

جامعة الزيتونة الأردنية Al-Zaytoonah University of Jordan كلية الهندسة والتكنولوجيا Faculty of Engineering and Technology



" عراقة وجودة" "Tradition and Quality"

Study Plan for Bachelor of Science Program - Study Plan Development and Updating
Procedures/ Mechanical Engineering DepartmentQF09/0407-4.0E

Course Plan for Sustainable Energy Engineering (Bachelor Program) No.: (2021-2022)

Approved by Deans Council by decision (10/20/2021-2022) dated (6/07/2022)

| (160) Cred | it Hours | Study system / hybrid program | | | | |
|-------------------|----------------|-------------------------------|--------------------|--|--|--|
| Type of specialty | □ Humanitarian | ✓- Scientific / technical | □ Medical Sciences | | | |

| Teaching style | Percentage of study plan hours / number | Model used (synchronous: asynchronous) | | | | |
|--|--|---|--|--|--|--|
| Complete e-learning courses | 17% / 27 CH | 2:1 (For SUN. TUE. THER) or 1:1 (for MON. WED.) | | | | |
| Blended Learning courses (for Humanity) | 40%-60% max/CH | 2:1 (For SUN. TUE. THER) or 1:1 (for MON. WED.) | | | | |
| Blended learning courses (for scientific and medical) | 44% / 71 CH | 2:1 (For SUN. TUE. THER) or 1:1 (for MON. WED.) | | | | |
| Traditional learning courses (for Humanity) | 20% min/CH | 3:0 For all academic divisions | | | | |
| Traditional learning courses (for scientific and medical) | 39% / 62 CH | 3:0 For all academic divisions | | | | |

Important note: (The teaching patterns of the subjects are distributed at all academic levels in the program)

Program vision: Towards a competitive faculty committed to excellence in teaching, innovative research, entrepreneurship and .community service

Program mission and objectives:

- 1. Implement technical, collaborative, and communication skills with leadership principle, to pursue careers in Sustainable Energy Engineering
- 2. Seek higher degree in Sustainable Energy Engineering and embark on continuing education
- 3. Seek professional membership, discharge their professional skills ethically, and being conscious of the impact of Sustainable Energy Engineering projects on society as well as environment

Program learning outcomes ((MK= Main Knowledge, MS= Main Skills, MC= Main Competences)

| | Main knowledge | | | | | | |
|-----|---|--|--|--|--|--|--|
| MK1 | Understand the basic principles and mathematical theories related to sustainable energy engineering | | | | | | |
| MK2 | Possess general knowledge and various engineering tools to build successful pioneering engineering | | | | | | |
| | projects in the field of sustainable energy engineering | | | | | | |
| MK3 | Familiarity with new sources of knowledge and findings of science in the field of sustainable energy | | | | | | |
| | engineering | | | | | | |
| | Basic skills | | | | | | |
| MS1 | Ability to solve complex engineering problems by applying principal methods of engineering, science and | | | | | | |
| | mathematics | | | | | | |
| MS2 | Ability to produce engineering designs within determinants to find specialized engineering solutions | | | | | | |
| MS3 | Ability to analyze data and results using appropriate engineering experiments | | | | | | |
| MS4 | Ability to evaluate and supervise technical design plans | | | | | | |
| | General competencies | | | | | | |
| MC1 | Ability to assume ethical and professional responsibilities | | | | | | |
| MC2 | Ability to apply leadership and communication skills within a team in the work environment | | | | | | |
| MC3 | Ability to identify and address learning needs and engage in continuous learning | | | | | | |
| MC4 | Ability to express and apply creative skills | | | | | | |
| MC5 | Ability to manage sustainable energy projects and realize their impact on society and environment | | | | | | |

Study Plan for Bachelor of Science Program - Study Plan Development and Updating Procedures/ Mechanical Engineering Department

QF09/0407-4.0E

| Teaching style | | /le | | | | TI | Pra | | Indica | ative |
|-------------------------------|----------------------|-------------------------|---------------|--|-------------|--------------|----------------|--|-------------------|---------------|
| Electronic learning | Blended learning | Traditional learning | Course No. | Course name | Credit hour | neory Hours | actical Hours | Prerequisite Co-requisite | Semester | year |
| | 1. Re | quire | ments (27) C | Credit Hours | | | • | • | | |
| | 1.1 N | /landa | tory require | ement (21 credit hour) | 3 | 3 | 0 | _ | 1 | 1 |
| • | | | 0420151 | Minitary Sciences | 3 | 3 | 0 | | 2 | 1 |
| • | | | 0420131 | National Education | 3 | 3 | 0 | | 1 | 2 |
| • | | | 0420115 | Communication skills in Arabic | 3 | 3 | 0 | Remedial Arabic Language | 1 | 2 |
| • | | | 0420113 | Communication skills in | 3 | 3 | 0 | Remedial English Language | 2 | 1 |
| • | | | 0420122 | English | 5 | 5 | 0 | Kemeulai English Language | 2 | 1 |
| • | | | 0420261 | Entrepreneurship and innovation | 3 | 3 | 0 | - | 2 | 2 |
| • | | | 0420241 | Leadership and social responsibility | 3 | 3 | 0 | - | 1 | 2 |
| | 1.2 Ur | niversi | ty elective r | equirements(06 credit hour) | | | | | | |
| • | | | 0420142 | Human Civilization | 3 | 3 | 0 | - | 1 | 1 |
| • | | | 0420253 | Development and environment | 3 | 3 | 0 | - | 1 | 2 |
| • | | | 0420172 | Digital skills | 3 | 3 | 0 | Remedial computer skills | 2 | 1 |
| • | | | 0420201 | first aid | 3 | 3 | 0 | - | 2 | 2 |
| • | | | 0420134 | Sports and health | 3 | 3 | 0 | - | 1 | 1 |
| • | | | 0420212 | Islamic culture | 3 | 3 | 0 | - | 1 | 2 |
| • | | | 0420341 | Basics of German Language | 3 | 3 | 0 | - | 1 | 3 |
| • | | | 0420392 | Basics of Psychology | 3 | 3 | 0 | - | 1 | 3 |
| • | | | 0420155 | Law in Our Lives | 3 | 3 | 0 | - | 1 | 1 |
| | | | | | | | | · | | |
| Tead Electroni learning | ching sty Blended | /le Tradition: | Course No. | Course name | Credit hour | Theory Hours | Practical Hour | Prerequisite Co-requisite | Indica Semeste | ative year |
| , <u>c</u> | 1 | al | | | | . | S. | | r | |
| | 2. Fa | culty | Requiremen | ts (26) Credit Hours | | | | | | |
| | | • | 0120121 | Calculus I | 3 | 3 | 0 | - | 1 | 1 |
| | | • | 0420802 | Calculus (2) for Engineering Students | 3 | 3 | 0 | Calculus (1) | 2 | 1 |
| | | • | 0420804 | Differential Equations | 3 | 3 | 0 | Calculus (2) For Engineering Students | 2 | 2 |
| | | • | 0420810 | General Physics I | 3 | 3 | 0 | - | 1 | 1 |
| | | • | 0420811 | General Physics Lab I | 1 | 0 | 3 | Co. General Physics | 1 | 1 |
| | | • | 0911101 | Engineering Workshops | 2 | 1 | 3 | - | 1 | 1 |
| | | • | 0905111 | Principles of Electrical Circuits | 3 | 3 | 0 | General Physics I | 2 | 1 |
| | • | | 0909101 | Computer Engineering Applications | 3 | 3 | 0 | Remedial computer Skills | 2 | 1 |
| | | • | 0911102 | Engineering Drawing | 3 | 0 | 6 | - | 2 | 1 |
| | • | | 0908201 | Technical Writing and Profession Ethics | 2 | 2 | 0 | Communication skills in English | 2 | 2 |

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QF09/0407-4.0E

| Teaching style | | | | 0 | Th | Pra | | Indicative | | |
|------------------------|---------------------|-------------------------|-----------------------------|--|-------------|-------------|---------------|---|----------|------|
| Electronic learning | Blended learning | Traditional learning | Course No. | Course name | Credit hour | neory Hours | actical Hours | Prerequisite Co-requisite | Semester | year |
| 1 3.1 M | l. Ma landato | ijor re rv req | equirements (uirements (| (107) Credit Hours 75) credit hours | | | | | | |
| | | • | 0914111 | Statics | 3 | 3 | 0 | General Physics (1) | 2 | 1 |
| | • | | 1134109 | Heat, Light and Sound Physics | 3 | 3 | 0 | Co. General Physics (1) | 2 | 1 |
| | | • | 2124091 | Dynamics | 3 | 3 | 0 | Statics | 1 | 2 |
| | | • | 0914215 | Strength of Materials | 3 | 3 | 0 | Statics | 1 | 2 |
| | | • | 2204091 | Intermediate Mathematical Analysis | 3 | 3 | 0 | Calculus (2) for Engineering Students | 1 | 2 |
| | | • | 2301409 | Sources and Types of Energy | 3 | 3 | 0 | Heat, Light and Sound Physics | 2 | 2 |
| | • | | 1321409 | Fluid Mechanics | 3 | 3 | 0 | General Physics (1) | 2 | 2 |
| | | • | 3221409 | Thermal fluid Lab | 1 | 0 | 3 | CO. Thermodynamics (1) and Fluid Mechanics | 2 | 2 |
| | • | | 0914271 | Materials Science | 3 | 3 | 0 | General Chemistry for Engineering Students | 2 | 2 |
| | | • | 0914330 | Statistics and Probabilities | 4 | 3 | 3 | Calculus (2) for Engineering Students | 2 | 3 |
| | • | | 0914331 | Power Generation Plants | 3 | 3 | 0 | Sources and Types of Energy | 2 | 3 |
| | | • | 0914333 | Mechanical Design | 3 | 3 | 0 | Strength of Materials | 2 | 3 |
| | | • | 3344091 | Heat Transfer Lab | 1 | 0 | 3 | Co. Heat Transfer | 1 | 3 |
| | • | | 3354091 | Heat Transfer | 3 | 3 | 0 | Thermodynamics (1) | 1 | 3 |
| | | • | 0091440 | Engineering and Field Training | 3 | 0 | 9 | After Passing 115 Credit Hours (Training duration: 280h) | | |
| | • | | 1141409 | Engineering Measurements | 3 | 3 | 0 | Fluid Mechanics | 2 | 4 |
| | | • | 2091441 | Engineering Measurements Lab | 1 | 0 | 3 | Co. Engineering Measurements | 2 | 4 |
| | • | | 0914418 | Power Electronics | 3 | 3 | 0 | Principles of Electrical Circuits | 1 | 4 |
| | | • | 0914445 | Photovoltaic and Solar Thermal Systems Lab | 1 | 0 | 3 | Co. Design of Photovoltaic Systems | 1 | 4 |
| | • | | 0914446 | Design of Photovoltaic Systems | 3 | 3 | 0 | Power Generation Plants | 1 | 4 |
| | • | | 0914448 | Design of Wind Energy Systems | 3 | 3 | 0 | Power Generation Plants | 1 | 4 |
| | | • | 0914449 | Wind Energy Lab | 1 | 0 | 3 | Co. Design of Wind Energy Systems | 1 | 4 |
| | • | | 1091447 | Energy Conversion | 3 | 3 | 0 | Heat Transfer | 2 | 4 |
| | • | | 2091447 | Energy Storage | 3 | 3 | 0 | Heat Transfer | 2 | 4 |
| | • | | 0501409 | Graduation Project (1) | 1 | 0 | 3 | Engineering and Field Training | 1 | 5 |
| | • | | 1501409 | Graduation Project (2) | 2 | 0 | 6 | Graduation Project (1) | 2 | 5 |
| | • | | 0914510 | Automatic Control | 3 | 3 | 0 | Engineering Measurements | 1 | 5 |
| | • | | 0914552 | Environmental Impact of Energy and Environmental Policies | 3 | 3 | 0 | Energy Storage | 2 | 5 |
| | • | | 0914572 | Energy Efficiency and Economy | 3 | 3 | 0 | Energy Storage | 1 | 5 |
| 3.2 M | lajor E | lective | es (9) Credit | Hours Special Topics in Renewable | | | | | 1 | _ |
| | • | | 0209145 | Energy and Engineering Sustainability | 3 | 3 | 0 | 5 th year level | 1 | 3 |
| | • | | 0309145 | Climate Change and Sustainability | 3 | 3 | 0 | Energy Conversion | 1 | 5 |
| | • | | 0914505 | Green Hydrogen and Fuel Cells | 3 | 3 | 0 | Energy Conversion | 1 | 5 |
| | • | | 5060914 | Molding and Simulation of Sustainable Engineering | 3 | 0 | 3 | Design of Photovoltaic Systems | 1 | 5 |
| | • | | 0850914 | Transmission and Distribution of Electric Power | 3 | 3 | 0 | Electrical Machines Fundamentals | 2 | 5 |

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QF09/0407-4.0E

| | • | | 1109145 | Carbon Capture Technology | 3 | 3 | 0 | Power Generation Plants | 2 | 5 |
|-----|-------|------|------------|--|---|---|---|---|---|---|
| | • | | 0914509 | Control and Protection of Energy Systems | 3 | 3 | 0 | Energy Conversion | 2 | 5 |
| 3.3 | Major | Supp | orting Rec | uirements (23) Credit Hours | | | | | | |
| | | • | 0101205 | Calculus (3) for Engineering Students | 3 | 3 | 0 | Calculus (2) For Engineering Students | 1 | 3 |
| | | • | 0201143 | General Chemistry for Engineering Students | 3 | 3 | 0 | - | 1 | 1 |
| | | • | 0201143 | General Chemistry for Engineering Student Lab | 1 | 0 | 3 | Co. General Chemistry for Engineering Students Lab | 2 | 1 |
| | | • | 0905332 | Electrical Machines Fundamentals | 3 | 3 | 0 | Principles of Electrical Circuits | 1 | 3 |
| | | • | 0905432 | Electrical Machines Lab | 1 | 0 | 3 | Co. Electrical Machines Fundamentals | 1 | 3 |
| | • | | 2211091 | Thermodynamics | 3 | 3 | 0 | General Physics (1) | 2 | 2 |
| | ٠ | | 0911363 | Numerical Analysis | 3 | 3 | 0 | Calculus (2) For Engineering Students | 1 | 3 |
| | • | | 0909404 | Engineering Economy | 3 | 3 | 0 | 4 th Year Level | 1 | 4 |
| | ٠ | | 0908461 | Projects Management and Value Engineering | 3 | 3 | 0 | Engineering Economy | 1 | 5 |

(The end of the study plan for the major students)