Program Catalogue 2023-2024 دليل البرنامج الدراسي

AlKarkh University of Science

جامعة الكرخ للعلوم

First Cycle – Bachelor's degree (B.Sc.) – Renewable Energy Science

باكلوريوس علوم – علوم الطاقة المتجددة

Table of Contents | جدول المحتويات

1. Mission & Vision Statement

Mission

Distinguished scientific education, learning and scientific research in all fields of knowledge of renewable energy in accordance with locally and internationally approved standards and building bridges with the local community that allow graduates of this specialty to integrate into the labor market immediately after graduation.

Vision

This degree explores the best ways to utilize renewable energy technologies, including solar thermal systems, photovoltaics, wind energy, biomass, underground energy and hydropower in a unified degree that supports learning for this growing industry. Many elements of this grade are derived from photovoltaics and solar energy, but look beyond the sun as an energy source, and encompass a wide range of technologies and their uses. It also deals with important areas in solar architecture, building design and energy-saving devices, as well as energy management and efficiency, and determining the best designs for solar energy systems and wind farms.

2. Program Specification

Programme code:	B.Sc. - REE	**ECTS**	240
Duration	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

Department of renewable energy refer to teaching and researching renewable energy technologies and sustainability. Such a department offer courses and programs related to renewable energy, sustainable engineering, energy policy, and environmental science. The department may also conduct research on renewable energy technologies, such as solar cells, wind turbines, and energy storage systems. This research could focus on areas such as improving efficiency, reducing costs, and developing new technologies. Level 1 exposes students to the fundamentals of renewable energies, suitable for progression to all programs within the department program group. Programme-specific core topics are covered at Level 2 preparing for research-led subject specialist modules at Levels 3 and 4. The new and renewable energies graduate is therefore trained to appreciate how research informs teaching and field-working, according to our vision.

Level 1:

- Awareness of the importance of renewable energy and sustainability

- Understanding of the course objectives and content

- Perception of the quality of the course delivery and materials

- Motivation to learn more about renewable energy and sustainability

Level 2:

- Knowledge of renewable energy technologies and their applications

- Understanding of the principles of sustainability and their relevance to energy systems

- Ability to analyze and evaluate different renewable energy options

- Familiarity with relevant policies, regulations, and standards

Level 3:

- Ability to apply the knowledge and skills learned in the course to real-world situations

- Incorporation of sustainable practices in personal and professional life

- Confidence in making informed decisions related to renewable energy and sustainability

- Collaboration and communication skills to work effectively with others on REs projects

Level 4:

- Increased adoption of renewable energy technologies and sustainable practices

- Reduced carbon emissions and other environmental impacts

- Improved energy efficiency and cost savings

- Increased awareness and understanding of renewable energy and sustainability issues

3. Program Goals

1. To provide students with a comprehensive understanding of different renewable energy technologies, their applications, and their potential impact on the environment, economy, and society.

2. To develop students' skills in designing, implementing, and evaluating renewable energy systems to meet the energy needs of communities, organizations, and individuals.

3. To promote innovation and research in renewable energy technologies, and to encourage students to develop new and sustainable energy solutions that address real-world challenges.

4. To prepare students for careers in the renewable energy sector, and to provide them with the knowledge, skills, and experience necessary to succeed as professionals in the field.

5. To foster a culture of sustainability and environmental stewardship, and to encourage students to incorporate sustainability principles into their personal and professional lives.

6. To collaborate with industry partners, government agencies, and non-profit organizations to promote renewable energy solutions and support the transition to a more sustainable energy system.

7. To provide outreach and education to the broader community on the importance of renewable energy and sustainability, and to inspire and engage individuals to support the transition towards a cleaner, more sustainable energy future.

4. Student Learning Outcomes

The study of new and renewable energies typically focuses on the science, technology, and policy related to renewable energy sources, including solar, wind, geothermal, hydropower, biomass, and ocean energy. It involves understanding the physical and chemical principles underlying renewable energy technologies, as well as the economic, environmental, and social factors that influence their adoption and deployment.

While the organizational and operational aspects of renewable energy systems are important components of the field, they are not the sole focus. Instead, the study of new and renewable energies typically covers a broad range of topics.

Overall, the study of new and renewable energies is an interdisciplinary field that draws on principles and techniques from science, engineering, economics, policy, and social science to address the complex challenges of transitioning to a more sustainable energy system.

Outcome 1:

Knowledge of renewable energy technologies graduates will have a comprehensive understanding of different renewable energy technologies, including their principles, applications, advantages, and limitations.

Outcome 2:

Understanding of sustainability principles graduates will understand the principles of sustainability and their relevance to energy systems, and be able to analyze the social, environmental, and economic impacts of renewable energy technologies.

Outcome 3:

Ethical and professional responsibility graduates will understand the ethical and professional responsibilities associated with renewable energy technologies, and be able to apply them in their personal and professional lives.

Outcome 4:

Laboratory and Field Studies graduates will be able to perform laboratory experiments and field studies, by using scientific equipment and computer technology while observing appropriate safety protocols.

Outcome 5:

Collaboration and communication skills graduates will be able to work effectively in teams, communicate their ideas clearly, and present their findings to diverse audiences.

Outcome 6:

Scientific Knowledge graduates will be able to design and implement renewable energy systems that meet the energy needs of communities, organizations, and individuals, and to evaluate their performance.

Outcome 7:

Data Analyses graduates will be able to evaluate the technical and economic feasibility of different renewable energy systems, and to compare them with conventional energy sources.

Outcome 8:

Critical Thinking graduates will be able to identify and assess complex problems related to renewable energy and sustainability, and to develop and implement effective solutions.

5. Academic Staff

Amani Ibraheem Mohammed | Ph.D. in Atmospheric Sciences | Assistant Prof.

Email: dr.amani_altmimi@kus.edu.iq
Mobile no.: +9647714336427

Hasan Mohammed Luaibi | Ph.D. in Chemistry | Assistant Prof.

Email: hasannsr@kus.edu.iq @kus.edu.iq
Mobile no.: +9647901444234

Firas Abdulrazaq Hadi | Ph.D. in Physics | Assistant Prof.

Email: firas.a.hadi@kus.edu.iq
Mobile no.: +9647716087822

Thamer Khaleel Mohammed | Ph.D. in Mathematics | Assistant Prof.

Email: thamer.197675@kus.edu.iq
Mobile no.: +9647717640935

Najdit Ridha Hameed | Ph.D. in Chemistry | Assistant Prof.

Email: najdatchemist71@kus.edu.iq
Mobile no.: +9647737911570

Ammar Waleed Saeed | Ph.D. in Chemical Engineering | Lecturer

Email: ammar.waleed@kus.edu.iq
Mobile no.: +9647709229548

Mohammed Ali Hassan Al-Dharob | Ph.D. in Atmospheric sciences| Lecturer

Email: dr.amani_altmimi@kus.edu.iq
Mobile no.: +9647714336427

Ethar Yahya Salih | Ph.D. in Applied Physics | Lecturer

Email: ethar@kus.edu.iq
Mobile no.: +964772130120

Mohammed Ali Hassan | Ph.D. in Physics | Lecturer

Email: albeaty33@kus.edu.iq
Mobile no.: +9647715870177

Fayiz Salim Abd | Ph.D. in Methods of Teaching Physics | Lecturer

Email: fayiz.salim@kus,edu,iq
Mobile no.: +96477036965439

Alaa Jwied Hamid | Ph.D. in Chemistry | Lecturer

Email: alaajoied@kus.edu.iq
Mobile no.: +964770263783

Sarah Abdulkareem Thamer | Ph.D. in Methods of Teaching Biology | Lecturer

Email: sarah.aladhami@kus.edu.iq
Mobile no.: +964773752020

Alhamzah Dheyaa Hameed | Ph.D. in Applied Physics | Lecturer

Email: alhamzah.dheyaa @kus.edu.iq
Mobile no.: +964777737554933

Omar Kanaan Noori | Ph.D. in Electric & Electronic engineering | Lecturer

Email: mar.k84 @kus.edu.iq
Mobile no.: +9647708490900

Marwah Mohammed Jasim | Ph.D. in Physics | Lecturer

Email: marwah.mohammed@kus.edu.iq
Mobile no.: +9647740299906

Layth K.T. Abuhadma | Ph.D. in Electrical Engineering | Lecturer

Email: layth.kadhim@kus.edu.iq
Mobile no.: +9647730073349

Osama Almaz Mohammed | Ph.D. in Arabic Language | Lecturer

Email: dr.osamah.almaz@kus.edu.iq
Mobile no.: +9647700492368

Mohanad Jamal Abbas | M.Sc. in Laser & Optoelectronic Engineering | Assistant Lecturer

Email: mohanad.alrubaiee@kus.edu.iq
Mobile no.: +9647700492368

Mohammed Obed Kadhim | M.Sc. in Physics | Lecturer

Email: mok1968@kus.edu.iq

Mobile no.: +9647714189079

Yahya Bashir Abdullah | M.Sc. in Electrical Engineering | Lecturer

Email: yahya@kus.edu.iq
Mobile no.: +9647721481060

Surah Thamir Nasir | M.Sc. in Atmospheric sciences | Lecturer

Email: sura.thamir91@kus.edu.iq
Mobile no.: +9647736406453

Maryam Ahmed | M.Sc. in Physics | Lecturer

Email: maryam.ahmed82@kus.edu.iq
Mobile no.: +9647706058188

6. Credits, Grading and GPA

Credit

The Department of Renewable Energy Science, College of Renewable Energy & Environmental Science, AlKarkh University of Science is following Bologna Process with the European Credit Transfer System (ECTS). The total degree program number of EXTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs. student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follow for module with 7 ECTS (175 hrs.):

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**94**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**6**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**82**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**5.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

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.

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

CGPA of 4-years B.Sc. degree:

$$CGPA = [(1^{st} \text{ module score } x \text{ ECTS}) + 1^{nd} \text{ module score } x \text{ ECTS}) + \cdots..]/240$$

7. Curriculum / Modules

Semester 1 | **30 ECTS** | **1 ECTS=25 hrs.**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CRE1101	**General physics**	79	96	7	S	
KUS1102	**General mathematics**	48	77	5	B	
KUS1103	**Fundamentals of computer science**	64	36	4	B	
CRE1104	**Analytical chemistry**	79	46	5	S	
REE1105	**Principles of renewable energies**	64	61	5	C	
KUS1106	**Arabic language**	33	67	4	B	

Semester 2 | **30 ECTS** | **1 ECTS=25 hrs.**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
REE1217	**Optics**	94	81	7	C	CRE1101
REE1208	**Fundamentals of electricity**	94	81	7	C	
KUS1209	**Human Rights**	33	42	3	B	
CRE12010	**Geology**	64	61	5	S	
CRE12011	**Organic chemistry**	64	36	4	S	
KUS12012	**English language**	48	52	4	B	

Semester 3 | **30 ECTS** | **1 ECTS=25 hrs.**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
REE23013	**Electronics**	94	81	7	C	
REE23114	**Circuit analysis**	79	46	5	C	REE1208
REE23015	**Energy sources**	48	52	4	C	
REE23016	**Inorganic chemistry**	48	52	4	C	
REE23017	**Thermodynamics**	79	71	6	C	
REE23018	**Optoelectronics**	48	52	4	C	

Semester 4 | **30 ECTS** | **1 ECTS=25 hrs.**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
REE24119	**Digital electronics**	79	71	6	C	REE23013
REE24020	**Fluids**	94	81	7	C	
KUS24021	**Freedom and democracy**	33	42	3	B	
REE24022	**Solar cells pv**	78	72	6	C	
REE24123	**Geothermal energy**	63	37	4	C	CRE12010
REE24024	**Materials science**	63	37	4	C	

Semester 5 | **30 ECTS** | **1 ECTS=25 hrs.**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
REE35025	**Measurements and control**	48	27	3	C	
REE35026	**Bioenergy**	63	62	5	C	
REE35027	**Solar energy systems**	94	81	7	C	
REE35028	**Energy transmission and storage**	48	52	4	C	
REE35029	**Modeling of renewable energy**	94	81	7	C	
REE35030	**Hydroelectric energy**	63	37	4	C	

Semester 6 | **30 ECTS** | **1 ECTS=25 hrs.**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
REE36031	**Passive solar Energy**	78	72	6	C	
CRE36032	**Climatic change**	63	62	5	S	
REE36033	**Meteorology**	63	62	5	C	
REE36034	**Heat transfer**	94	81	7	C	REE24020
REE36035	**Statistics**	48	52	4	C	
REE36036	**Elective course**	48	27	3	E	
	Elective course-1 (E1) Photo chemistry					
	Elective course-2 (E2) Waste recycling for saving & production of energy					
	Elective course-3 (E3) Sustainable energy utilization					

Semester 7 | **30 ECTS** | **1 ECTS=25 hrs.**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
REE47037	**Hybrid energy**	78	72	6	C	
KUS47038	**Job ethics**	33	42	3	B	
REE47039	**Energy management**	78	97	7	C	
REE47040	**Energy efficiency**	78	72	6	C	
REE47041	**graduation project**	48	52	4	C	
REE47042	**Elective course**	48	52	4	E	
	Elective course-1 (E1) Fuel and hydrogen cells					
	Elective course-2 (E2) Tidal energy					
	Elective course-3 (E3) Sustainable building					

Semester 8 | **30 ECTS** | **1 ECTS=25 hrs.**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
REE48043	**Wind energy**	79	71	6	C	
REE48144	**Solar thermal energy systems**	94	81	7	C	REE35027
REE48045	**Conductive polymers**	48	52	4	C	
REE48046	**Nanotechnology**	63	37	4	C	
REE48147	**Economics of energy**	63	62	5	C	REE47039
REE48048	**Elective course**	48	52	4	E	
	Elective course-1 (E1) Nuclear energy					
	Elective course-2 (E2) The impact of energy production on environment					

8. Contact

Program Manager:

Hasan Mohammed Luaibi | Ph.D. in Analytical Chemistry | Assistant Prof.

Email: hasan.luaibi@kus.edu.iq

Mobile no.: +964-7901444234

Program Coordinator:

Ammar Waleed Saeed | Ph.D. in Chemical Engineering | Lecturer

Email: ammar.waleed@kus.edu.iq

Mobile no.: +964-7709229548