

ELEG 5523 – Electric Power Quality

Fall 2024

TIME: **Online** VENUE: N/A

TEXTBOOK: **Electrical Power System Quality**, Third Edition by Dugan, McGranaghan, Santoso and Beaty. (McGraw Hil, 2012, ISBN: 978-0-07-176156-7)

Optional: **Fundamentals of Electric Power Quality** by Surya Santoso. (ISBN 978-1440491023)

INSTRUCTOR: **Dr. J. C. BALDA (3178 Bell Engineering Center, e-mail: jbalda@uark.edu)**

OFFICE HOURS: **Emails sent to Dr. Balda's account**

1.0 COURSE OUTLINE

1. Introduction to Electric Power Quality
2. Power Electronics Background
3. Wiring and Grounding
4. Voltage Sags and Interruptions
5. Harmonics
6. Distributed Generation and Power Electronic Systems
7. Power Quality Benchmarking
8. Instrumentation and PQ Analyzers
9. Transients

2.0 GRADING POLICY

3 Tests	70%
Homework Assignments	30%

The first test covers items 1 to 3, the second test covers items 4 to 5, and the third test covers items 6 to 9.

Grading system: $A \geq 90$, $90 > B \geq 80$; $80 > C \geq 70$; $70 > D \geq 50$

The homework assignments require that the student uses a computer software like LTSpice® or Matlab/Simulink™ to solve them.

Cutting a test will result in a zero grade; i.e., THERE IS NO MAKE UP TEST UNDER ANY CIRCUMSTANCE. A formula sheet with only numbered equations from the textbook is allowed in each test. Drawings, equivalent circuits, solved problems ARE NOT ALLOWED on the formula sheet; failure to satisfy this will be considered academic dishonesty. As written in the UA Academic Integrity website, "As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail. Each University of Arkansas student is required to be familiar with and abide by the University's 'Academic Integrity Policy' which may be found at <https://honesty.uark.edu/>. A short video is at

http://www.youtube.com/watch?v=SQW_IoOhjvo&feature=youtu.be

Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor." Please, refer to <https://www.ieee.org/about/corporate/governance/p7-8.html> for the IEEE Code of Ethics.

3.0 ATTENDANCE POLICY

Attendance is voluntary; each student is responsible for the information presented during each class meeting.

4.0 GENERAL

Students are advised to contact Dr. Balda via email to reinforce any concept that may not be clear independently of their grades.

Any of the above rules may be changed at any time if the circumstances warrant doing so.

Session ends on October 8, 2024.

5.0 EMERGENCY PROCEDURES

Many types of emergencies can occur on campus; instructions for specific emergencies such as severe weather, active shooter, or fire can be found at emergency.uark.edu.

Severe Weather (Tornado Warning):

- Follow the directions of the instructor or emergency personnel
- Seek shelter in the basement or interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside
- If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building
- Stay in the center of the room, away from exterior walls, windows, and doors

Violence / Active Shooter (CADD):

- **CALL** 911
- **AVOID**- If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
- **DENY**- Barricade the door with desk, chairs, bookcases or any items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it's safe.
- **DEFEND**- Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.

6.0 GUIDE TO RECORDED LECTURES

- You should be watching one lecture per day to keep up with the class.
- The tentative dates for the tests also provide the lectures covering the material in a particular test.
- You must make use of the pdf files and the textbook. The pdf files are based on the material in the textbook but complemented with additional material when necessary.
- Unfortunately, the substitute lectures do not exist anymore since recordings were lost when moving from an old server to a new one.

7.0 TAKING TESTS

You have two options to take a test:

Option 1 – In-person Proctor: You get a proctor for your tests. The proctor could be your manager, someone in Human Resources, a community college providing proctoring services, etc. The proctor must be approved by Dr. Balda so you must provide the proctor's name, telephone number and email by August 26, 2024.

Option 2 – Respondus LockDown Browser: Students will have the option of taking their tests using “Respondus LockDown Browser” in Blackboard. Therefore, students should familiarize themselves with this software package before taken the first test.

By taking the test using Respondus LockDown Browser, the student states that (a) has only used test-approved material to answer all questions, (b) not received or provided information from any other person or student, and (c) have not made use of course websites like Chegg, ChatGPT, etc.

ELEG 5523 – FALL 2024 8W1

August 19 to October 8, 2024

Relevant Tentative Dates for Homework Assignments and Tests

The lectures that you are watching were taped in the spring 2017, so the dates referred to the taping of a lecture are for the spring 2017.

Homework Assignment Tentative Deadlines

- The first homework assignment dealing with modeling a source is due on Saturday August 24, 2024.
- The first homework assignment for voltage sags is due on Sunday September 1, 2024.
- The second homework assignment on voltage sags is due on Sunday September 8, 2024.
- The first homework assignment on harmonics is due on Saturday September 14, 2024.
- The second homework assignment on harmonics is due on Monday September 23, 2024.

Homework assignments are sent to Dr. Balda's email as an attachment in a single "pdf file" or Word file.

Test Dates

Test rules are:

- (a) Closed book and closed notes; you can have a formula sheet with ONLY equations from the textbook or class notes. No solved problems, no graphs, nothing except equations. **Formula sheet are submitted with your test solutions. Failure to do so will result in a zero grade for the test.**
- (b) Tests are set to last 90 minutes. **You have 15 minutes after submitting the test solutions to the website to send the pdf file to me via email with your numerical solutions TOGETHER with your formula sheet.**
- (c) You can use a calculator that does not have capabilities of connecting to the internet or storing files (like a pdf file of the textbook). You cannot use your cellular phone, your laptop or any device with connectivity to the internet.
- (d) Make sure that you use a dark pen when taking a test since it will be scanned and emailed to me by you or your proctor. Experience tells me that some tests do not scan well when using a pencil or light color pen.
- (e) By taking the test, the student states that (1) has only used test-approved material to answer all questions, (2) not received or provided information from any other person or student, and (3) have not made use of course websites like Chegg or Chatgpt.

The tentative dates are the following:

- Test 1 covers Lectures 1 and 2; the beginning of Lecture 3 explains the rules for the test.
This test should be taken on Friday September 6, 2024.
- Test 2 covers from Lecture 1 to up to 35 minutes into Lecture 13.
This test should be taken Friday September 27, 2024.
- Test 3 covers from Lecture 13 to Lecture 19.
This test should be taken on Tuesday October 8, 2024.

When using a proctor, you need to schedule the tests with your proctor within the dates given below; the actual time will depend on your time availability and that of your proctor.

Proctor Information

If you are using a testing center, you need to provide me with the proctor's name and contact details by August 26, 2024. The proctor can be someone in human resources if they proctor tests/exams, your manager or supervisor, or a community institution or library that provides testing services.