10- Course Specification of: Electrical Power Quality Course Code (PME549)

I. General Information About the Course:

1.	**Course Title:**	**Electrical Power Quality**			
2.	**Course Code and Number:**	**PME549**			
3.	**Credit Hours:**	**Credit Hours**			**Total**
		Lecture	Practical	Seminar/Tutorial	
		3	-	-	**3**
4.	**Study Level and Semester:**	**2nd Semester**			
5.	**Pre-requisites (if any):**	Power Electronics, Renewable Energy Technologies.			
6.	**Co-requisites (if any):**	None			
7.	**Program (s) in which the course is offered:**	MSc. in Electrical Power Engineering Program			
8.	**Language of teaching the course:**	English			
9.	**Study System:**	Courses & Thesis			
10.	**Prepared By:**	Dr. Adel Ahmed Al-Shakiri			
11.	**Reviewed by:**	Prof. Dr. Omar Hassan Al-Sakaf			
12.	**Date of Approval:**				

II. Course Description:

Both electric utilities and end users of electric power are becoming increasingly concerned about the quality of electric power. Newer-generation load equipment, with microprocessor-based controls and power electronic devices, is more sensitive to power quality variations than was equipment used in the past. The increasing emphasis on overall power system efficiency has resulted in continued growth in the application of devices such as high-efficiency, adjustable-speed motor drives and shunt capacitors for power factor correction to reduce losses. This is resulting in increasing harmonic levels on power systems.

This course provides an introduction to power quality and harmonics phenomena in electric power systems. It covers topics such as voltage sags, electrical transients, harmonics, mitigation techniques, and standards of power quality and harmonics.

III. Course Intended Learning Outcomes (CILOs):

Upon successful completion of Electrical Power Quality Course, the graduates will be able to:

a1 - Understand issues on power quality phenomena, classifications, measuring and monitoring methods and mitigation techniques.

a2 - Recognize the effects of power quality in modern power systems in the supply and demand side.

a3 - Define the problems and factors dealing with power quality issues.

b1 - Evaluate parameters of the equipment needed to diagnose power in order to determine quality and the presence of harmonics.

b2- Analyze the power quality characteristics to select the suitable components for a better power quality.

c1- Apply specialist technical tools to determine power quality and harmonics in a variety of contexts.

c2- Develop specialist practices to ensure efficiency in both transmission and distribution of quality power.
c3 - Compare different standards and safety codes related to calculation of power quality parameters.
d1- Acquire new advanced knowledge related to power quality and power system in general.
d2 - Demonstrate, independently and in groups, the ability to plan, organize and implement a power quality project based on a problem of relevance to efficiency of power system.

IV. Alignment of Course Intended Learning Outcomes (CILOs) to Program Intended Learning Outcomes (PILOs)

CILOs		PILOs
a. Knowledge and Understanding: Upon successful completion of **the Electrical Power Quality Course**, the graduates will be able to:		**A. Knowledge and Understanding:** Upon successful completion of the **MSc. in Electrical Power Engineering Program**, the graduates will be able to:
a1.	Understand issues on power quality phenomena, classifications, measuring and monitoring methods and mitigation techniques.	**A1.** Demonstrate in-depth understanding of the theory and practice of modern electrical power systems design and operation and system identification.
a2.	Recognize the effects of power quality in modern power systems in the supply and demand side.	**A2.** Recognize and comprehend the key role of sustainable energy for national and global sustainable development.
a3.	Define the problems and factors dealing with power quality issues.	**A3.** Explain in detail the key considerations and challenges of sustainable design and development of modern electrical power system components.
b. Cognitive/ Intellectual Skills: Upon successful completion of the **Electrical Power Quality Course,** the graduates will be able to:		**B. Cognitive/ Intellectual Skills:** Upon successful completion of the **MSc. in Electrical Power Engineering Program,** the graduates will be able to:
b1.	Evaluate parameters of the equipment needed to diagnose power in order to determine quality and the presence of harmonics.	**B1.** Identify and apply specialized knowledge and skills to solve problems that are critical to future growth of industry and business.
b2.	Analyze the power quality characteristics to select the suitable components for a better power quality.	**B2.** Critically review the scientific literature for effective justification and support of results and decisions.
c. Professional and Practical Skills: Upon successful completion of the **Electrical Power Quality Course,** the graduates will be able to:		**C. Professional and Practical Skills:** Upon successful completion of the **MSc. in Electrical Power Engineering Program,** the graduates will be able to:

c1.	Apply specialist technical tools to determine power quality and harmonics in a variety of contexts.	**C1.** Apply modern tools for research, computation, simulation, analysis, and design of modern power systems. .
c2.	Develop specialist practices to ensure efficiency in both transmission and distribution of quality power.	**C2.** Recognize the interdisciplinary nature of technical problems and apply other areas of knowledge to the solution, and work with other professions to arrive at a solution for complex engineering problems.
c3.	Compare different standards and safety codes related to calculation of power quality parameters.	C3 Employ design standards and safety codes as an integral part of the design and building process for machine parts and systems.
d. Transferable Skills: Upon successful completion of the **Electrical Power Quality Course,** the graduates will be able to:		**D. Transferable Skills:** Upon successful completion of the **MSc. in Electrical Power Engineering Program,** the graduates will be able to:
d1.	Acquire new advanced knowledge related to power quality and power system in general	**D1.** Demonstrate leadership skills in the workplace, to function professionally in a globally competitive world, and to communicate engineering results effectively. .
d2.	Demonstrate, independently and in groups, the ability to plan, organize and implement a power quality-project based on a problem of relevance to efficiency of power system.	**D2.** Realize the relevance of economics, ethics and teamwork to the profession.

V. Alignment of CILOs to Teaching and Assessment Strategies

a. Alignment of Knowledge and Understanding CILOs:

Knowledge and Understanding CILOs		Teaching Strategies	Assessment Strategies
a1.	Understand issues on power quality phenomena, classifications, measuring and monitoring methods and mitigation techniques.	▪ Lectures, ▪ Self-Learning	▪ Written Exam,
a2.	Recognize the effects of power quality in modern power systems in the supply and demand side.	▪ Lectures, ▪ Seminars, ▪ Self-Learning Problems/Studies,	▪ Written Exam, ▪ Assignments
a3.	Define the problems and factors dealing with power quality issues.	▪ Lectures, ▪ Case study,	▪ Written Exam, ▪ Assignments

b. Alignment of Intellectual Skills CILOs:

Intellectual Skills CILOs		Teaching Strategies	Assessment Strategies
b1.	Evaluate parameters of the equipment needed to diagnose power in order to determine quality and the presence of harmonics.	▪ Lectures, ▪ Simulation Exercises, ▪ Analysis and Problem Solving,	▪ Reports, ▪ Survey, ▪ Written Exam, ▪ Assignments

b2.	Analyze the power quality characteristics to select the suitable components for a better power quality.	▪ Lectures, ▪ Self-Learning, ▪ Simulation Exercises, ▪ Analysis and Problem Solving,	▪ Reports, ▪ Survey, ▪ Written Exam, ▪ Assignments

c. Alignment of Professional and Practical Skills CILOs:

Professional and Practical Skills CILOs		Teaching Strategies	Assessment Strategies
c1.	Apply specialist technical tools to determine power quality and harmonics in a variety of contexts.	▪ Lectures, ▪ Case Study, ▪ Simulation Exercises,	▪ Written Research Proposal,
c2.	Develop specialist practices to ensure efficiency in both transmission and distribution of quality power.	▪ Lectures, ▪ Case Study, ▪ Simulation Exercises,	▪ Written Research Proposal
c3.	Compare different standards and safety codes related to calculation power quality parameters.	▪ Lectures, ▪ Case Study, ▪ Analysis and Problem Solving,	▪ Seminar Report, ▪ Written Research Proposal,

d. Alignment of Transferable (General) Skills CILOs:

Transferable (General) Skills CILOs		Teaching Strategies	Assessment Strategies
d1.	Acquire new advanced knowledge related to power quality and power system in general	▪ Dissertation Defenses and Presentation, ▪ Independent Study, ▪ Presenting Researches, ▪ Publish Research Papers.	▪ Written Research Proposal ▪ Written Exam, ▪ Assignments, ▪ Survey, ▪ Written Report.
d2.	Demonstrate, independently and in groups, the ability to plan, organize and implement a power quality-project based on a problem of relevance to efficiency of power system.	▪ Dissertation Defenses and Presentation, ▪ Independent Study, ▪ Presenting Researches, ▪ Publish Research Papers.	▪ Written Research Proposal ▪ Assignments, ▪ Written Report.

VI. Course Content

1. Theoretical Aspect

Order	Topic List / Units	Sub -Topics List	Number of Weeks	Contact Hours	Course ILOs
1	Introduction: Power Quality Terms, Definitions and Standards.	▪ What's Power Quality? ▪ Power Quality-Voltage Quality ▪ Why we are concerned about Power Quality. ▪ The Power Quality evaluation procedure ▪ General classes of power quality problems. ▪ Transients. ▪ Long duration voltage variations. ▪ Short-duration voltage variations. ▪ Voltage imbalance ▪ Waveform distortion, voltage fluctuations, ▪ Power frequency variations, power quality standards and terms.	1	3	a.1, a.2, b.1, b.2
2	Voltage Sags and Interruption	▪ Sources of Sags and Interruptions ▪ Estimating Voltage Sag Performance ▪ Fundamental Principles of Protection ▪ Solutions at the End-User Level ▪ Motor-Starting Sags ▪ Utility System Fault-Clearing Issues	2	6	a.1, a.2, b.1, b.2, c.1, c.2, d.1, d.2
3	Transient Overvoltages.	▪ Sources of Transient Overvoltages ▪ Principles of Overvoltage Protection ▪ Devices for Overvoltage Protection ▪ Utility Capacitor-Switching Transients ▪ Utility System Lightning Protection ▪ Managing Ferroresonance ▪ Switching Transient Problems with Loads ▪ Computer Tools for Transients Analysis	2	6	a.1, a.2, b.1, b.2, c.1, c.2, d.1, d.2
4	Fundamentals of Harmonics.	▪ Harmonic Distortion ▪ Voltage versus Current Distortion ▪ Harmonics versus Transients ▪ Harmonic Indexes ▪ Harmonic Sources from Commercial Loads ▪ Harmonic Sources from Industrial Loads ▪ Locating Harmonic Sources ▪ System Response Characteristics ▪ Effects of Harmonic Distortion ▪ Interharmonics	2	6	a.1, a.2, b.1, b.2, c.1, c.2, d.1, d.2
	Mid-Term Exam		1	3	All

5	Applied Harmonics	▪ Harmonic Distortion Evaluations ▪ Principles for Controlling Harmonics ▪ Where to Control Harmonics ▪ Harmonic Studies ▪ Devices for Controlling Harmonic Distortion ▪ Harmonic Filter Design: A Case Study ▪ Case Studies ▪ Standards of Harmonics	**1**	**3**	a.1, a.2, b.1, b.2, c.1, c.2, d.1, d.2
6	Long Duration Voltage Variations.	▪ Principles of Regulating the Voltage ▪ Devices for Voltage Regulation ▪ Utility Voltage Regulator Application ▪ Capacitors for Voltage Regulation ▪ End-User Capacitor Application ▪ Regulating Utility Voltage with Distributed Resources ▪ Flicker	**1**	**3**	a.1, a.2, b.1, b.2, , c.1, c.2, d.1, d.2
7	Power Quality Benchmarking	▪ Benchmarking Process ▪ RMS Voltage Variation Indices ▪ Harmonics Indices ▪ Power Quality Contracts ▪ Power Quality Insurance ▪ Power Quality State Estimation ▪ Including Power Quality in Distribution Planning	1	3	a.1, a.2, b.1, b.2, c.1, c.2, d.1, d.2
8	Distributed Generation DG and Power Quality	▪ Resurgence of DG ▪ DG Technologies ▪ Interface to the Utility System ▪ Power Quality Issues ▪ Operating Conflicts ▪ DG on Distribution Networks ▪ Siting DG Distributed Generation ▪ Interconnection Standards	2	6	a.1, a.2, b.1, b.2, c.1, c.2, d.1, d.2
9	Wiring and Grounding	▪ Resources ▪ Definitions ▪ Reasons for Grounding ▪ Typical Wiring and Grounding Problems ▪ Solutions to Wiring and Grounding Problems	1	3	a.1, a.2, b.1, b.2, c.1, c.2, d.1, d.2
10	Power Quality Monitoring	▪ Monitoring Considerations ▪ Historical Perspective of Power Quality Measuring Instruments ▪ Power Quality Measurement Equipment ▪ Assessment of Power Quality Measurement Data ▪ Application of Intelligent Systems ▪ Power Quality Monitoring Standards	1	3	a.1, a.2, b.1, b.2, c.1, c.2, d.1, d.2
	Final Exam		1	3	All
Number of Weeks /and Contact Hours Per Semester			**16**	**48**	

2. Practical Aspect	NA			
Order	**Practical / Tutorials topics**	**Number of Weeks**	**Contact Hours**	**Course ILOs**
1	▪			
2	▪ ▪			
Number of Weeks /and Contact Hours Per Semester				

3. Tutorial Aspect:		NA		
No.	**Tutorial**	**Number of Weeks**	**Contact Hours**	**Learning Outcomes (CILOs)**

VII. Teaching Strategies:

- Lectures,
- Seminars,
- Self-Learning
- Presentations,
- Case studies
- Analysis and Problem Solving,
- Simulation Exercises

VIII. Assessment Methods of the Course:

- Assignments
- Reports,
- Written Exams.

IX. Tasks and Assignments:

No	Assignments/ Tasks	Individual/ Group	Mark	Week Due	CILOs (symbols)
1	Research work	Individual	10	3. 5, 7, 9	a1, a2, b1, b2, d1, d2
2	Mini-Project	Group	10	11	a1, a2, b1, b2, d1, d2
3	Case studies	Group	5	6, 8	a1, a2, b1, b2, d1, d2
4	Presentations	Individual	5	2, 4, 6, 8, 10, 12	a1, a2, b1, b2, d1, d2
	Total Score		**30**	==	===

X. Learning Assessment:

No.	Assessment Tasks	Week due	Mark	Proportion of Final Assessment	CILOs
1	Tasks and Assignments	3,4,5,6	30	20%	a1, a2, b1, b2, d1, d2
2	Quizzes	7,9,11,13	15	10%	a1, a2, b1, b2, c1, c2, c3
3	Midterm Exam	8	30	20%	All

5	Final Exam (Theoretical)	16	75	50%	All
Total			**150**	**100%**	**===**

XI. Learning Resources :

1. Required Textbook(s) :

1. Dugan Roger C, McGranaghan M F, Santoso S and Beaty H Wayne, Electrical Power Systems Quality, 3rd edition, McGraw-Hill, 2012.
2. C. Sankaran, Power Quality, CRC Press LLC 2002.

2. Essential References:

1. Alexander Kusko, Marc T. Thompson, Power Quality in Electrical Systems, McGraw-Hill, 2007.
2. Barry W. Kennedy, Power Quality Primer, McGraw-Hill, 2000.

3. Electronic Materials and Web Sites *etc.*

1. Course Power Point.
2. Video clips.
3. Links to information resources.

• **الضوابط والسياسات المتبعة في المقرر Course Policies**	
بعد الرجوع للوائح الجامعة يتم كتابة السياسة العامة للمقرر فيما يتعلق بالآتي:	
سياسة حضور الفعاليات التعليمية Class Attendance: **- يلتزم الطالب بحضور 75% من المحاضرات ويحرم في حال عدم الوفاء بذلك.** **- يقدم أستاذ المقرر تقريرا بحضور وغياب الطلاب للقسم ويحرم الطالب من دخول الامتحان في حال تجاوز الغياب 25% ويتم اقرار الحرمان من مجلس القسم.**	**1**
الحضور المتأخر Tardy: **- يسمح للطالب حضور المحاضرة إذا تأخر لمدة ربع ساعة لثلاث مرات في الفصل الدراسي، وإذا تأخر زيادة عن ثلاث مرات يحذر شفويا من أستاذ المقرر، وعند عدم الالتزام يمنع من دخول المحاضرة.**	**2**
ضوابط الامتحان Exam Attendance/Punctuality: **- لا يسمح للطالب دخول الامتحان النهائي إذا تأخر مقدار (20) دقيقة من بدء الامتحان** **- إذا تغيب الطالب عن الامتحان النهائي تطبق اللوائح الخاصة بنظام الامتحان في الكلية.**	**3**
التعيينات والمشاريع Assignments & Projects: **- يحدد أستاذ المقرر نوع التعيينات في بداية الفصل ويحدد مواعيد تسليمها وضوابط تنفيذ التكليفات وتسليمها.** **- إذا تأخر الطالب في تسليم التكليفات عن الموعد المحدد يحرم من درجة التكليف الذي تأخر في تسليمه.**	**4**
الغش Cheating: **- في حال ثبوت قيام الطالب بالغش في الامتحان النصفي أو النهائي تطبق عليه لائحة شؤون الطلاب.** **- في حال ثبوت قيام الطالب بالغش او النقل في التكليفات والمشاريع يحرم من الدرجة المخصصة للتكليف.**	**5**
الانتحال Plagiarism: **– في حالة وجود شخص ينتحل شخصية طالب لأداء الامتحان نيابة عنه تطبق اللائحة الخاصة بذلك**	**6**
سياسات أخرى Other policies: **- أي سياسات أخرى مثل استخدام الموبايل أو مواعيد تسليم التكليفات ..... الخ**	**7**

Course Plan (Syllabus): Electrical Power Quality

I. Information about Faculty Member Responsible for the Course:

Name	**Dr. AdelAl-Shakiri**	**Office Hours**					
Location &Telephone No.	Faculty of Engineering, 772771672	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail	**ashakiri62@gmail.com**						

II. General information about the course:

1.	**Course Title**	**Electrical Power Quality**			
2.	**Course Code and Number**	**PME549**			
3.	**Credit Hours**	**Credit Hours**			**Total**
		Lecture	**Practical**	**Seminar/Tutorial**	
		3	-	-	**3**
4.	**Study Level and Semester**	**2nd Semester**			
5.	**Pre-requisites**	Power Electronics, Renewable Energy Technologies.			
6.	**Co –requisite**	None			
7.	**Program (s) in which the course is offered**	MSc. In Electrical Power Engineering Program			
8.	**Language of teaching the course**	**English**			
9.	**Location of teaching the course**	**Electrical Engineering Department**			

III.Course Description:

Both electric utilities and end users of electric power are becoming increasingly concerned about the quality of electric power. Newer-generation load equipment, with microprocessor-based controls and power electronic devices, is more sensitive to power quality variations than was equipment used in the past. The increasing emphasis on overall power system efficiency has resulted in continued growth in the application of devices such as high-efficiency, adjustable-speed motor drives and shunt capacitors for power factor correction to reduce losses. This is resulting in increasing harmonic levels on power systems.

This course provides an introduction to power quality and harmonics phenomena in electric power systems. It covers topics such as voltage sags, electrical transients, harmonics, mitigation techniques, and standards of power quality and harmonics.

IV. Course Intended Learning Outcomes (CILOs):

Upon successful completion of Electrical Power Quality Course, the graduates will be able to:

a1 - Understand issues on power quality phenomena, classifications, measuring and monitoring methods and mitigation techniques.

a2 - Recognize the effects of power quality in modern power systems in the supply and demand side.

a3 - Define the problems and factors dealing with power quality issues.

b1 - Evaluate parameters of the equipment needed to diagnose power in order to determine quality and the presence of harmonics.

b2- Analyze the power quality characteristics to select the suitable components for a better power quality.

c1- Apply specialist technical tools to determine power quality and harmonics in a variety of contexts.

c2- Develop specialist practices to ensure efficiency in both transmission and distribution of quality power.

c3 - Compare different standards and safety codes related to calculation of power quality parameters.

d1- Able to acquire new advanced knowledge related to power quality and power system in general.

d2 - Demonstrate, independently and in groups, the ability to plan, organize and implement a power quality project based on a problem of relevance to efficiency of power system.

V. Course Content:

- **Theoretical Aspect:**

Order	Units	Sub Topics	Week Due	Contact Hours
1	Introduction: Power Quality Terms, Definitions and Standards.	▪ What's Power Quality? ▪ Power Quality-Voltage Quality ▪ Why we are concerned about Power Quality. ▪ The Power Quality evaluation procedure ▪ General classes of power quality problems. ▪ Transients. ▪ Long duration voltage variations. ▪ Short-duration voltage variations. ▪ Voltage imbalance ▪ Waveform distortion, voltage fluctuations, ▪ Power frequency variations, power quality standards and terms.	**1**	**3**
2	Voltage Sags and Interruption	▪ Sources of Sags and Interruptions ▪ Estimating Voltage Sag Performance ▪ Fundamental Principles of Protection ▪ Solutions at the End-User Level ▪ Motor-Starting Sags ▪ Utility System Fault-Clearing Issues	**2,3**	**6**
		▪ ▪		
3	Transient Overvoltages.	▪ Sources of Transient Overvoltages ▪ Principles of Overvoltage Protection ▪ Devices for Overvoltage Protection ▪ Utility Capacitor-Switching Transients ▪ Utility System Lightning Protection ▪ Managing Ferroresonance ▪ Switching Transient Problems with Loads ▪ Computer Tools for Transients Analysis	**4,5**	**6**
4	Fundamentals of Harmonics.	▪ Harmonic Distortion ▪ Voltage versus Current Distortion ▪ Harmonics versus Transients ▪ Harmonic Indexes ▪ Harmonic Sources from Commercial Loads ▪ Harmonic Sources from Industrial Loads ▪ Locating Harmonic Sources ▪ System Response Characteristics ▪ Effects of Harmonic Distortion ▪ Interharmonics	**6,7**	**6**
	Mid-Term Exam		**8**	**3**
5	Applied Harmonics	▪ Harmonic Distortion Evaluations ▪ Principles for Controlling Harmonics ▪ Where to Control Harmonics ▪ Harmonic Studies ▪ Devices for Controlling Harmonic Distortion ▪ Harmonic Filter Design: A Case Study	**9**	**3**

		▪ Case Studies ▪ Standards of Harmonics		
6	Long Duration Voltage Variations.	▪ Principles of Regulating the Voltage ▪ Devices for Voltage Regulation ▪ Utility Voltage Regulator Application ▪ Capacitors for Voltage Regulation ▪ End-User Capacitor Application ▪ Regulating Utility Voltage with Distributed Resources ▪ Flicker	**10**	**3**
7	Power Quality Benchmarking	▪ Benchmarking Process ▪ RMS Voltage Variation Indices ▪ Harmonics Indices ▪ Power Quality Contracts ▪ Power Quality Insurance ▪ Power Quality State Estimation ▪ Including Power Quality in Distribution Planning	**11**	**3**
8	Distributed Generation and Power Quality	▪ Resurgence of DG ▪ DG Technologies ▪ Interface to the Utility System ▪ Power Quality Issues ▪ Operating Conflicts ▪ DG on Distribution Networks ▪ Siting DG Distributed Generation ▪ Interconnection Standards	**12,13**	**6**
9	Wiring and Grounding	▪ Resources ▪ Definitions ▪ Reasons for Grounding ▪ Typical Wiring and Grounding Problems ▪ Solutions to Wiring and Grounding Problems	**14**	**3**
10	Power Quality Monitoring	▪ Monitoring Considerations ▪ Historical Perspective of Power Quality Measuring Instruments ▪ Power Quality Measurement Equipment ▪ Assessment of Power Quality Measurement Data ▪ Application of Intelligent Systems ▪ Power Quality Monitoring Standards	**15**	**3**
	Final Exam		**16**	**3**
Number of Weeks /and Contact Hours Per Semester				

- **Practical Aspect** **NA**

Order	Practical / Tutorials topics	Number of Weeks	Contact Hours	Course ILOs
1	▪			
2	▪ ▪			
Number of Weeks /and Contact Hours Per Semester				

• Training/ Tutorials/ Exercises Aspects: NA			
Order	**Tutorials/ Exercises**	**Week Due**	**Contact Hours**
1	▪		
2	▪		
Number of Weeks /and Contact Hours Per Semester			

VI. Teaching Strategies:

- Lectures,
- Seminars,
- Self-Learning
- Presentations,
- Case studies
- Analysis and Problem Solving,
- Simulation Exercises

VII. Assessment Methods of the Course:

- Assignments
- Reports,
- Written Exams.

VIII. Tasks and Assignments:

No	Assignments	Individual /Groups	Mark	Week Due
1	**Research works**	**Individual**	**10**	**3. 5, 7, 9**
2	**Mini/Major Project**	**Group**	**10**	**11**
3	**Case studies**	**Group**	**5**	**6, 8**
4	**Presentations**	**Individual**	**5**	**2, 4, 6, 8, 10, 12**
	Total Score		**30**	

IX. Learning Assessment:

No	Assessment Method	Week Due	Mark	Proportion of Final Assessment %
1	**Tasks and Assignments**	3,4,5,6	**30**	**20%**
2	**Quizzes**	7,9,11,13	**15**	**10%**
3	**Midterm Exam**	8	**30**	**20%**
5	**Final Exam (Theoretical)**	16	**75**	**50%**
	المجموعTotal		**150**	**100 %**

X. Learning Resources:

1. Required Textbook(s) :

1. Dugan Roger C, McGranaghan M F, Santoso S and Beaty H Wayne, Electrical Power Systems Quality, 3rd edition, McGraw-Hill, 2012.
2. C. Sankaran, Power Quality, CRC Press LLC 2002.

2. Essential References:

1. Alexander Kusko, Marc T. Thompson, Power Quality in Electrical Systems, McGraw-Hill, 2007.
2. Barry W. Kennedy, Power Quality Primer, McGraw-Hill, 2000.

3. Electronic Materials and Web Sites etc.

1. Course Power Point.
2. Video clips.
3. Links to information resources.

XI. الضوابط والسياسات المتبعة في المقرر Course Policies	
بعد الرجوع للوائح الجامعة يتم كتابة السياسة العامة للمقرر فيما يتعلق بالآتي:	
1	**سياسة حضور الفعاليات التعليمية Class Attendance:** **- يلتزم الطالب بحضور 75% من المحاضرات ويحرم في حال عدم الوفاء بذلك.** **- يقدم أستاذ المقرر تقريرا بحضور وغياب الطلاب للقسم ويحرم الطالب من دخول الامتحان في حال تجاوز الغياب 25% ويتم اقرار الحرمان من مجلس القسم.**
2	**الحضور المتأخر Tardy:** **- يسمح للطالب حضور المحاضرة إذا تأخر لمدة ربع ساعة لثلاث مرات في الفصل الدراسي، وإذا تأخر زيادة عن ثلاث مرات يحذر شفويا من أستاذ المقرر، وعند عدم الالتزام يمنع من دخول المحاضرة.**
3	**ضوابط الامتحان Exam Attendance/Punctuality:** **- لا يسمح للطالب دخول الامتحان النهائي إذا تأخر مقدار (20) دقيقة من بدء الامتحان** **- إذا تغيب الطالب عن الامتحان النهائي تطبق اللوائح الخاصة بنظام الامتحان في الكلية.**
4	**التعيينات والمشاريع Assignments & Projects:** **- يحدد أستاذ المقرر نوع التعيينات في بداية الفصل ويحدد مواعيد تسليمها وضوابط تنفيذ التكليفات وتسليمها.** **- إذا تأخر الطالب في تسليم التكليفات عن الموعد المحدد يحرم من درجة التكليف الذي تأخر في تسليمه.**
5	**الغش Cheating:** **- في حال ثبوت قيام الطالب بالغش في الامتحان النصفي أو النهائي تطبق عليه لائحة شؤون الطلاب.** **- في حال ثبوت قيام الطالب بالغش او النقل في التكليفات والمشاريع يحرم من الدرجة المخصصة للتكليف.**
6	**الانتحال Plagiarism:** **– في حالة وجود شخص ينتحل شخصية طالب لأداء الامتحان نيابة عنه تطبق اللائحة الخاصة بذلك**
7	**سياسات أخرى Other policies:** **- أي سياسات أخرى مثل استخدام الموبايل أو مواعيد تسليم التكليفات ..... الخ**