment (projector, smart board, software)	• The rooms are equipped with data show, Smart Board, WI-FI access.
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	Direct: Questionnaire.
	Course Responsible	Direct: Course e-Portfolio. Indirect: Second examiner checklist-Course report.
	Peer Reviewer	Direct: Questionnaire. Indirect: External assessor report.
Effectiveness of Students assessment	**Program Leaders**	Direct: Course e-Portfolio. Indirect: Course report.
	Students	Indirect: Second examiner checklist-Course report.
Quality of learning resources	**Faculty (Academic Advisory)**	Direct: course Entrance/Exit. Indirect: Observations - Accreditation review.
	Program Leaders	Direct: Course e-Portfolio. Indirect: Course evaluation survey- Observations- Syllabus review- Accreditation review.
The extent to which CLOs have been achieved	**Course Responsible**	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
	Program Leaders	**Indirect:** Exams.
Lab Performance	**Students**	Direct: Lab reports, Final Lab exam, Course e-Portfolio.

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**COUNCIL OF DEPARTMENT OF CHEMISTRY**
REFERENCE NO.	**7 (NO. 2/3)**
DATE	**29/3/1446 - 2/10/2024**