

ENGR 2305: Electrical Circuits
Lecture Section 010 MW 11:00-11:50
Laboratory Section 01Z M 2:00-4:50

1: Instructor

David Bixler, PhD
Office: VIN 115

Phone: 325-942-2242

Email: David.Bixler@angelo.edu

Office Hours: MTWRF 9:30-11:00; other times by appointment

2: Required materials

“Electrical Engineering, Principles and Applications”, by Hambley (7th edition)

An advanced scientific calculator.

3: Prerequisites

Mathematics 2413 and Physics 2326

4: Course Description

Fundamental principles of electric circuits. Network analysis, fields, DC analysis, series and parallel circuits, resistance, inductance, capacitance, current sources, and AC circuit analysis. (3 credit hours with 2 lecture hours and 3 lab hours per week.)

5: Student Learning Outcomes

Upon completion of Engineering 2305, you should be able to:

1. Apply mathematical reasoning and basic laws to solve quantitative problems in the study of analog electronics and circuits.
2. Use appropriate software in the study and analysis of analog electronics and circuits.
3. Demonstrate technical skill in the construction and troubleshooting of analog circuits.
4. Demonstrate the proper use of measurement tools needed in analog electronics, such as multimeters, oscilloscopes, and frequency analyzers.
5. Apply scientific reasoning in the analysis of data collected from analog electronics and circuits.
6. Communicate effectively with electrical engineers on engineering projects.

6: Course outcome mapping

The mapping of the course outcomes to the ABET Criterion 3 student outcomes is shown in **Table 1**.

Table 1: Course Outcome Mapping

ABET Criterion 3	Course Learning Outcome Number					
	1	2	3	4	5	6
1. Solve Problems	X	X	X		X	
2. Design		X				
3. Communication						X
4. Ethics & Professionalism						
5. Teamwork			X	X	X	
6. Experimentation			X	X	X	
7. Acquire New Knowledge	X	X	X	X		

7: Course structure

This course is a lecture and laboratory course. The focus of the lecture will be to better understand concepts that are then demonstrated and analyzed in the laboratory. Some course material may be presented via Blackboard and not covered during the lecture. Special emphasis will be placed on the topics covered on the electrical engineering portion of the Fundamentals of Engineering exam.

8: Professionalism

Professional engineering standards apply in this class. You are expected to demonstrate a behavior consistent with the conduct of an individual practicing in the engineering profession. You are expected to: (1) come prepared for class; (2) respect faculty and peers; (3) demonstrate responsibility and accountability for your own actions; (4) demonstrate sensitivity and appreciation for diverse cultures, backgrounds, and life experiences; (5) offer and accept constructive criticism in a productive manner; (6) demonstrate an attitude that fosters professional behavior among peers and faculty; (7) be punctual to class meetings; (8) maintain a good work ethic and integrity; and (9) recognize the classroom as a professional workplace.

9: Graded Material

9.1: *Class Attendance, Participation, Timeliness and Teamwork*

The number one complaint of engineering clients is the timeliness of deliverables (reports, drawings, specifications, etc.). As a professional engineer you will be expected to arrive at scheduled meetings on time and prepared. Thus...

You are expected to meet every class meeting on time and prepared. Attendance will be taken. Should you find it necessary to miss a class for any reason, you are expected to notify your instructor as early as the absence is known—preferably before the absence. It is important that you clearly communicate your instructors.

You will be given homework assignments nearly every lesson. Your assignments will be due at the time specified when the assignment is made. Laboratory reports are due at the beginning of the next laboratory meeting. Your instructor will assess penalties for late work.

9.2: *Exams*

This course will have three mid-term exams, and a comprehensive final exam.

9.3 *Grades: Weighting and Letter Grades*

The weighting system shown in **Table 2** will be used in determining final grade for the course

Table 2: Grade Weighting

<u>Item</u>	<u>Percent</u>
Homework	20%
Laboratories	25%
Midterm exams (3)	30%
Final Exam	25%
Total	100%

The instructor will determine letter grades for the course using his professional judgment, and the following standards as described in the University Catalog:

A = excellent work B = good work C = average work D = poor work F = failing work

10: Classroom and University Policies and Student Support

10.1: General Policies

All students are required to follow the policies and procedures presented in the [Angelo State University Student Handbook](#)¹ and [Angelo State University Catalog](#)².

10.2: Student Disability Services

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA), and subsequent legislation.

The Office of Student Affairs is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability, and it is the student's responsibility to initiate such a request by contacting Ms. Dallas Swafford, Director of Student Disability Services, at 325-942-2047 or Dallas.Swafford@angelo.edu, or visit the [Student Disabilities Services website](#)³.

10.3: Title IX Statement

Angelo State University is committed to the safety and security of all students. If you or someone you know experience sexual harassment, sexual assault, domestic or dating violence, stalking, or discrimination, you may contact ASU's Title IX Coordinator: Ms. Michelle Boone, Director of Title IX Compliance, at 325-486-6357, or Michelle.Boone@Angelo.Edu.

10.4: Observance of Religious Holy Day

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for [Observance of Religious Holy Day](#)⁴ for more information.

10.5: Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#)⁵ for more information.

10.6: Student Conduct Policies

Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU. The College of Science and Engineering adheres to the Statement of [Academic Integrity](#)⁶

Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#)⁶ in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft. It is expected that you will summarize or paraphrase ideas and give appropriate credit to the source.

Copyright Policy

Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

Modifications to the Syllabus

This syllabus, including grade evaluation and course schedule, is subject to modification. In particular, the pandemic may require significant changes in course delivery and content on potentially short notice.

11: Course Outline

The course outline is presented in **Table 3**.

Table 3: Course Lesson Outline

Week	Dates	Lecture Topics	Laboratory
1	Aug. 23-25	Introduction. Circuits, Current, Voltage, Power, and Energy. Ohm's Law, Circuit Diagrams and Symbols. Review of Resistors, Series and Parallel Circuits. Kirchhoff's Laws. Mesh current analysis. Thevenin and Norton equivalence.	No Laboratory
2	Aug. 30-Sep. 1	Thevenin and Norton equivalence. Node-Voltage analysis. Advanced Resistive Networks. Delta-Wye conversions. The Wheatstone Bridge.	The Breadboard and Ohm's Law, Resistor Networks
3	Sep. 6-8	Monday, September 6: Labor Day Holiday Capacitors and Capacitor networks, RC circuits.	No Laboratory
4	Sep. 13-15	Inductance and Inductors, RLC circuits, Resonance, Steady-state circuits. Sinusoidal voltages and currents, RMS, phase, AC signals. Wednesday, September 15: Take-Home Exam 1	Kirchhoff's Laws, Thevenin and Norton
5	Sep. 20-22	Phasors, Complex Reactance/Impedance, Simple AC circuits. Advanced AC circuits, Power Factor	The DC-RC Circuit and The Oscilloscope
6	Sep. 27-29	Advanced AC circuits, Mesh analysis of AC circuits. Thevenin and Norton equivalence in AC circuits. RLC resonance, Black-Box Circuits.	AC Circuits
7	Oct. 4-6	Power and Reactive power, Transformers. Frequency response, Fourier analysis, Bode Plots. Filter responses.	Series RLC Resonance
8	Oct. 11-13	Passive First-order Filters, Second-order filters. Digital and analog signals, base 10 and base 2, base conversions, Binary arithmetic. Wednesday, October 13: Take-Home Exam 2	Passive Filter Circuits
9	Oct. 18-20	Boolean algebra, Logic gates, simple digital circuits. Digital Combinational logic.	No Laboratory
10	Oct. 25-27	Digital Combinational logic. Karnaugh Maps	Digital Circuits – Logic gates

Week	Dates	Lecture Topics	Laboratory
11	Nov. 1-3	Silicon and p-n junctions, Diodes Load Lines, Diode circuits, Rectifiers	Combinational Logic
12	Nov. 8-10	Field Effect Transistors, Load Lines, FET Biasing. Transconductance, The Common Source Amplifier and the Source Follower Amplifier	Diode Circuits
13	Nov. 15-17	Operational Amplifiers, Inverting and Non-Inverting Amplifiers, Summing Amplifiers, Integrators and Differentiators Wednesday, November 17: Take-Home Exam 3	The Common Source Amplifier
14	Nov. 22-24	Overview of Motors, DC machines and motors Wednesday, November 24: Thanksgiving Holiday	Operational Amplifiers
15	Nov. 29-Dec. 1	Three-phase AC induction motors and synchronous AC motors Final Exam Review	No Laboratory
16	Dec. 8	Final exam 10:30am-12:30pm	No Laboratory

12: End Notes

¹ <https://www.angelo.edu/current-students/student-handbook/>

² <https://www.angelo.edu/academics/catalog/>

³ <https://www.angelo.edu/current-students/disability-services/>

⁴ <https://www.angelo.edu/live/files/14206-op-1019-student-absence-for-observance-of>

⁵ <https://www.angelo.edu/live/files/14197-op-1011-grading-procedures>

⁶ <http://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>