**Minoufiya University,**

**Faculty of Engineering,**

**Electrical Eng. Dept.,**

**Post Graduate Studies and Research.**

**Minoufiya University**

Faculty of Engineering

**Course Specification**

***Title: Power Generation from Renewable Sources***

***Code Symbol: ELE 612***

***Department offering the course: Electrical Eng. Dept***

***Date of specification approval: / /2012***

***A- COURSE IDENTIFICATION AND INFORMATION:***

***B - Professional Information***

***B.1 Course Aims:***

This course aims provide the student, upon completing the electrical engineering program,

with the basic knowledge and skills of how to design and operating renewable energy power plant

(REP) types (Wind, Solar photovoltaic and solar cell) to integrated with power systems and

evaluate its impact on energy conservation and environment. This course will also provide students

with the ability to assess the generation of these RESs and economy. The skill of installing and

coordinating of different RESs configurations are also provided. It is also aimed that the student

will get acquainted with the applications of various RES types to accommodate the load energy

requirements considering the meteorological data at the installation site

***B.2 Course Objectives***

**1. Demonstration of the knowledge and understanding of the importance of operating REPs**

**(solar photovoltaic, solar thermal and wind Farms )**

**2. Definition of requirements for installing, operation and generation of REPs.**

**3. Evaluation the energy generation and its economy of the study type of REPs.**

**4. Assessment of the impact operating REPs on conventional energy conservation and**

**environment.**

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| Field | Programme ILOs that the course  contribute in achieving | Course ILOs |
| Knowledge&  Understanding | A1. Understand theory, basics and  practices of mathematics, sciences and  various electrical power and  machines engineering technologies. | a1-1) Explain the  principles physics of  electric power  generation. |
| A3. Understand the scientific  developments in electrical power and  machines engineering. | a3-1) Explain the  importance of  operating REPs. |
| A5. Understand quality basics for  working in the power and machines  engineering field. | a5-1) Analyzing and  understanding the  quality of energy  consumption in  residential buildings. |
| Intellectual skills | B1. Analyze and evaluate the data and  use it to solve electrical power and  machines problems. | b1-1) Select and  evaluate the  appropriate  mathematical solution  for REPs problems. |
| B2. Produce solutions to power and  machines problems through the  application of specific engineering  discipline knowledge based on limited  and possible information. | b2-1) Select the  appropriate computer  programming to solve  REPs problems based  on possible  information. |
| Professional and Practical Skills | C3. Evaluate the available methods  and tools in the power and machines  engineering field. | c3-1) Apply the  computer  programming for  characterizing  parameters of WECS. |

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| Field | Academic Reference Standards For Electrical Engineering Postgraduates  (ARSEP-ELE) | | | |
| Knowledge &  Understanding | Intellectual  Skills | Professional  and Practical  Skills | General and Transferrable  Skills |
| Programme  Academic Standards  that the course  contribute in  achieving | A1, A3, A5 | B1,B2 | C3,C4 | D1,D2,D3,D4,D5,D6,D7,D8 |

***B.3 Relationship between the course and the programme***

***B.4 Course Intended Learning Outcomes (ILOs)***

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|  | C4. Define, plan, analyze, and solve  the power and machines problems to  reach conclusions and compare the  results with others. | c4-1) Identify and  formulate the  generation energy  problems of wind  farms. |
| General and Transferrable  Skills | D1. Communicate effectively in  writing, verbally and through  illustrations and mathematical  equations. | d1-1) Effective  communication and  sharing ideas through  solving tutorials. |
| D2. Apply information technology  tools related to specific power and  machines discipline. | d2-1) Apply the  matrix technique all  over the course. |
| D3. Evaluate him-her and determine  his personal education needs. | d3-1) Measure his-her  level by ordinary  investigations in  regular times. |
| D4. Use different resources to obtain  knowledge and information. | .d4-1) Use textbooks,  and databases  information in  lectures. |
| D5. Put the rules and indicators to  evaluate performance of the others. | d5-1) Measure actual  performance against  expected performance. |
| D6. Work with a group and manage  the team. | d6-1) communicate  with a team work to  analyze certain  problems. |
| D7. Manage the time efficiently. | d7-1) Apply monthly  list of tasks that need  to be done |
| D8. Self and continuous learning. | d8-1) Apply an  introduction to  nuclear energy |

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| Topic  No. | General Topics | Weeks |
| 1st | Generation of solar PV power plant | 1 |
| 2nd | Interconnecting solar PV power plants with electric utility and its impact on  the generation cost | 2 |
| 3rd | Integrating solar thermal power plant with conventional thermal power plants | 3-4 |
| 4th | Generation of integrated solar thermal combined cycle | 5-6 |
| 5th | Economy of solar thermal generation | 7 |
| 6th | Interconnecting solar thermal combined cycle with electrical power system  and its impact on the energy generation costs | 8-9 |
| 7th | Generation of wind farms | 10-11 |
| 8th | Interconnecting wind farm with electrical power systems and its impact on  energy generation costs | 12 |
| 9th | Impact of operating REPs on the energy conservation and environment | 13-14 |
| 10th | An introduction to nuclear energy | 15 |

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***B.5 Course Topics.***

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| ***Week***  ***No.*** | ***Sub. Topics*** | ***Total***  ***Hours*** | ***Contact hrs*** | | | ***Course ILOs***  ***Covered (By No.)*** |
| **Lec.** | **Tut.** | **Lab.** |
| *Week-1* | Generation of solar PV power plant | 6 | 4 | 2 | - | a1-1, a3-1, a5-1, |
| *Week-2* |  Interconnecting solar PV power  plants with electric utility and its  impact on the generation cost | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1,b2-1, c3-1,  c4-1, |
| *Week-3* | Integrating solar thermal power plant  with conventional thermal power plants | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1,b2-1, c3-1,  c4-1, |
| *Week-4* | Integrating solar thermal power plant  with conventional thermal power plants | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1,b2-1, c3-1,  c4-1 |
| *Week-5* | Integrated solar thermal combined cycle | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1,b2-1, c3-1,  c4-1 |
| *Week-6* | Generation of integrated solar thermal  combined cycle | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1,b2-1, c3-1,  c4-1 |
| *Week-7* | Economy of solar thermal generation | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1, c3-1, c4-1 |
| *Week-8* | Interconnecting solar thermal combined  cycle with electrical power system | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1, c3-1, c4-1,  d6-1, d3-1, d5-1,  d6-1, d7-1, d8-1 |
| *Week-9* | Interconnecting solar thermal combined  cycle with electrical power system and  its impact on the energy generation  costs | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1, c3-1, c4-1,  d6-1, d3-1, d5-1,  d6-1, d7-1, d8-1 |
| *Week-*  *10* | Wind farms | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1, c3-1, c4-1,  d6-1, d3-1, d5-1,  d6-1, d7-1, d8-1 |
| *Week-*  *11* | Generation of wind farms | 6 | 4 | 2 | - | b1-1, c3-1, d1-  1,d2-1, d3-1, d4-1,  d5-1, d6-1, d7-1,  d8-1 |
| *Week-*  *12* | Interconnecting      wind      farm      with  electrical power systems and its impact  on energy generation costs | 6 | 4 | 2 | - | a1-1, a3-1, a5-1,  b1-1, c3-1, d1-  1,d2-1, d3-1, d4-1,  d5-1, d6-1, d7-1,  d8-1 |
| *Week-*  *13* | Impact of operating REPs on the energy  conservation |  |  |  |  | a1-1, a3-1, a5-1,  b1-1, c3-1, d1-  1,d2-1, d3-1, d4-1,  d5-1, d6-1, d7-1,  d8-1 |
| *Week-*  *14* | Impact      of      operating      REPs      on  environment |  |  |  |  | b1-1, c3-1, d1-  1,d2-1, d3-1, d4-1,  d5-1, d6-1, d7-1,  d8-1 |
| *Week-*  *15* | An introduction to nuclear energy |  |  |  |  | d1-1,d2-1, d3-1,  d4-1, d5-1, d6-1,  d7-1, d8-1 |



***B.6 Course Topics/hours/ILOS***

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| **Course Intended**  **learning outcomes**  **(ILOs)** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Knowledge &**  **understanding** | **a1-1** | **x** |  | **x** | **x** | **x** | **x** |  |  |  |  |  |  |  |
| **a3-1** | **x** |  | **x** | **x** | **x** | **x** |  |  |  |  |  |  |  |
| **a5-1** | **x** |  | **x** | **x** | **x** | **x** |  |  |  |  |  |  |  |
| **Intellectual**  **Skills** | **b1-1** | **x** |  | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |  |
| **b2-1** | **x** |  | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |  |
| **Professional**  **and practical**  **Skills** | **c3-1** | **x** |  | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |  |
| **c4-1** | **x** |  | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |  |
| **General and**  **Transferrable**  **Skills** | **d1-1** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |  |  |  |
| **d2-1** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |  |  |  |
| **d3-1** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |  |  |  |
| **d4-1** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |  |  |  |
| **d5-1** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |  |  |  |
| **d6-1** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |  |  |  |
| **d7-1** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |  |  |  |
| **d8-1** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** | **x** |  |  |

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| **Assessment Method** | **Mark** | **Percentage** |
| **Final Examination (*written*)** | **100** | **100%** |
| **Total** | **100** | **100%** |



**B.7*Teaching and Learning Method:***

**Selflearning**

**Presentation**

**andMovies**

**Cooperative**

**Discovering**

**Discussion**

**Modelling**

**Sitevisits**

**Problem**

**solving**

**Brain**

**storming**

**Tutorial**

**Projects**

**Lecture**

**Playing**

**B. 8*Assessments:***

***B.9 Facilities required for teaching and learning:***

***Weighting of assessments:***

**A. Library Usage:** Students should be encouraged to use library technical resources in the

preparation of reports.

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***B.10 List of references:***

**1- Michael Geyer and Volker ;"Solar Thermal Power" Renewable energy world ,**

**July-Aug 200**

**2- D.R Mills and C.Dey ;"Development strategies for Solar Thermal Electricity**

**Generation" Solar Energy , Vol.14,2001.**

**3- 3-British Wind Energy Association ;"Wind Energy Technology"**

**(http:\www.bwea.com\ref\tecohehtml).**

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**Course Coordinators:** **Head of Department**

**Prof. Dr. Abdel-Mohsen Kinawy** **Prof. Dr. Gamal Morsi**

**Prof. Atef Abd El-Hakim El-Zeftawy**

**Dr. Hala S. El-Sayed**

**Date:**