University of Jordan
School of Engineering
Department of Electrical Engineering
1st Term – A.Y. 2017-2018

Course: Power Systems Quality – 0923788 (3 Cr. – Elective Course)

Catalog Data: Transients: impulsive and oscillatory. Long-duration voltage variations: overvoltage, under voltage, and sustained interruptions. Short-duration voltage variations: interruptions, sags (dips), and swells. Voltage imbalance. Voltage fluctuation. Power frequency variations. Wave distortion: dc offset, notching, noise interharmonics, and harmonics. Harmonic distortion, harmonic distortion indices, power and power factor, effects of harmonic distortional Mitigation of harmonics. Sources of harmonics and modeling. Computer tools for harmonic analysis . Monitoring power Quality. Solution to power quality problems. Standards and regulations/ Study Cases.

Prerequisites by Course: None

Textbook:

- Dugan, McGranaghan, Santoso, and Beaty, "Electrical Power Systems Quality", McGraw-Hill, 2nd Ed., 2003

References:

- Francisco C. De Larose, "Harmonics and Power Systems" , CRC 2006.
- Jos Arrillaga, Neville R. Watson "Power System Harmonics", 2nd Edition, John Wiley & Sons, Ltd, 2004.

Schedule & Duration: 16 Weeks, 48 lectures, 50 minutes each (including exams).

Course Objectives:

This course is designed to give the students a comprehensive overview of the phenomena of electric power system Quality and Harmonics.

Course Learning Outcomes and Relation to Program Learning Outcomes:

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

1. identify and classify power quality disturbances, their causes, and their impact on electric equipment [i,ii]
2. become familiar with the most important and widely used industry standards to control harmonic distortion levels as well as the terminology used in power quality engineering [i,ii, iii].
3. to recommend appropriate mitigation techniques for power quality problems [ii,iii].
4. understanding the definition and modeling of power system harmonics under nonsinusoidal situations [iii].
5. describe the different sources of harmonics such as DC and AC motor drives, large electric furnaces, electric welders, battery chargers, electronic ballasts, and switching mode power supplies [i,ii].
6. understand the effects of harmonics on the residential, commercial, and industrial customers [i, ii].

7. understand the principle of operation and design of single-tuned and high-pass passive filters as one of the most effective methods to mitigate the effects of harmonics [i, ii,iii,iv].

Course Topics:

Topic	Description	Contact Hours
T.1.	Electrical Power Systems Quality Problems: Terms And Definitions.	3
T.2.	Voltage Sag, swell and Interruptions	6
T.3.	Long-Duration Voltage Variations	6
T.4.	Power System Harmonic Distortion and Power Quality Indices	6
T.5.	Harmonic Source Modelling	6
T.6.	Harmonic Mitigation & Control	6
T.7.	Harmonic Analysis	6
T.8.	Harmonic Filter Design	6

Computer Usage: students are encouraged to write/use computer programs for mathematical modelling.

Attendance: Class attendance will be taken and the University policy on absence will be followed.

Assessments: Exams

Grading policy:

Semester work	60 %
Final Exam	40 %
Total	100%

Instructor:

Instructor Name	Office	Ext.	E-mail
Dr. Eyad A. Feilat	E 305	22839	e.feilat@ju.edu.jo

Program learning outcomes

i Demonstate a sound, in-depth and up-to-date technical knowledge in the field of specialization.

ii Ability to identify and solve engineering problems in their chosen field of study.

iii Acquir the skills for continued professional development and independent self-study.

iv Demonstrate the ability to communicate technical informatiom effectively and professionally both orally and in writing..

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