**ELEC4104 ENERGY DISTRIBUTION SYSTEMS
COURSE CATALOG INFO**

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| **Course Code :**ELEC4104 | **Course Name :**Energy Distribution Systems |
| **Semester** | **Lecture + Laboratory + PS** | **Local Credit** | **ECTS** | **Language** | **Category** | **Instructional Methods** | **Prerequisites** |
|  | (3+0+0) | 3 | 5 | English | Core | Course | ELEC3101 |
| **Course Content** | Power system overview. Electric industry structure. Single phase systems. Three phase systems. Complex power. Power factor correction. Y and Delta connected loads. Short medium long line models. Power factor correction. Power flow analysis. Bus admittance matrix. Power Flow Analysis via Gauss-Seidel (GS) and Newton-Raphson (NR) methods. Matlab for power systems analysis. |
| **Course Outcomes** |  **CO 1.** Define a basic power system and its elements, i.e. generation, transmission, distribution. **CO 2.** Analyze single phase systems, balanced three phase systems and solve the problems related to power factor correction, Y and Delta connected loads in these systems **CO 3.** Analyze short/medium/long line models via voltage and current waves and solve problems related to surge impedance loading, complex power flow, power transmission capability, line compensation. **CO 4.** Analyze and solve problems related to complex power flow using bus admittance matrix and source transformation. **CO 5.** Analyze and solve problems related to complex power flow using nonlinear algebraic equations based on Gauss-Seidel (GS) and Newton-Raphson (NR) methods. **CO 6.** Solve power flow equation to find line flows and losses using GS and NR methods. |
|  | **Program Outcomes** |
| **PO1** | Adequate knowledge in fundamentals of mathematics (algebra, differential equations, integrals, probability etc), science (physics, chemistry, biology etc.) and computer science (programming and simulation); ability to use theoretical and applied knowledge in these areas in complex engineering problems. |
| **PO2** | Ability to identify, define, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose. |
| **PO3** | Ability to design and integrate components of a complex system or process, as they relate to Electrical and Electronics Engineering discipline, under realistic constraints and conditions, in such a way as to meet desired requirements; ability to apply modern design methods. |
| **PO4** | Ability to devise, select, and use techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. |
| **PO5** | Ability to design and conduct experiments, gather, analyze and interpret data. |
| **PO6** | Ability to work in intra-disciplinary and multi-disciplinary teams; ability to take individual responsibilities. |
| **PO7** | Ability to effectively communicate in Turkish, ability to express his/her knowledge, ideas and work in English via oral, written and visual means; ability to write effective reports and comprehend written reports; ability to give and follow instructions. |
| **PO8** | Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself. |
| **PO9** | Consciousness to behave according to ethical principles, and about professional and ethical responsibility; knowledge on standards used in engineering practice. |
| **PO10** | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development. |
| **PO11** | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions. |

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| **CONTRIBUTION OF COURSE OUTCOMESONELECTRICAL AND ELECTRONICS ENGINEERING PROGRAM OUTCOMES** |
| **Course\Program** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** | **CO6** |
| **PO1** |  |  |  |  |  |  |
| **PO2** |  |  |  |  |  |  |
| **PO3** |  |  |  |  |  |  |
| **PO4** |  |  |  |  |  |  |
| **PO5** |  |  |  |  |  |  |
| **PO6** |  |  |  |  |  |  |
| **PO7** |  |  |  |  |  |  |
| **PO8** |  |  |  |  |  |  |
| **PO9** |  |  |  |  |  |  |
| **PO10** |  |  |  |  |  |  |
| **PO11** |  |  |  |  |  |  |

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| **COURSE ASSESMENT AND ECTS WORK LOAD** |
| **Type of Work** | **Count** | **ECTS WORK LOAD** |
| **Time (Hour)(Including prep. time)** | **Work Load** |
| Attendance | 14 | 3 | 42 |
| Final Exam | 1 | 2 | 2 |
| Quizzes |  |  | 0 |
| Term project |  |  | 0 |
| Reports |  |  | 0 |
| Final Project |  |  | 0 |
| Seminar |  |  | 0 |
| Assignments |  |  | 0 |
| Presentation |  |  | 0 |
| Midterms |  |  | 0 |
| Project |  |  | 0 |
| Laboratory |  | 0 | 0 |
| Tutorial |  | 0 | 0 |
| Other(Self study) |  |  | 0 |
|  | **Total work load** | 44 |
|  | **Total work load/25** | 1.76 |
|  | **ECTS Credit** | 2 |