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| **Course Plan for Sustainable Energy Engineering (Bachelor of Science Program) No.: (2021-2022)** | | | |
| **Approved by Deans Council by decision (10/20/2021-20200) dated (6/07/2022)** | | | |
| **)160) Credit Hours** | | **Study system / hybrid program** | |
| **Type of specialty** | * **Humanitarian** | * **Scientific / technical** | * **Medical Sciences** |

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| **Teaching style** | **Percentage of study plan hours / number** | **Model used (synchronous: asynchronous)** |
| **Complete E-learning courses** | 17% / 27 CH | 1:1 (For THER. SAT.) |
| **Blended Learning courses (For Humanity)** |  | 1:1 (For SUN. TUE.) or (MON. WED.) |
| **Blended learning courses (for scientific and medical)** | 36.875% / 59 CH | 1:1 (For SUN. TUE.) or (MON. WED.) |
| **Traditional learning courses (for humanity)** |  | 2:0 For all academic divisions |
| **Traditional learning courses (for scientific and medical)** | 46.25% / 74 CH | 2:0 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)*

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| **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 |

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| Teaching Style | | | Course No. | Course Name | Credit hour | Theory Hours | Practical Hours | Prerequisite  Co-requisite | Indicative | | |
| Electronic Learning | Blended Learning | Traditional Learning | Semester | Year | |
| 1. **Requirements (27) Credit Hours** | | | | | | | | | | | |
| * 1. **Mandatory Requirement (21 Credit Hours)** | | | | | | | | | | | |
| **•** |  |  | 0420101 | Military Sciences | 3 | 3 | 0 |  | 1 | | 1 |
| **•** |  |  | 0420151 | National Education | 3 | 3 | 0 |  | 2 | | 1 |
| **•** |  |  | 0420271 | Life Skills | 3 | 3 | 0 |  | 1 | | 2 |
| **•** |  |  | 0420115 | Communication Skills in Arabic | 3 | 3 | 0 | Remedial Arabic Language | 1 | | 1 |
| **•** |  |  | 0420122 | Communication Skills in English | 3 | 3 | 0 | Remedial 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 University Elective Requirements (06 Credit Hours)** | | | | | | | | | | | |
| **•** |  |  | 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 | German Language Basics | 3 | 3 | 0 |  | 1 | | 3 |
| **•** |  |  | 0420392 | Psychology Basics | 3 | 3 | 0 |  | 1 | | 3 |
|  |  |  | 0420155 | Law in Life | 3 | 3 | 0 |  | 1 | | 1 |

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| Teaching Style | | | Course No. | Course Name | Credit hour | Theory Hours | Practical Hours | Prerequisite  Co-requisite | Indicative | | |
| Electronic Learning | Blended Learning | Traditional Learning | Semester | Year | |
| 1. **Faculty Requirements (21) Credit Hours** | | | | | | | | | | | |
|  |  | **•** | 0120121 | Calculus (1) | 3 | 3 | 0 | - | 1 | | 1 |
|  |  | **•** | 0150111 | General Physics (1) | 3 | 3 | 0 | - | 1 | | 1 |
|  |  | **•** | 0150101 | General Physics Lab (1) | 1 | 0 | 3 | Co. General Physics (1) | 1 | | 1 |
|  |  | **•** | 0905111 | Principles of Electrical Circuits | 3 | 3 | 0 | General Physics (1) | 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 Professional Ethics | 2 | 2 | 0 | Communication Skills in English | 2 | | 2 |
|  | **•** |  | 0909404 | Engineering Economy | 3 | 3 | 0 |  | 1 | | 4 |

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| Teaching Style | | | Course No. | Course Name | Credit Hour | Theory Hours | Practical Hours | Prerequisite  Co-requisite | Indicative | | |
| Electronic Learning | Blended Learning | Traditional Learning | Semester | | Year |
| 1. **Major Requirements (112) Credit Hours** | | | | | | | | | | | |
| 3.1 **Mandatory Requirements (80) Credit Hours** | | | | | | | | | | | |
|  |  | **•** | 0914100 | Engineering Workshops | 1 | 1 | 3 | - | 1 | | 1 |
|  | **•** |  | 0914113 | Heat, Light and Sound Physics | 3 | 3 | 0 | Co. General Physics (1) | 2 | | 1 |
|  |  | **•** | 0914220 | Intermediate Mathematical Analysis | 3 | 3 | 0 | Calculus (2) for Engineering Students | 1 | | 2 |
|  |  | **•** | 0914330 | Statistics and Probabilities | 4 | 3 | 3 | Calculus (2) for Engineering Students | 2 | | 3 |
|  |  | **•** | 0914111 | Statics | 3 | 3 | 0 | General Physics (1) | 2 | | 1 |
|  |  | **•** | 0914212 | Dynamics | 3 | 3 | 0 | Statics | 1 | | 2 |
|  |  | **•** | 0914215 | Strength of Materials | 3 | 3 | 0 | Statics | 1 | | 2 |
|  | **•** |  | 0914230 | Sources and Types of Energy | 3 | 3 | 0 | Heat, Light and Sound Physics | 2 | | 2 |
|  |  | **•** | 0914231 | Fluid Mechanics | 3 | 3 | 0 | General Physics (1) | 2 | | 2 |
|  | • |  | 0914335 | Heat Transfer | 3 | 3 | 0 | Thermodynamics (1) | 1 | | 3 |
|  |  | **•** | 0914334 | Heat Transfer Lab | 1 | 0 | 3 | Co. Heat Transfer | 1 | | 3 |
|  |  | **•** | 0914232 | Thermal fluid Lab | 1 | 0 | 3 | CO. Thermodynamics (1) or Fluid Mechanics | 2 | | 2 |
|  |  | **•** | 0914333 | Mechanical Design | 3 | 3 | 0 | Strength of Materials | 2 | | 3 |
|  | **•** |  | 0914271 | Materials Science | 3 | 3 | 0 | General Chemistry for Engineering Students | 2 | | 2 |
|  |  | **•** | 0914449 | Wind Energy Lab | 1 | 0 | 3 | Design of Wind Energy Systems | 1 | | 4 |
|  | **•** |  | 0914411 | Engineering Measurements | 3 | 3 | 0 | Fluid Mechanics | 2 | | 4 |
|  |  | **•** | 0914412 | Engineering Measurements Lab | 1 | 0 | 3 | Co. Engineering Measurements | 2 | | 4 |
|  |  | **•** | 0914446 | Design of Photovoltaic Systems | 3 | 3 | 0 | Sources and Types of Energy | 1 | | 4 |
|  |  | **•** | 0914445 | Photovoltaic and Solar Thermal Systems Lab | 1 | 0 | 3 | Co. Design of Photovoltaic Systems | 1 | | 4 |
|  |  | **•** | 0914448 | Design of Wind Energy Systems | 3 | 3 | 0 | Sources and Types of Energy | 1 | | 4 |
|  |  | **•** | 0914331 | Power Generation Plants | 3 | 3 | 0 | Thermodynamics (1) | 2 | | 3 |
|  |  | **•** | 0914400 | Engineering and Field Training | 3 | 0 | 9 | After Passing 115 Credit Hours |  | |  |
|  |  | **•** | 0914472 | Energy Storage | 3 | 3 | 0 | Thermodynamics | 2 | | 4 |
|  |  | **•** | 0914471 | Energy Conversion | 3 | 3 | 0 | Heat Transfer | 2 | | 4 |
|  |  | • | 0914509 | Control and Protection of Energy Systems | 3 | 3 | 0 | Design of Wind Energy Systems | 2 | | 5 |
|  |  | **•** | 0914418 | Power Electronics | 3 | 3 | 0 | Principles of Electrical Circuits | 1 | | 4 |
|  |  | **•** | 0914510 | Automatic Control | 3 | 3 | 0 | Engineering Measurements | 1 | | 5 |
|  |  | **•** | 0914520 | Automatic Control Lab | 1 | 0 | 3 | Co. Automatic Control | 1 | | 5 |
|  | **•** |  | 0914572 | Energy Efficiency and Economy | 3 | 3 | 0 | Energy Conversion | 1 | | 5 |
|  | **•** |  | 0914552 | Environmental Impact of Energy and Environmental Policies | 3 | 3 | 0 | Power Generation Plants | 2 | | 5 |
|  | **•** |  | 0914500 | Graduation Project (1) | 1 | 0 | 3 | Engineering and Field Training | 1 | | 5 |
|  | **•** |  | 0914501 | Graduation Project (2) | 2 | 0 | 6 | Graduation Project (1) | 2 | | 5 |
| **2.3 Major Electives (9) Credit Hours** | | | | | | | | | | | |
|  | **•** |  | 0914502 | Special Topics in Renewable Energy and Engineering Sustainability | 3 | 3 | 0 | Thermodynamics (1) | **1** | | **5** |
|  | **•** |  | 0914554 | Theories and Applications of Sustainability | 3 | 3 | 0 | Thermodynamics (1) | **2** | **3** | |
|  | **•** |  | 0914503 | Climate Change and Sustainability | 3 | 3 | 0 | Thermodynamics (1) | **1** | | **5** |
|  | **•** |  | 0914504 | Green and Smart Building | 3 | 3 | 0 | Energy efficiency and economy | **1** | | **5** |
|  | **•** |  | 0914505 | Green Hydrogen and Fuel Cells | 3 | 3 | 0 | Sources and types of Energy | **1** | | **5** |
|  | **•** |  | 0914506 | Molding and Simulation of Sustainable Engineering | 3 | 0 | 3 | Design of Photovoltaic Systems | **1** | | **5** |
|  | **•** |  | 0914507 | Environmental Systems Design | 3 | 3 | 0 | Design of Photovoltaic Systems | **1** | | **5** |
|  | **•** |  | 0914508 | Transmission and Distribution of Electric Power | 3 | 3 | 0 | Electrical Machines Fundamentals | **2** | | **5** |
|  | **•** |  | 0914511 | Carbon Capture Technology | 3 | 3 | 0 | Thermodynamics (1) | **2** | | **5** |
|  | • |  | 0914512 | Refrigeration and Air Conditioning Systems | 3 | 3 | 0 | Thermodynamics (1) | **2** | | **5** |
| **Major Supporting Requirements (23) Credit Hours** | | | | | | | | | | | |  | 3 | 3 | 0 |  | **2** | **5** |
|  |  | **•** | 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 |
|  |  | **•** | 0101104 | Calculus (2) for Engineering Students | 3 | 3 | 0 | Calculus (1) | 2 | | 1 |
|  |  | **•** | 0101273 | Differential Equations (1) | 3 | 3 | 0 | Calculus (2) For Engineering Students | 2 | | 2 |
|  | • |  | 0911221 | Thermodynamics | 3 | 3 | 0 | General Physics (1) | 2 | | 2 |
|  | **•** |  | 0101205 | Calculus (3) for Engineering Students | 3 | 3 | 0 | Calculus (2) For Engineering Students | 1 | | 3 |
|  |  | **•** | 0911363 | Numerical Analysis | 3 | 3 | 0 | Differential Equations (1) | 1 | | 3 |
|  |  | **•** | 0905432 | Electrical Machines Lab | 1 | 0 | 3 | Co. Electrical Machines Fundamentals | 1 | | 3 |

The end of the study plan for the major students

Subjects taught in the major for students of other majors (university requirements, college requirements, major family requirements, support requirements)

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| Teaching Style | | | Course No. | Course Name | Credit hour | Theory Hours | Practical Hours | The Type of Requirement and the Recipient |
| Electronic learning | Blended learning | Traditional learning |
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