ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
ELECTRIC AND COMPUTER ENGINEERING PROGRAM
COURSE DESCRIPTION AND SYLLABUS

Course Title	Code	Semester	T+L Hours	Credit	ECTS
Electric Power Distribution System Engineering	ECE-553	FALL-SPRING	3 + 0	3	10

Prerequisite Courses	None

Type	Selective
Language	English
Coordinator	Assist. Prof Dr. Ahmet Onen
Instructor	Assist. Prof Dr. Ahmet Onen
Adjunt	none
Aim	Power distribution system modelling, primary and secondary system, voltage control and capacitor control and usage of a programming language during the course of these analysis.
Learning Outcomes	• learn the operating principlesof distribution systems • learn the the operating principles of distribution transformers • learn the techniques of designing distribution substation • learn the the operating principles of primary systems • learn how to calculate of power losses and voltage drop • learn application of capacitors in distribution systems • learn how to mitigate harmonic into distribution system and designing harmonic filters
Course Content	• Introduction to Distribution Systems • Load Characteristics and Nature of Loads • Application of Distribution Transformers • Design of Subtransmission Lines and Distribution Substation • Design Considerations of Primary Systems • Design Considerations of Secondary Systems • Voltage Drop and Power Loss Calculations • Application of Capacitors to Distribution Systems • Distribution System Voltage Regulation • Power System Harmonics • Distributed generators (if time allowed)

WEEKLY TOPICS AND PRELIMINARY STUDY

Week	Topic	Preliminary Study
1	Introduction to Distribution systems: Demand, Demand factor, Diversity factor, Plant factor, utilization factor, loss factor, annual peak	
2	Load Characteristics: Customer class type load, residential, commercial load, constant current, constant power and constant impedance loads	
3	Distribution Transformer design: learining type of distribution transformer and their charteristics	
4	Distribution Transformer applications: Operating principles of distribution transformer	
5	Design of distribution substation: Operating principles, analysis and design criterias	
6	MIDTERM EXAM 1	
7	Primary distribution Systems: Operation principle of primary distribution system and their differences from secondary systems	
8	Secondary distribution Systems: Operation principle of secondary distribution system and their differences from primary systems	
9	Voltage Drop and Power Loss Calculations: Voltage drops and transient effects on voltage and calculation of losses with voltage drops	
10	Application of Capacitors: compansation of reactive power by using capacitors, capacitor calculation and usage in distribution systems	
11	MIDTERM EXAM 2- or review of presentation	
12	Distribution System Voltage Regulation: importance of voltage regulation, how to regulate voltage by using voltage regulator or oher control devices	

13	Power System Harmonics: what makes harmonic, total distortion calculation of current and voltage with respect to harmonic	
14	Power distribution system power quality: power quality problem with harmonic and elimination of harmonics, voltage flicker and arc flash study	
15	Distributed generators: Usage of controlled distributed generation and their entegration into the systems.	
16	Final Exam	

SOURCES	
Lecture Notes	Lecture slides
Other Sources	1. "Electric Power Distribution Engineering", Turan Gonen, 3nd Edition, 2014, CRC Press. RECOMMENDED BOOKS: 1. Class Notes from AGU

COURSE MATERIALS SHARING	
Documents	Lecture notes, slides
Homeworks	Students will be given one homework each week
Exams	1 Midterm and 1 Final Exam

EVALUATION SYSTEM		
SEMESTER STUDY	**NUMBER**	**CONTRIBUTION**
Midterm	1	20
Homework	14	25
Quiz	14	25
SUB-TOTAL		70
Contribution of Semester Study		70
Contribution of Final Exam	1	30
TOTAL		100

Course Category	
Sciences and Mathematics	30%
Engineering	70%
Social Sciences	0%

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS

No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	The skills of using mathematics, science and engineering information in advanced research,					**x**
2	The skills of analyzing, designing and/or implementing an original system that will be able to solve an engineering problem,					**x**
3	The skills of using the required software, hardware and modern measurement equipments in their field of research,					**x**
4	The skills of planning independent research and implementing in detail,					**x**
5	The skills of following literature, listening to and making technical presentation, writing a paper in academic level,				**x**	
6	The skills of innovative and interrogative thinking and finding original solutions				**x**	

*Increasing from 1 to 5.

ECTS / WORK LOAD TABLE			
Activities	Number	Duration (Hours)	Total Work Load
Course Length (includes exam weeks: 16x total course hours)	16	3	48
Out-of-class Study Time (Pre-study, practice)	16	5	90
Internet search, library work, literature search	16	4	64

Presentation	7	3	21
Homework	16	4	64
Midterm	1	15	15
Final Exam	1	20	20
Total Work Load			322
Total Work Load / 30			322/30
Course ECTS Credit			10