**COURSE SPECIFICATION**

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| This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification. |

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| University of Baghdad | 1. Teaching Institution |
| College of Engineering / Energy Engineering | 2. University Department/Centre |
| 329ENRE | 3. Course title/code |
| BSc. | 4. Programme(s) to which it contributes |
| weekly | 5. Modes of Attendance offered |
| year | 6. Semester/Year |
| 90 hour | 7. Number of hours tuition (total) |
| 15/05/ 2016 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| 1-Cognitivedevelopmentof studentsby recognizing theimportance ofrenewable energies,environmental andeconomic sense. | |
| 2- Engineering skillsdevelopmentfor studentsto learn abouthydroelectric powerandwave powerandtidal energyandbiomass energy, biofuels and thermal energyinundergroundthermal energyin the oceansas well asenergy storagesystems.. | |
| 3- Identify thestages ofthe development oftheseenergysystems, data and Miniown. | |
| 4- Learn how toextractthese energiesfromsources. | |
| 5- Identify themathematical modelsforrenewable energiesabove-mentionedsystems. | |
| 6- To identify thetypes ofrenewable energyextractionsystems. | |
| 7- Learn how tocalculate theefficiency andperformance of thesystemsof renewable energies. | |
| 8- Identification ofhydroelectricpower plants, thermal stationsof the oceanandgeothermalfarmswavesand tides. | |

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| 10· Learning Outcomes, Teaching ,Learning and Assessment Methods |
| 1. Knowledge and Understanding   A1. Thestudent learnsthe basics ofrenewable energysources andlearnedhow toextract it.  A2.The studentrecognizes themodeling ofrenewable energysystems.  A3.The studentrecognizes themanyrenewable energysystems.  A4.Studentatthermal power plantsto some sources, farmsandwave andtidalfarmsrecognize. |
| B. Subject-specific skills  B1.Solve thefundamentals problemsof renewable energies.  B2.The use ofvideosof renewable energiessystems.  B3.Encourage students toadoptaprojectforrenewable energysystems in thegraduationstage |
| Teaching and Learning Methods |
| Themethod oflecturing.  Team Project.  Video learning.  Themethod ofdiscussion andweeklyassignments. |
| Assessment methods |
| Adaily and monthlytests, and the commitmentand respect forthe studentsto attendlecturesandinteractionduring andalsohanded overthe requiredfollow-upreports |
| C. Thinking Skills  C1.Inference.  C2. Solve the application problems of renewable energiessystems.  C3. Directingstudents tospecificsites on the Internetto followthe latest developments inthese systems.  C4. Askstudentsto writereports onspecific topicsforrenewable energysystems |
| Teaching and Learning Methods |
| The lecture/discussion/solve AppliedEngineeringproblems renewable energysystems/Video learning. |
| Assessment methods |
| Adaily and monthlytests, and the commitmentand respect forthe studentsto attendlecturesandinteractionduring andalsohanded overthe requiredfollow-upreports. |

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| D. General and Transferable Skills (other skills relevant to employability and personal development)  D1. Giving students theskillandknowledgeprocessforrenewable energysystems.  D2. Solvingengineering problemsin a scientific waybystudents.  D3. Showingvideosforrenewable energysystemscontribute toincreasethe perceptionand understanding ofthese systemsas well as thefurther development ofunderstanding and comprehensionof the studentsadequatelyforthese systems |

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| 11. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | General introductionof renewable energies | o identify therenewable energysources andcomparingconventionalenergiesofthe environmental andeconomic sense | 2 H | 1 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | GeneralIntroduction toHydropower | Recognizethe importance ofhydroelectric powerfrom theenvironmental and economictermsand the extent ofefficiencycompared to otherstationsas well asits ownMini | 2 H | 2 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | GeneralIntroduction toHydropower | To identify thetypes ofhydroelectricpower plantsin terms of capacityand location | 2 H | 3 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | GeneralIntroduction toHydropower | Identify thebasicparts of thehydro power plants | 2 H | 4 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Hydraulic Turbines | To identify thespecialhydraulicturbine types of hydroelectric powerstationsin terms ofhead andcapacityand direction ofwaterflow | 2 H | 5 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Impulse Turbines | identify thecharacteristics andtypes ofimpulse turbinesand its parts | 2 H | 6 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Impulse Turbines | Identify thedesignand modeling of Impulseturbines | 2 H | 7 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Identify thecharacteristicsand types ofreactionturbinesand its parts | Reaction Turbines | 2 H | 8 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Identify thedesignand modeling ofreactionturbines | Reaction Turbines | 2 H | 9 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Identify thepeakload,loadfactor,installed capacityandreservecapacityfor hydroelectric power plants | Importantfactors forhydroelectric power plants | 2 H | 10 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | GeneralIntroduction to thewave powerand importanceofthe economic andenvironmental point ofStatisticsandits own | Wave Energy | 2 H | 11 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Identify thewaves farmsand importanceenvironmentally and economically, types and its turbineown | Wave Energy | 2 H | 12 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Modelingenergieswavessystemsand solvinga set ofproblems ofwavesenergy | Wave Energy | 2 H | 13 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | GeneralIntroduction to thetidal powerand importanceofthe economic andenvironmental point ofStatisticsandits own | Tidal Energy | 2 H | 14 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Identify thetidefarms, carrots and importanceenvironmentally, economically andkindsof turbinesandtheir own | Tidal Energy | 2 H | 15 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | ModelingTidal powersystemsand solvingset problems oftidal energy. | Tidal Energy | 2 H | 16 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | GeneralIntroduction to theoceanthermalenergyand theimportanceofthe economic andenvironmental point ofStatisticsandits own | Oceanthermalenergy | 2 H | 17 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | To identify thetypes ofthermal power plantsof the oceansand the types ofcycles andtheimportanceof environmentally, economically and kindsof turbinesandtheir own | Oceanthermalenergy | 2 H | 18 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Modeling ofoceanthermalenergy systemsand resolvingissuesespeciallythoseregimes | Oceanthermalenergy | 2 H | 19 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | GeneralIntroduction to thegeothermalenergyand importanceofthe economic andenvironmental point ofStatisticsandits own | Geothermal Energy | 2 H | 20 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | To identify thetypes ofthermal powerstationsundergroundandtypes of systemsandtheimportanceof environmentallyand economically | Geothermal Energy | 2 H | 21 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Modeling ofgeothermalenergy systemsand resolvesome of theissuestheseregulations | Geothermal Energy | 2 H | 22 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | To identify thesourcesof biomassenergyand importanceofthe economic andenvironmental point ofStatisticsandownand how tobe extract. | Biomass Energy | 2 H | 23 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Identification ofdiesel fuelandits sources andimportanceofthe economic andenvironmental point ofStatisticsandits ownand howextract it. | Biodiesel | 2 H | 24 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Identification of biofuelsandits sources andimportanceofthe economic andenvironmental point ofStatisticsandits ownand howextract it. | Biofuels | 2 H | 25 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | Identify thethermal, mechanical and chemical energystoragesystems | Energy storage systems | 2 H | 26 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | thermalenergystoragesystemswithmodelingtheir own | Energy storage systems | 2 H | 27 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | MechanicalEnergyStoragewithmodelingtheir ownsystems | Energy storage systems | 2 H | 28 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | ChemicalEnergyStoragewithmodelingtheir ownsystems | Energy storage systems | 2 H | 29 |
| Atheorytestsand claimspecialreports | The lecture,discussion, and video trucking | To identify thetypes offuel cellsandtheir specificationsandtheir importance | Fuel Cells | 2 H | 30 |

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| 12. Infrastructure | |
| * Fundamentals of Renewable Energy Processes, by (**Aldo Vieira da Rosa**), (2005) * Renewable Energy Resources, Second edition, (2006) by **John Twidell and Tony Weir**. * Introduction to Hydro Energy Systems, Basics, Technology and Operation. By (**Hermann-Josef Wagner & Jyotirmay Mathur**) (2011).   وكذلك مصادر اخرى من الانترنت. | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER |
| Distribution ofcomprehensive questionson the subjectand ask thestudentsolve | Special requirements(including, for example, to solvebasic and appliedengineeringissues)) |
| Discuss the importance ofrenewable energies,withsometechnicianson some occasions | Social services(including, for example, awarenessof specificsegment of the communityon the importance ofrenewable energysystems) |

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| 13. Admissions | |
|  | Pre-requisites |
| 10 | Minimum number of students |
| 30 | Maximum number of students |