**ELEC4102 HIGH VOLTAGE TECHNIQUE  
COURSE CATALOG INFO**

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| **Course Code :**ELEC4102 | | | | | **Course Name :**High Voltage Technique | | | |
| **Semester** | | **Lecture + Laboratory + PS** | **Local Credit** | **ECTS** | **Language** | **Category** | **Instructional Methods** | **Prerequisites** |
|  | | (3+0+0) | 3 | 5 | English | Core | Course | ELEC2202OR ELEC2212O |
| **Course Content** | | | | Review of electromagnetic theory. Breakdown in capacitors. Breakdown in gases and liquids. Townsend’s ionization. Suspended particle theory. Bubble and cavitation theory. Breakdown in solid dielectrics. Half-wave and full-wave rectifiers. Voltage doublers and multipliers. Tesla transformers. Resonant transformers. Impulse voltage generators and lightning generators. Spice simulations and Matlab for HV circuits. | | | | |
| **Course Outcomes** | | | | **CO 1.** Analyze and solve certain kind of problems in Electric field theory related to HV engineering.  **CO 2.** Solve breakdown problems in planar, cylindrical and spherical coordinate multi-dielectric capacitors.  **CO 3.** Analyze the conduction and breakdown phenomenon in gaseous dielectrics, derive the breakdown criteria for primary, secondary and electronegativity types of ionization in gaseous insulators.  **CO 4.** Analyze the conduction and breakdown phenomenon in liquid dielectrics, derive the breakdown criteria using suspended particle theory, bubble and cavitation theory in liquid insulators.  **CO 5.** Analyze the conduction and breakdown phenomenon in solid dielectrics, derive the breakdown criteria due to cavities in solids.  **CO 6.** Analyze and design of HV DC half-wave/full-wave rectifiers, voltage doublers/multipliers, Van De Graff generators.  **CO 7.** Analyze and design of HV AC generators made of cascade transformer, tesla transformers, resonant transformers, impulse voltage generators. | | | | |
|  | **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 OUTCOMES ON ELECTRICAL AND ELECTRONICS ENGINEERING PROGRAM OUTCOMES** | | | | | |
| **Course\ProgramZ** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** | **CO6** | **CO7** |
| **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 |