

Academic Course Description

King Saud University
Electrical Engineering Department
EE435 Electric Drives
First Semester 1426/27 (2005/2006)

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Textbook: The recommended textbook is: “Electric Motor Drives, *Modeling, Analysis and Control*”, by R Krishnan published by Prentice Hall. Students are encouraged and expected to consult other books in the general area of Electric Drives.

Support references: “Power Semiconductor Controlled Drives”, by Gopal K. Dubey, Prentice Hall, 1989.

Prerequisites: EE331 & EE432.

Co requisites by Topics:

- Review of Control Engineering.
- DC machines: theory, applications, steady-state and dynamic performance.
- AC machines: theory, applications and steady-state performance.

Course Objectives:

- The course provides basic understanding of types of electrical drives and mechanical loads and their joint characteristics
- The course provides basic understanding of performance of electromechanical systems under steady-state, transient, and intermittent operations
- The course provides basic understanding of the main principles of DC drives, AC drives and various modes of operation and control of electrical drives.
- Use of electronic in performance improvement of variable speed drives and its industrial applications.

Topics Covered: Principal of electric drive. Definitions; Electrical considerations: running, starting, braking. Mechanical consideration: types of enclosure, noise, drive transmission, motor selection. Electric traction; DC & AC solid state drives.

Class Tutorial Schedule: Class is held three times per week in 50 minute lecture sessions. There is also a 50 min weekly tutorial associated with this course.

Relationship to Program Objectives: This course contributes to the general objectives listed for an Electrical Engineering Department.

Relationship to the Program:

Objective A: Students will have the ability to apply knowledge of mathematics, physics, and circuit analysis, this course supports the objective of producing graduates with a strong foundation in basic science.

Objective B: Students will have the ability to identify, formulate, and solve engineering problems by applying methodologies learned in the course to actual design problems, this course supports the objective of producing graduates with a strong foundation in electrical engineering.

Objective C: By encouraging the students to participate in the class; acquire and develop a communication skills; problem solving skills in both an individual and team environment, this course supports the objective of producing graduates with good communication skills.

Objective D: Students will have the ability to learn ethical and professional standards in dealing with real life, and to develop an awareness of the impact of electrical machines on society.

Objective E: By teaching student how to design a speed control schemes of AC and DC motors, this course supports the objective of producing graduates with the relevant engineering design experience.

Laboratory Experiments: None

Evaluation: Method of Evaluation is as follows:

Category	Percentage
First Exam	20 %
Second Exam	20%
Attendance in class	10%
Quizzes and tutorial home-work.	10%
Final Exam	40 %

Attendance Policy: According to KSU policy, every student should attend at least 75% of the course classes (Including the tutorials). Those who fail to fulfill this condition will fail in the course.

Weekly Teaching Plan

Week #	Topics
1	Introduction to power semiconductor controlled drives.
2	Running, starting and breaking of electric drive systems.
3	Revision of speed control of DC motors
4	Single-phase rectifier control of DC drives.
5	Three-phase rectifier control of DC drives.
6	Chopper control of DC drives.
7	Closed loop control of DC drives.
8	Revision the principles of speed control of induction motors.
9	Control of induction motor by AC voltage controllers.
10	Variable-frequency control of induction machines part I.
11	Variable-frequency control of induction machines part II.
12	Slip power controlled wound-rotor induction motor drives.
13	Starting and breaking of synchronous motors.
14	Speed control of synchronous motors.