MUTAH UNIVERSITY
Faculty of Engineering
Department of Electrical Engineering

Course Syllabus

Course Code	Course Name	Credits	Contact Hours
0401488	Power Systems Lab	1	2 T

INSTRUCTOR/COORDINATOR	
Name	Dr. Talal Aljaafreh
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Office Hours	12.00:1.00 (Mon)

TEXTBOOK	
Title	Electric Power Transmission System
Author/Year/Edition	Theodore Wildi/1993/1st Edition
Other Supplemental Materials	
Title	LabVolt Lab. manual
Author/Year/Edition	

SPECIFIC COURSE INFORMATION
A. Brief Description of the Content of the Course (Catalog Description)
Experiments in power system simulation, transmission lines, power flow, load compensation, symmetrical and unsymmetrical faults, harmonics, stability and transient characteristics.
B. Pre-requisites (P) or Co-requisites (C)
Electric Machines Lab (0401479) **(P)** Power Systems (2) (0401482) **(P)**
C. Course Type (Required or Elective)
Required

SPECIFIC GOALS

A. Course Learning Outcomes (CLOs)

By the end of this course, the student should be able to:

CLO1: Develop understanding of the basic concepts of load flow, fault analysis, transient stability, and voltage regulation [6].

CLO2: To model, build and predict power system behavior for different operating conditions [6].

CLO3: Apply this knowledge to design power transmission and distribution systems to meet needs [6].

CLO4: To Work effectively in groups (teamwork) by sharing discuss and analyze the results [5].

B. Student Learning Outcomes (SOs) Addressed by the Course

1	2	3	4	5	6	7
				✓	✓	

BRIEF LIST OF TOPICS TO BE COVERED

List of Topics	No. of Weeks	Contact Hours
Lab introduction	1	2
Power System Simulation Simulation which include all system stages	1	2
Real Power and Reactive Power To interpret the meaning of positive, negative, real and reactive power. To observe the flow of real and reactive power in three phase circuits.	1	2
Power flow and voltage regulation of a simple transmission line To observe the flow of real and reactive power in a three-phase transmission line with known, passive, loads. To observe the voltage regulation at the receiver end as a function of the type of load.	1	2
Phase angle and voltage drop between sender and receiver To regulate the receiver end voltage. To observe the phase angle between the voltages at the sending and the receiving end of the transmission line. To observe the line voltage drop when the sending and receiving end voltages have the same magnitude.	1	2
Parameters which affect real and reactive power flow To observe reactive power flow when sender and the receiver voltages are different, but in phase. To observe real power flow when sender and the receiver voltages are equal, but out of phase. To study the flow of real and reactive power when sender and the receiver voltages are different and out of phase.	1	2
Parallel lines, transformers and power handling capacity Study of the real power vs phase angle curve of a transmission line. Use of transformers to in crease the power-handling capacity of a line. Transmission lines in parallel.	1	2

The Synchronous Motor To observe the behavior of a synchronous motor connected to an infinite bus.	1	2
The Synchronous condenser and long high voltage lines To show how a synchronous capacitor can regulate the receiver voltage. To study bus.	1	2
Transmission line networks and the buck boost, phase shift transformer To observe the division of power between two transmission lines in parallel. To learn the properties of a three-phase regulating autotransformer. To modify the power division between two parallel lines with a three phase regulating autotransformer.	1	2
The Synchronous Motor under load To observe the behavior of a synchronous motor under load.	1	2
Hunting and system oscillation To observe the hunting of a synchronous motor. To study how inertia and reactance affect the frequency of oscillation.	1	2
Power system transients To observe voltage and power fluctuations under abnormal transmission line condition. To observe voltage and power fluctuations under due to line switching.	1	2
Fault Analysis	1	2
Total	*14*	*28*

EVALUATION		
Assessment Tool	**Due Date**	**Weight (%)**
Mid Exam	According to the university calendar	20
Reports	One week after being assigned	40
Final Exam	According to the university calendar	40

ABET's Students Learning Outcomes (Criterion # 3)		
	Relationship to program outcomes	
ABET 1-7		**Engineering Student Outcomes**
1		an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

2		an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3		an ability to communicate effectively with a range of audiences.
4		an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5	√	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6	√	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7		an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.