

Course Syllabus: EET-222 Electric Circuits, Fall 2011

Lecture Instructor: __Rick Pancoast_____

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Lab Instructor: _____

Office - _____ Phone # _____ ext. _____

COURSE DESCRIPTION:

This course is a study of the fundamentals of AC electrical circuits. Topics include series/parallel RC, RL and RLC circuits, voltage and impedance phasor diagrams, power in AC circuits, filters, resonance, frequency response and Bode plots.

I. Class Meetings

3 hours per week class time allocated for Lecture / HW

3 hours per week class time allocated for Lab

II. Course Materials

A. Text:

Electric Circuits Fundamentals, Eighth Edition by Thomas L. Floyd and David M. Buchla,
Pearson / Prentice Hall, 2010, ISBN 13: 978-0-13-507293-6

or

Electric Circuits Fundamentals, Sixth Edition by Thomas L. Floyd, Pearson / Prentice Hall, 2004,
ISBN 0-13-111139-6

or

Electronics Fundamentals, Circuits, Devices, and Applications, Sixth Edition by Thomas L.
Floyd, Pearson / Prentice Hall, 2004, ISBN 0-13-111138-8

B. Course Objectives, Lectures and Homework: Provided

C. Laboratory Manual / Material: Provided

D. Laboratory Logbook: "5-squares to the inch"

Must be similar to the Roaring Springs "Compositions" notebook,
9 ¾ x 7 ½, 100 leaves. [Lab Instructor will provide at cost]

III. Evaluation

A. Two (2) excused absences are permitted per term. Call the instructor to be excused. If a student's absences are excessive, the instructor may drop that student from the course.

B. Calculation of Final Grade Point Average:

- Chapter Homework (Instructor will review for completeness) 10%
 - To be done in a bound or spiral notebook. - Due on the day of Chapter Test
 - Late policy: Instructor will accept no more than one homework per week.

Ex: If you turn in five (5) home works to be graded during the last week, four will receive a zero (0).
- Tests 60%
 - Tests are typically given in class. To be excused from a test you must phone or email the instructor *before* the test is to be taken. (Your instructor will indicate his/her preferred method of contact.)
 - *You will be given the opportunity to make up excused tests during an assigned make-period **during the final examination week.*** This make-up test will be similar to the excused test. The

time and date of this make up test will be assigned after the “Official College Final Exam Schedule” is published. This occurs just after the midpoint of the semester.

- The sum of the after-lecture “Post Tests” equal one test

• Laboratories and Final Project (Oral Presentation and Written Report) 30%

- 15% deducted from report without instructor review of draft of conclusion

- Late policy: Instructor will grade no more than one lab per week.

Ex: If your turn in three labs to be graded during the last week of course, two labs will receive a grade of zero.

- The oral presentation and written report each count as one laboratory

C. Final Grade Computation:

A = 90+	B+ = 85+	B = 80+	C+ = 75+	C = 70+	D = 60+	F < 60
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IV. Course Topics

Ch. 8 Introduction to Alternating Current and Voltage

Ch. 9 Capacitors

Ch. 10 RC Circuits

Ch. 11 Inductors

Ch. 12 RL Circuits

Ch. 13 RLC Circuits and Resonance

Ch. 14 Transformers

V. Laboratories

1. Amplitude and Phase Shift Measurement using the Oscilloscope
2. Measuring DC and AC Resistance, an Introduction to Impedance
3. RC Time Constant
4. Voltage Phasor Diagram for a Series RC Circuit
5. Power in a Parallel RC Circuit
6. Voltage Phasor Diagram for a Series RL Circuit
7. Power & Power Factor in a Series RL Circuit
8. Series RL and Series RC in Parallel
9. Series Resonance
- 10 & 11. Final Project and Oral Report

VI. Schedule (FALL 2011)

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Date	9/1	9/8	9/15	9/22	9/29	10/6	10/13	10/20	10/27	11/3	11/10	11/17	12/1	12/8	12/15
Chap	Syl.	8	8/9	9	9/10	10	10	10/11	11	12	12/13	13	13	14	Finals Week
H.W.				8		9		10		11		12		13	
Lab															
Test				8		9		10	or 10	11		12		13	

Program Mission Statement

The mission of the Burlington County College Electronics Engineering Technology and Computer Servicing & Networking Technology programs is to produce graduates who are able to obtain employment as a technicians or transfer to a four-year college. In addition, our graduates will be technically competent, able to communicate effectively, work well with others and demonstrate professionalism.

Program Educational Objectives (Numbers included for reference purposes only)

The Electronics Engineering Technology and Computer Servicing & Networking Technology programs prepare graduates who, during the first few years after graduation, should be able to:

1. Find employment as a technician or transfer to a four-year college,
2. Apply a broad knowledge of electronics and computer engineering technology to support manufacturing, design, testing, troubleshooting, sales, and field service of electronic and computer systems,
3. Apply knowledge of analog and digital electronics and use mathematics, scientific principles, and critical thinking to creatively solve technical problems,
4. Utilize computers and software in a technical environment,
5. Communicate effectively both verbally and in writing,
6. Work effectively as an individual and as a member of a team,
7. Show a recognition of the need for professional, ethical and social responsibilities
8. Continue professional training through conferences, seminars, courses and the pursuit of advanced degrees.

Program Outcomes (Letters refer to ABET "Criterion 2. Program Outcomes")

Graduates of the Electronics Engineering Technology and Computer Servicing & Networking Technology programs should demonstrate:

- a. an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines,
- b. an ability to apply current knowledge to new applications,
- c. an ability to conduct, analyze and interpret experimental results and apply results to make improvements where applicable,
- d. an ability to apply creativity in the design of systems, circuits or processes,
- e. an ability to work effectively on teams,
- f. an ability to identify the characteristics of, analyze and solve technical problems,
- g. an ability to communicate effectively through writing and oral presentation,
- h. a recognition of the need for, and an ability to engage in lifelong learning,
- i. an ability to understand professional, ethical, and social responsibilities,
- j. respect for diversity and a knowledge of contemporary professional, societal, and global issues, and
- k. a commitment to quality, timeliness and continuous improvement.

VII. Chapter Reading and Problems

Note: The “Basic Problems” are given for both the Sixth and Eighth Editions. The number *before* the equal sign is for the 6th and the number *after* the equal sign is for the 8th.

Example “12 = 16”. Problem 12 in the 6th = Problem 16 in the 8th.

Chapter 8 Introduction to Alternating Current and Voltage

Objectives:

- Identify a sinusoidal waveform and measure its characteristics
- Describe how sine waves are generated
- Determine the voltage and current values of sine waves
- Describe angular relationships of sine waves
- Mathematically analyze a sinusoidal waveform
- Apply the basic circuit laws to ac resistive circuits
- Determine total voltages which have both ac and dc components
- Identify the characteristics of basic nonsinusoidal waveforms
- Use the oscilloscope to measure waveforms

Reading: Chapter 8

Section Reviews: After you read each section try these “Section Reviews”. The answers are at the end of the chapter.

Self-Test: After you read the chapter, answer these questions. The answers are at the end of the text.

Basic Problems [Ans]: 1=1, 3=3, 5=27, 6=28 [120Hz], 8=6 [8.48V, 24V, 7.64V], 10=8 [25V, 50V, 17.7V, 15.9V], 11=11, 13=13, 14=14 [0.524 rad, 0.785 rad, 1.36 rad, 2.36 rad, 3.49 rad, 5.24 rad], 15=15, 16=16 [28.28V, 7.32, 15.4, 21.7, 26.6, 26.6, 16.2, -26.6, -16.2V], 17=17, 18=18 [3.44V, 6.36, 9, 6.36, 0, -9, 0V], 21=21, 22=22 [31.5V, 40.5V], 24=24 [39V, 9V], 25=25, 26=26 [-1V], 27=33, 28=34 [25%, 66.7%], 29=35, 30=36 [250kHz, 33Hz], 34=40 [0.6V, 500ms], 35=41.

Chapter 9 Capacitors

Objectives:

- Describe the basic structure and characteristics of a capacitor
- Discuss various types of capacitors
- Analyze series capacitors
- Analyze parallel capacitors
- Analyze capacitive dc switching circuits
- Analyze capacitive ac circuits
- Discuss some capacitor applications
- Test a capacitor

Reading: Chapter 9

Section Reviews: After you read each section try these “Section Reviews”. The answers are at the end of the chapter.

Self-Test: After you read the chapter answer these questions. The answers are at the end of the text.

Basic Problems [Ans]: 1=1, 2=2 [100,000 pF, 2500 pF, 5,000,000 pF], 5=5, 7=7, 9=11, 12=14 [See Fig. 9-15], 13=15, 16=18 [200 pF], 20=22 [1057 pF, 0.121 μ F], 23=25, 25=27, 26=28 [9.2V, 1.24V, 458mV, 168mV], 29=31, 32=34 [33.86kHz, 3.386kHz], 34=36 [3.39V], 35=37, 36=38 [V_{ripple} decreases as capacitance is increases], 37=39.

Chapter 10 RC Circuits

Objectives:

- Describe the relationship between current and voltage in an RC circuit
- Determine impedance and phase angle in a series RC circuit
- Determine impedance and phase angle in a parallel RC circuit
- Analyze series-parallel RC circuits
- Determine power in RC circuits
- Discuss some basic RC applications
- Troubleshoot RC circuits

Reading: Chapter 10

Section Reviews: After you read each section try these “Section Reviews”. The answers are at the end of the chapter.

Self-Test: After you read the chapter answer these questions. The answers are at the end of the text.

Basic Problems [Ans]: 1=1, 3=3, 5=5, 6=6 [343k Ω , 87.9k Ω , 65.4k Ω , 57.6k], 7=7, 10=10 [97.3 Ω , 103mA, 5.76V, 8.18V], 11=11, 12=14 [1.05k Ω], 13=15, 14=16 [(a) 405 Ω , 57.3 $^\circ$ (b) 230 Ω , 72.2 $^\circ$ (c) 142 Ω , 79.1 $^\circ$ (d) 72 Ω , 84.5 $^\circ$], 15=17, 17=19, 18=20 [9.03 Ω , 10mA, 4.76mA, 11.1mA, 25.5 $^\circ$], 19=21, 20=22 [Z = 20.1k Ω , $R_{\text{eq}} = 18.4\text{k}\Omega$, 196pF], 25=27, 26=28 [0.591W, 0.840 VAR], 27=29.

Chapter 11 Inductors

Objectives:

- Describe the basic structure and characteristics of an inductor
- Discuss various types of inductors
- Analyze series and parallel inductor circuits
- Analyze inductive dc switching circuits
- Analyze inductive ac circuits
- Discuss some inductor applications
- Test an inductor

Reading: Chapter 11

Section Reviews: After you read each section try these “Section Reviews”. The answers are at the end of the chapter.

Self-Test: After you read the chapter answer these questions. The answers are at the end of the text.

Basic Problems [Ans]: 1=1, 3=3, 44 [1A], 5=5, 7=7, 11=11, 13=13, 15=15, 17=17, 19=19, 21=21.

Chapter 12 RL Circuits

Objectives:

- Describe the relationship between current and voltage in an RL circuit
- Determine impedance and phase angle in a series RL circuit
- Determine impedance and phase angle in a parallel RL circuit
- Analyze series-parallel RL circuits
- Determine power in RL circuits
- Discuss some basic RL applications
- Troubleshoot RL circuits

Reading: Chapter 12

Section Reviews: After you read each section try these “Section Reviews”. The answers are at the end of the chapter.

Self-Test: After you read the chapter answer these questions. The answers are at the end of the text.

Basic Problems [Ans]: 1=1, 3=3, 5=5, 6=6 [(a) 14.1Ω , 14.1Ω (b) 410Ω , 287Ω (c) 752Ω , $2.38k\Omega$ (d) 706Ω , 706Ω], 7=9, 9=11, 10=12 [θ increases by 19.4° from 38.7° to 58.1°], 11-13, 12=14 [$4.84V$, $1.22V$], 13=17, 14=18 [(a) 6.37Ω (b) 9.43Ω (c) 10.9Ω (d) 11.6Ω], 15=19, 17=21, 18=22 [$1.83k\Omega$, $4.21k\Omega$], 19=23, 20=24 [Predominantly inductive], 21=25, 22=26 [354 mVA], 23=27, 25=29, 27=30.

Chapter 13 RLC Circuits and Resonance

Objectives:

- Determine the impedance and phase angle of a series RLC circuit
- Analyze series RLC circuits
- Analyze a circuit for series resonance
- Analyze series resonant filters
- Analyze parallel RLC circuits
- Analyze the operation of parallel resonant filters
- Discuss some system applications of resonant circuits

Reading: Chapter 13

Section Reviews: After you read each section try these “Section Reviews”. The answers are at the end of the chapter.

Self-Test: After you read the chapter answer these questions. The answers are at the end of the text.

Basic Problems [Ans]: 1=1, 2=2 [$6.51k\Omega$], 4=4 [$614\ \mu A$, $2.89V$, $4.91V$, $2.15V$], 5=5, 6=6 [$35.8mA$, 181 mW , 390 mVAR , 430 mVA], 7=9, 9=11, 10=12 [$500mA$], 11=13, 13=15, 14=16 [99.7Ω], 15=16, 16=18 [$I_{tot} = 50.2mA$, $I_L = 4.42Ma$, $V_R = 5V$, $I_R = 50.0mA$, $I_C = 8.29mA$], 18=20 [Z_r is infinitely large], 19=21, 20=22 [$119nA$, $193\ \mu A$], 22=24 [$400Hz$], 24=26 [$1.99mH$, $0.199\ \mu F$].

Chapter 14 Transformers

Objectives:

- Explain mutual inductance
- Describe how a transformer is constructed and how it works
- Explain how a step-up and a step-down transformer work
- Discuss the effects of a resistive load across the secondary winding
- Discuss the concept of a reflected load in a transformer
- Discuss impedance matching with transformers
- Explain how the transformer acts as an isolation device
- Describe a practical transformer
- Describe several types of transformers
- Troubleshoot transformers

Reading: Chapter 14

Section Reviews: After you read each section try these “Section Reviews”. The answers are at the end of the chapter.

Self-Test: After you read the chapter answer these questions. The answers are at the end of the text.

Basic Problems [Ans]: 1=1, 2=2 [0.25], 5=5, 7=7, 9=9, 11, 13, 14 [50mA, 15V, 25mA, 0.75W], 15, 16 [20k Ω], 17, 18 [0.057], 19, 20 [38.9W], 22 [6V, 0V, 40V], 25, 26 [94.5%], 28 [1.67A, 359 Ω , 359 Ω , 7.4 μ F], 29, 30 [11,5V, 23V, 23V, 46V], 33.