Course Title	**Electric Power Systems**
Course Code	**EE4403**
No. of Credit Hrs (Lecture + Tutorial + Lab)	**4 (3+0+1)**
No. of Contact Hrs (Lecture + Tutorial + Lab)	**5 (3+0+2)**
Level-Year	**7-4**
Prerequisite (if any)	**EE3300**

1) Course Objectives:

This is an introductory course for the modern power system. It introduces the main structure of power system (generation, transmission, and distribution) including divisions and basic components. It discusses the concept of per-unit system and per-unit quantities representation on impedance and reactance diagrams. The course explains transmission line parameters calculations, lines modeling and performance evaluation. Finally, this course concludes all of the above by performing power flow analysis for an interconnected power system under normal operation. Since fault analysis is a crucial part of power system designing process, balanced fault analysis is performed.

2) Expected Learning Outcomes:

Upon completion of this course, the students will be able to:

1. **Explain** the structure, function, and main components of electric power systems, including their interactions. **PLO1 [1]**
2. **Design and model** transmission lines and evaluate their performance under practical operating conditions. **PLO2 [2]**
3. **Apply** the concept of the per-unit system to simplify and analyze power system calculations. **PLO1 [1]**
4. **Analyze and investigate** power systems using power flow analysis to assess system operation. **PLO3 [6]**
5. **Perform and simulate** studies on transmission line modeling, power flow, and fault analysis, and interpret results. **PLO3 [6]**
6. **Communicate** technical findings effectively by preparing structured reports on power system performance and fault analysis. **PLO8 [3]**

3) Course Contents:

1. An overview of Power System.
2. Basic Concepts: Representation, Equivalent circuit and P-U system.
3. Transmission Line Parameters.
4. Transmission Line Model and Performance Evaluation.
5. Power Flow Analysis.
6. Balanced Faults.

4) Course Contents lab:

Conduct experiments to cover the following topics

1. Introduction to MATLAB.
2. Introduction to Power World.
3. Medium Transmission Line Modeling: ABCD Parameters Determination (MATLAB).
4. Long Transmission Line Modeling: ABCD Parameters Determination (MATLAB).
5. Formation of Y-Bus and Z-Bus Matrices Using Inspection Method (MATLAB).
6. Power Flow Study Using Gauss-Seidel and Newton-Raphson Methods (Power World).
7. Balanced Fault Analysis (Power World).

5) Teaching Methods:

- Lectures and Discussion
- Videos
- Self-learning
- Laboratory demonstrations

6) Mode of Evaluation:

Course Assessment Methods

- Quizzes , Assignment, Homeworks, Reports, Presentations etc.
- Lab Work
- Mid Exam
- Final Exam

Evaluation

No	Assessment Activities *	Percentage
1.	Assignments/Quizzes/HomeWorks/Mini-Projects/Presentations/Reports+Quizzes	15%
2.	Mid Exam	25%
3.	Lab/Tutorial (Lab Exam)	10%
4.	Lab/Tutorial (Lab Reports)	10%
5.	Final Exam	40%

7) Textbook(s):

- Hadi Saadat, "Power System Analysis" McGraw-Hill, 3rd Edition
- J. Duncan Glover, "Power system Analysis and Design" CENGAGE Learning, 5th Edition
- John J. Grainger, William D. Stevenson " Power System analysis" McGraw-Hill, 4th Edition.
- Lab Manual

8) References

- Alarainy, et…," Fundamentals of electrical power engineering", King Saud Univ., academic press.
- Gross CA, "Power System analysis" John Wiley.