Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	**Erbil Technology College**	
Department	**Department of Electricity**	
Module Name	**Net Work Programing**	
Module Code		
Degree	**Bachelor**	
Semester	**6**	
Qualification	**Ms.c**	
Scientific Title	**Assistant Lecture**	
ECTS (Credits)	**8**	
Module type	**Core**	
Weekly hours	**6**	
Weekly hours (Theory)	**(2)hr Class**	**(118) Total hrs Workload**
Weekly hours (Practical)	**(2)hr Class**	**(64) Total hrs Workload**
Number of Weeks	**12**	
Lecturer (Theory)	**Abubaker aziz ahmed**	
E-Mail & Mobile NO.	**abubaker.ahmed@epu.edu.iq**	**07504889179**
Lecturer (Practical)	**Martn ,Ibrahim**	
E-Mail & Mobile NO.		
Websites		

Course Book

Course Description	• Power System Analysis is one of the core functions of the planning unit of any power transmission or distribution utility. It is a highly skilled task and requires to be performed for transmission/distribution planning, on regular basis. Such analyses are undertaken by carrying out different power system studies to simulate, analyze and optimize the network, using specially designed simulation software. (Some of the popular software are MATLAB, , PSS/E, ASPIN, Power World Simulator, DigSilent-Power Factory). Power system planning and analysis tools have become a necessity for organizations throughout the electric power industry to address increasing complexity in modern grid systems. Precision of the analyses depends on the quality of the software and more importantly on the skills and experience of the engineer/planner handling the software.
Course objectives	• Power System Simulation for Engineering (PSS/E) is composed of a comprehensive set of programs for studies of power system transmission network and generation performance in both steady-state and dynamic conditions. Currently two primary simulations are used, one for steady-state analysis and one for dynamic simulations. PSS/E can be utilized to facilitate calculations for a variety of analyses, including: • Power flow and related network functions • Optimal power flow • Balanced and unbalanced faults • Network equivalent construction • Dynamic simulation, The lab manuals that will be considered throughout the duration of this course will be primarily focused on power flow, dynamic simulations will not be explained. PSS/E uses a graphical user interface that is comprised of all the functionality of state analysis; including load flow, fault analysis, optimal power flow, equivalency, and switching studies. In addition, to the steady-state and dynamic analyses, PSS/E also provides the user with a wide rage of auxiliary programs for installation, data input, output, manipulation and preparation. Furthermore, one of the most basic premises of PSS/E is that the engineer can derive the greatest benefit from computational tools by retaining intimate control over their application. • ASPEN is a process simulation software package widely used in industry. Given a process design and an appropriate selection of thermodynamic models, ASPEN uses mathematical models to predict

<table>
<tr><td></td><td>the performance of the process. This information can then be used in an iterative fashion to optimize the design.</td></tr>
<tr><td>Student's obligation</td><td>
The students should attend the theoretical lectures and study them very well to understand them and ask about any part which is not clear, also the students should have daily examinations about the previous lecture and solve the homework questions.
For the practical part the students should attend in time every week to make the experiment and prepare a report about it, in addition the students should have daily exams about the previous experiment and of course there will exams at the end of each term At the end of the semester the students should have both practical and theoretical examinations.
Missed classes will not be compensated including the quizzes and the scheduled assignments. The students will lose marks on unattended classes with quizzes unless a legal document or authorized leave is presented which should explain the excuse of the absence. However, the absent student should take the responsibility for making up the missed lecture.

1. Regular attendance to classes.(must not be exceed to 10%)
2. Written tests clearly linked to learning objectives.
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<tr><td>Required Learning Materials</td><td>
Forms of teaching
Lecturing style in theory and laboratory in practice.
Studentes take course laboratory in (Kurdistan Regional Government | Ministry of Electricity) in central of training
Means of explanation:
1. Data show and power point
2. White board
3. Live software on line KRG Electric net work.
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<tr><td>Evaluation</td><td>
<table>
<tr><th colspan="2">Task</th><th>Weight (Marks)</th><th>Due Week</th><th>Relevant Learning Outcome</th></tr>
<tr><td colspan="2">Paper Review</td><td></td><td></td><td></td></tr>
<tr><td rowspan="6">Assignments</td><td>Homework</td><td>14%</td><td></td><td></td></tr>
<tr><td>Class Activity</td><td>2%</td><td></td><td></td></tr>
<tr><td>Report</td><td></td><td></td><td></td></tr>
<tr><td>Seminar</td><td>10%</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Quiz</td><td>4%</td><td></td><td></td></tr>
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	Lab.	14%		
	Midterm Exam(P+T)	16%		
	Final Exam (P+T)	40%		
	Total	100%		

Specific learning outcome:	**Student learning outcome:** 1. Describe the working principle of a PSS/E software . 2. Describe the working principle of a ASPEN software .
Course References:	**Key references**: every references about two softwares 1. PSS/E software 2. ASPEN software

Course topics (Theory)	**Week**	**Learning Outcome**
• Introduction to the Characteristics of Power Grids Introduction to Power System Simulation Software - PSSE	1	
• Power System Fundamentals a. Three-phase System b. Active Power c. Reactive Power d. Per Unit System	2	
• Series Impedance of Transmission Lines a. Line Resistance b. Inductance of a Single-Phase Two-Wire Line c. Inductance of Three-Phase Lines d. Inductance Calculations for Bundled Conductors	3	
• Capacitance of Transmission Lines a. Capacitance of a Two-Wired Line b. Capacitance of a Three-Phase Line c. Capacitance Calculations for Bundled Conductors	4	
• Representation of Lines a. Short Line b. Medium-Length Line c. Long Line d. Transmission Line Equivalent Circuit	5	
• Load Flow Analysis of Radial Systems Single-Machine-Infinite-Bus System	6	
• Voltage Control a. Reactive Power Flow b. Shunt Compensation c. Series Compensation d. Transformer Tap Changing	7	

• Voltage Control a. Reactive Power Flow b. Shunt Compensation c. Series Compensation d. Transformer Tap Changing	8	
• Natural and Step Responses of RLC Circuits	9	
• Introduction to ASPEN software.	10	
• ASPEN software	11	
• ASPEN software	12	
Practical Topics: The laboratory will involve simulation in analyses in KRG MINNESTRY ELECTRIC LAB , along with the corresponding subject in the lectures. A brief outline of the simulations and analyses to be done are as follows:	**Week**	**Learning Outcome**
• Introduction to PSS/E software and covers the objective and motivatio the course, and an introduction in KRG. Via PSS/E.	1	
• Introduction to name plate data and specification of (conductor, transformer, transmission line, bus bar and generator)	2	
• Simulation of simple grid via PSS/E software.	3	
• Simulation of simple grid via PSS/E software.	4	
• Simulation of simple grid via PSS/E software. And analyses	5	
• Power flow and contingency analysis, So, students will learn the theory on power flow and contingency analysis, and the skills of solving problems using PSS/E software.	6	
• Fault analysis, covers the theoretical basis of symmetrical and unbalanced fault analysis, and how to carry out fault analysis using PSS/E.	7	
• Transient analysis, The electromagnetic transient phenomenon is introduced (analysis using PSS/E.)	8	
• Power system stability analysis, Power angle stability phenomenon and equal area criterion are introduced. The concept of critical clearing time is covered; how to practically obtain this parameter for a system under a specific disturbance by gradually changing the	9	

tripping time of the protection system is illustrated.(analysis using PSS/E.)		
• Introduction to ASPEN software.	10	
• ASPEN software	11	
• ASPEN software	12	

Questions Example Design

1-Compositional:

2-Multiple choices:

3-Problems

Extra notes:

External Evaluator

- This course book have been reviewed, resigned and approved by (Hussain Ali Ibrahim.) former lecturer of this subject.

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