



**ESOGU ELECTRICAL - ELECTRONICS ENGINEERING DEPARTMENT
COURSE INFORMATION FORM**

| Course Title | Course Code |
|-------------------------|-------------|
| Power System Analysis I | 151227457 |

| Semester in Program | Number of Course Hours per Week | | ECTS |
|---------------------|---------------------------------|----------|------|
| | Theory | Practice | |
| 7 | 3 | 0 | 5 |

| Course ECTS Credit Distribution | | | | |
|---------------------------------|----------------------|--------|-------------------|--------|
| Basic Sciences | Engineering Sciences | Design | General Education | Social |
| | 3 | | | |

| Language of Instruction | Course Level | Course Type |
|-------------------------|---------------|-------------|
| English | Undergraduate | Elective |

| | |
|---------------------------------|--|
| Prerequisite | |
| Objectives of the Course | This course will help the students to understand the theory and the techniques involved in the modeling and analysis of power system components and networks. Moreover, they will learn how such modeling and analysis is used in the design and planning of power systems. |
| Brief Course Content | Introduction to power system analysis, review of phasors, instantaneous power, complex power, and elementary aspects of balanced three-phase circuits, power transformers, transmission line parameters, steady state operation of transmission lines, symmetrical components. |

| Learning Outcomes of the Course | Contributed POs | Teaching Methods * | Assessment Methods ** |
|--|-----------------|--------------------|-----------------------|
| 1 Learn the analysis of balanced three-phase circuits. | 1 | Lecture | Exam |
| 2 Learn the modeling and analysis of power transformers. | 2 | Lecture | Exam |
| 3 Learn the transmission line parameters. | 2 | Lecture | Exam |
| 4 Learn the modeling and the analysis of the transmission lines | 3 | Lecture | Exam |
| 5 Perform the transmissions line voltage regulation and the loadability analysis | 3 | Lecture | Exam |
| 6 Apply the line compensation techniques. | 4 | Lecture | Exam |
| 7 | | | |
| 8 | | | |

*Teaching Methods 1:Lecture, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Problem Solving, 11:Individual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation

**Assessment Methods A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam

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|----------------------------------|--|
| Main Textbook | J. D. Glover, M. S. Sarma "Power System analysis and Design," Brooks/Cole publishing, 5th Edition, 2010. |
| Supplementary Resources | |
| Necessary Course Material | |

| Course Weekly Schedule | |
|------------------------|---|
| 1 | Introduction to power system analysis |
| 2 | Phasors, instantaneous power in single and three-phase systems, complex power |
| 3 | Balanced three-phase circuits |
| 4 | Equivalent circuit of practical transformers and per-unit systems |
| 5 | Power transformers |
| 6 | Transmission line parameters |
| 7 | Medium and short transmission lines |
| 8 | Mid-Term Exams |
| 9 | Transmission line differential equations and equivalent π circuit |
| 10 | Lossless lines and maximum power flow |
| 11 | Line loadability |
| 12 | Line loadability |
| 13 | Reactive compensation techniques |
| 14 | Reactive compensation techniques |
| 15 | Symmetrical components |
| 16,17 | Final Exams |

| Calculation of Course Workload | | | |
|---|-------|-------------|-----------------------|
| Activities | Count | Time (Hour) | Total Workload (Hour) |
| Weekly classroom time | 14 | 3 | 42 |
| Weekly study time (review, reinforcing, preparation) | 14 | 5 | 70 |
| Homework | | | |
| Taking a quiz | | | |
| Studying for a quiz | | | |
| Oral exam | | | |
| Studying for an oral exam | | | |
| Report writing (Preparation and presentation time included) | | | |
| Project (Preparation and presentation time included) | | | |
| Presentation (Preparation time included) | | | |
| | | | |
| | | | |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
| Total workload | | | 134 |
| Total workload / 30 | | | 4.46 |
| Course ECTS Credit | | | 5 |

| Assessment | |
|----------------------|----|
| Activity Type | % |
| Mid-term | 45 |
| Quiz | |
| Final Exam | 55 |

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|--------------|-----|
| Total | 100 |
|--------------|-----|

| COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low) | | |
|---|--|---------------------|
| NO | PROGRAM OUTCOMES | Contribution |
| 1 | a. Sufficient knowledge of mathematics | |
| | b. Sufficient knowledge of basic sciences | |
| | c. Sufficient basic engineering and Electrical-Electronics engineering knowledge | 4 |
| | d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems | |
| 2 | Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods. | 4 |
| 3 | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. | 3 |
| 4 | To analyze and solve the complicated engineering problems: | 3 |
| | a. skill of developing, selecting and applying the required techniques and devices | |
| | b. skill of using information technologies effectively | |
| 5 | To study the complicated on the complicated Electrical-Electronics engineering problems and research subjects: | |
| | a. skill of experimental design | |
| | b. skill of performing the experiments, collecting the data and analyzing and interpreting the results | |
| 6 | a. Skill of performing individual studies | |
| | b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | |
| 7 | a. Skill of effective oral and writing communication in Turkish | |
| | b. Skill of improving and using foreign language knowledge | |
| | c. Skill of effective reporting, understanding the reports and preparing the design and production reports | |
| | d. Skill of effective presentation and giving and getting clear and understandable instructions. | |
| 8 | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | |
| 9 | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | |
| | b. Knowledge about legal regulations and standards of engineering | |
| 10 | a. Knowledge about project management, risk management and change management | |
| | b. Awareness of the significance of entrepreneurship and innovation | |
| | c. Knowledge about sustainable development | |
| 11 | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of Electrical-Electronics engineering; and awareness of the legal issues resulting from engineering solutions | |
| 12 | Knowledge about modern problems in local and universal scale | |

| LECTURER(S) | | | | |
|---------------------|-----------------------------|--|--|--|
| Prepared by | Assoc.prof.Dr Atabak NAJAFI | | | |
| Signature(s) | | | | |

Date:06.07.2024