| Date | Spring 2019-2020 | Credits | 3 credits |
|---------------------|------------------------------------|----------------------------|-----------|
| Course Title | Electrical Distribution Systems | Course Number | EEE458 |
| Pre-requisite (s) | None | Co-requisite (s) | None |
| Hours | 45 hours | Out Of Class Work Hours | 90 Hours |

Place and Time of Class Meeting

Wednesday 14:00-16:50 @ C310

Name and Contact Information of Instructor

Asst. Prof. Omer Cihan Kivanc @ C215 e-mail: cihan.kivanc@okan.edu.tr

Book required

T. Gönen, "Electric Power Distribution System Engineering", McGraw-Hill Book Company, 1986.

Classroom expectations for students

Attendance Policy

Students are liable to attend every course, practical and laboratory work of the program they are enrolled and to take the exams and participate in academic work required for achieving the course. Student attendance to all courses is compulsory. Students who do not attend a minimum 70% of the theoretical courses and 80% of the practical courses will be considered as absent for the related courses. Students who do not meet the mandatory minimum requirement of attendance will fail the course. Students who fail a course for not fulfilling minimum attendance requirement are obliged to meet the attendance requirement when they re-take the course.

Student Tardiness Policy

Students are permitted to arrive to the class in the first 15 minutes after the scheduled start of the course; extension of tardiness time is in instructor's discretion.

Course Description (must correspond exactly to Catalog description)

The purpose of this course is to introduce following topics: Properties of electrical energy and energy distribution systems. Line constants and calculation methods. Effect of abnormal voltages

on apparatus and machines. Fundamentals of line conductor cross-section determinations. Lines loaded from a point. Energy distribution networks. Lines loaded with point loads and their cross-section calculations. Distributed loads and power densities. Cross-section calculations on compact and distributed load lines. Determination of transformation locations, and calculations of powers. Towers, calculation of side-wing forces and determination of tower types. Preparation fundamentals of low voltage energy distribution network projects.

Learning Objectives

At the end of this course students will be able to:

- Describe the properties of electrical energy and energy distribution systems.
- Understand the Line constants and calculation methods, effect of abnormal voltages on apparatus and machines
- Understand the fundamentals of line conductor cross-section determinations and lines loaded from a point, lines loaded with point loads and their cross-section calculations
- Describe energy distribution networks.
- Calculate the distributed loads and power densities, Cross-section calculations on compact and distributed load lines
- Determine the transformation locations, and calculations of powers
- Calculate Towers, side-wing forces and determination of tower types
- Prepare fundamentals of low voltage energy distribution network projects

Topical Outline and Schedule

| DATE | WEEK 1 |
|-------------------|---|
| SPECIFIC | Introduction to electrical distribution systems |
| OBJECTIVES | |
| TOPIC (S) | • Syllabus |
| | • Properties of electrical energy and energy distribution systems |
| LEARNING | Discussion of syllabus |
| ACTIVITIES | Discussion of examples |
| | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 2 |
|-------------------|---|
| SPECIFIC | Fundamental definitions of electrical distribution lines and networks |
| OBJECTIVES | |
| TOPIC (S) | Line constants and calculation methods |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 3 |
|-------------------|---|
| SPECIFIC | Effects of unbalanced operations |
| OBJECTIVES | |
| TOPIC (S) | • Effect of abnormal voltages on apparatus and machines |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 4 |
|-------------------|--|
| SPECIFIC | Design and determinations of power system components and effects |
| OBJECTIVES | of their sizing |
| TOPIC (S) | • Fundamentals of line conductor cross-section determinations |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 5 |
|-------------------|---|
| SPECIFIC | Load characteristics and their effects to the network |
| OBJECTIVES | |
| TOPIC (S) | Lines loaded from a point |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 6 |
|-------------------|------------------------------|
| SPECIFIC | Network types |
| OBJECTIVES | |
| TOPIC (S) | Energy distribution networks |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 7 |
|-------------------|--|
| SPECIFIC | Design and determinations of power system loads and effects of their |
| OBJECTIVES | sizing |
| TOPIC (S) | • Lines loaded with point loads and their cross-section calculations |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 8 |
|-------------------|---------------------------------------|
| SPECIFIC | Power flow within network |
| OBJECTIVES | |
| TOPIC (S) | Distributed loads and power densities |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 9 |
|-------------------|--------------------------------------|
| SPECIFIC | • Evaluate students via midterm exam |
| OBJECTIVES | |
| TOPIC (S) | Midterm Exam |
| | |
| LEARNING | None |
| ACTIVITIES | |
| OUT OF | None |
| CLASS | |
| WORK | |
| ASSIGNMENT | |

| DATE | WEEK 10 |
|-------------------|--|
| SPECIFIC | Design and determinations of distributed load lines and effects of |
| OBJECTIVES | their sizing |
| TOPIC (S) | • Cross-section calculations on compact and distributed load lines |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 11 |
|-------------------|--|
| SPECIFIC | Transformer load types and effects of transformer's location on |
| OBJECTIVES | network |
| TOPIC (S) | • Determination of transformation locations, and calculations of |
| | powers |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGMENT | |

| DATE | WEEK 12 | | |
|-------------------|--|--|--|
| SPECIFIC | Tower types and force analysis | | |
| OBJECTIVES | | | |
| TOPIC (S) | • Towers, calculation of side-wing forces and determination of tower | | |
| | types | | |
| LEARNING | Discussion of examples | | |
| ACTIVITIES | Example problems | | |
| OUT OF | Review the Class Notes | | |
| CLASS | | | |
| WORK | | | |
| ASSIGMENT | | | |

| DATE | WEEK 13 | |
|-------------------|---|--|
| SPECIFIC | Design process and fundamental criteria for low voltage distribution | |
| OBJECTIVES | network project | |
| TOPIC (S) | • Preparation fundamentals of low voltage energy distribution network | |
| | projects | |
| LEARNING | Discussion of examples | |
| ACTIVITIES | Example problems | |
| OUT OF | Review the Class Notes | |
| CLASS | | |
| | | |

| WORK | |
|-----------|--|
| ASSIGMENT | |

| DATE | WEEK 14 |
|-------------------|--|
| SPECIFIC | • Analyze and design of example applications |
| OBJECTIVES | |
| TOPIC (S) | Example Circuits |
| LEARNING | Discussion of examples |
| ACTIVITIES | Example problems |
| OUT OF | Review the Class Notes |
| CLASS | |
| WORK | |
| ASSIGNMENT | |

| DATE | | WEEK 15 |
|-------------------|------|----------------------------------|
| SPECIFIC | • | Evaluate students via final exam |
| OBJECTIVES | | |
| TOPIC (S) | • | Final Exam |
| LEARNING | None | |
| ACTIVITIES | | |
| OUT OF | None | |
| CLASS | | |
| WORK | | |
| ASSIGNMENT | | |

Instructional Methods

In developing methodological strategies, it is best to discuss them between teachers and students in an environment of freedom and mutual agreement in order to ensure that the students make them their own and take responsibility for their execution and for attaining the goals of this course.

The following strategies may be used in this class:

- 1. A review of the literature.
- 2. Check of the reading.
- 3. Analysis of assigned readings.
- 4. Group discussions.
- 5. Individual and group discussions.
- 6. Preparation of reports.
- 7. Preparation of a didactic plan.
- 8. Carrying out a micro-class.

Instructional Materials and References

T. A. Short, "Electric Power Distribution Equipment and Systems", 2006.Anthony j. Pansini, "Guide to Electrical Power Distribution Systems", CRC Pres, 2005.Westinghouse Electric Corporation, "Electric Utility Engineering Reference Book-Distribution Systems", 1965.

Assessment Criteria and Methods of Evaluating Students

| Grade | Coefficient |
|-------|-------------|
| AA | 4.00 |
| ВА | 3.50 |
| ВВ | 3.00 |
| СВ | 2.50 |
| СС | 2.00 |
| DC | 1.50 |
| DD | 1.00 |
| FF | 0.00 |
| VF | 0.00 |

| Distribution of Grade Elements | | |
|--------------------------------|----------|------------|
| In-Term Studies | Quantity | Percentage |
| Homework | 7 | 30 |
| Midterm | 1 | 30 |
| | | |
| Total | | 60 |
| End-Term Studies | Quantity | Percentage |
| Final | 1 | 40 |

| Total | | 40 |
|--|--|-----|
| Contribution Of In-Term Studies To Overall Grade | | 60 |
| End-Term Studies | | 40 |
| Total | | 100 |