POWE 333 Electric Machines and Drives

COURSE SYLLABUS FALL 2017

Curricular Area	**Mechanical Engineering**
Type of Course	Mandatory
Catalogue Description	Single-Phase and 3-phase Transformers; Power Transmission and Distribution; DC Machines, Motors; Synchronous Generators; Poly-Phase Induction Motors.
Prerequisites by Courses	POWE210 and POWE238
Prerequisites by Topics	Physics, Electric Circuits, and Power Electronics
Instructor	Dr. Khaled Chahine k.shahine@bau.edu.lb (Please allow 24-48 hours to return your correspondence during week days.) Engineering Building – Department of Electrical and Computer Engineerin Office G111 (Ext: 3404)
Office Hours	Mondays →10:00-12:00 Tuesdays →10:00-12:00 Thursdays →12.00-14:00
Load	3 credits: two 75-minute lectures per week
Textbook	Electric Machinery Fundamentals, 5th edition, Stephen J. Chapman, McGraw-Hill
Topics	*Subjects covered*
	DC motor construction, theory, operation, characteristics and control
	Alternator construction, theory, operation, characteristics and control
	Single-phase transformer construction, theory, operation, and characteristics.
	Three phase transformer connection and performance
	Poly-phase induction motor construction, theory, operation, characteristics, starting and control
	Single-phase induction motor types, construction, theory, operation, characteristics, starting.
	Power transmission and distribution

Course Schedule:

WEEK	CHAPTER	LECTURES
WEEK 1	CHAPTER 2: TRANSFORMERS	LECTURE 1: COURSE OVERVIEW LECTURE 2: 2.2, 2.3, 2.5
WEEK 2	CHAPTER 2: TRANSFORMERS	LECTURE 3: 2.5, 2.6 LECTURE 4: 2.6, 2.7
WEEK 3	CHAPTER 2: TRANSFORMERS	LECTURE 5: PROBLEM SOLVING LECTURE 6: 2.10
WEEK 4	CHAPTER 2: TRANSFORMERS	LECTURE 7: 2.12, PROBLEM SOLVING LECTURE 8: PROBLEM SOLVING
WEEK 5	CHAPTER 7: DC MACHINERY FUNDAMENTALS	LECTURE 9: 7.1, 7.3 LECTURE 10: 7.3, 7.4
WEEK 6	CHAPTER 7: DC MACHINERY FUNDAMENTALS CHAPTER 8: DC MOTORS	LECTURE 11: 7.5, 7.7, PROBLEM SOLVING LECTURE 12: 8.2, 8.3, 8.4
WEEK 7	CHAPTER 8: DC MOTORS	LECTURE 13: 8.6, 8.7 LECTURE 14: 8.10, PROBLEM SOLVING
WEEK 8	CHAPTER 3: AC MACHINERY FUNDAMENTALS	LECTURE 15: 3.2, 3.4, 3.5 LECTURE 16: 3.5, 3.7, PROBLEM SOLVING
WEEK 9	CHAPTER 4: SYNCHRONOUS GENERATORS	LECTURE 17: 4.1, 4.2, 4.3 LECTURE 18: 4.4, 4.5
WEEK 10	CHAPTER 4: SYNCHRONOUS GENERATORS	LECTURE 19: 4.6, 4.8 LECTURE 20: 4.9, 4.11
WEEK 11	CHAPTER 4: SYNCHRONOUS GENERATORS	LECTURE 21: PROBLEM SOVING LECTURE 22: PROBLEM SOLVING
WEEK 12	CHAPTER 6: INDUCTION MOTORS	LECTURE 23: 6.1, 6.2, 6.3 LECTURE 24: 6.4, 6.5
WEEK 13	CHAPTER 6: INDUCTION MOTORS	LECTURE 25: 6.8, 6.9, 6.10 LECTURE 26: PROBLEM SOLVING
WEEK 14	CHAPTER 9: INTRODUCTION TO SINGLE-PHASE INDUCTION MOTORS AND THREE-PHASE SYNCHRONOUS MOTORS	LECTURE 27: 9.2, 9.3, 9.4 LECTURE 28: 5.1, 5.2. 5.3

Homework:

Homework #	*Chapter*	*Problems*	*Due date*
1	Chapter 2	Uploaded to iConnect	End of chapter. Exact due date to be announced in class.
2	Chapter 8	Uploaded to iConnect	End of chapter. Exact due date to be announced in class.
3	Chapter 4	Uploaded to iConnect	End of chapter. Exact due date to be announced in class.
4	Chapter 6	Uploaded to iConnect	End of chapter. Exact due date to be announced in class.

Homework should be **clearly** presented i.e.:

1. It should be written on A4 paper. The problem number should be clearly shown, and the problems must be organized in ascending order. **One** problem is allowed on each side of the paper. **Do not** write two or more problems on the same face of the sheet.
2. Each necessary figure that is part of the solution must be neatly drawn.
3. It should include a title page (Course Name, Semester, Date, Name…).
4. Papers should be **stapled** together.

Grade Breakdown:

Assessments	*Dates*	*Weight*
Assessment 1	Week 5	25%
Assessment 2	Week 10	25%
Homework	Due at the end of each chapter	10%
Final Exam	TBA	40%

ABET Student Outcomes (a-k)

a an ability to apply knowledge of mathematics, science and engineering
b an ability to design and conduct experiments, as well as to analyze and interpret data
c an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d an ability to function on multidisciplinary teams
e an ability to identify, formulate, and solve engineering problems
f an understanding of professional and ethical responsibility
g an ability to communicate effectively
h the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i a recognition of the need for, and an ability to engage in life-long learning
j a knowledge of contemporary issues
k an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Learning Outcomes:

On successfully completing this course, students should be able to:

1. **Illustrate** the construction and the basic principles of operation of transformers, DC motors, synchronous generators and induction motors. **(a)**
2. **Determine** the equivalent circuit models of transformers, DC motors, synchronous generators and induction motors. **(e)**
3. **Analyze** the behavior of transformers and electrical machines under different load conditions. **(e)**
4. **Explain** speed control techniques of DC and induction motors. **(a)**
5. **Determine** the efficiency of real transformers and electrical machines. **(e)**

Attendance:

Per BAU regulations specified in the student manual, students who miss more than ***one-fifth*** of the sessions of any course in the first ten weeks of the semester will be required to withdraw from the course with a grade of "WF".