MUSKINGUM
U N I V E R S I T Y

Department of Physics and Engineering

Course Description (Muskingum University Catalog)
Electronics (4) is an introduction to electrical measurements, electric circuit theory, semiconductor devices and circuits. 3 hours of lecture and 2 hours of laboratory. Prerequisite: PHEN 122, MATH 200

Lecture:	BSC 125	11:00 – 11:50 am MWF
Lab:	BSC 125	8:00 – 9:50 am T

Instructor
Dr. Sandra Soto-Cabán
BSC 122
(740) 826-6137
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Office Hours
- MWF 9:00 – 9:50 am, MW 2:00 - 3:00 pm
- Other office hours are available by appointment.
- If I'm unable to hold an office hour, I'll send an e-mail to the class and/or post a note on my office door.

Required Materials
- *Electrical Engineering: Concepts and Applications*, 1st Ed., S. A. Reza Zekavat, Prentice Hall, 2013
- Scientific calculator.

References
- *Grob's Basic Electronics*, 11th Edition, Mitchel E. Schultz, McGraw Hill, 2011.
- *Electrical Engineering: Principles and Applications,* 5th Ed., Allan R. Hambley, Prentice Hall, 2011.
- *Fundamentals of Electrical Engineering,* 1st Ed., Giorgio Rizzoni, McGraw-Hill, 2008.

Recommended Materials
- PSpice 9.1/9.2, Student Version (software)

Course Learning Objectives
Students will be able to
1. identify the principal elements of electrical circuits: nodes, loops, meshes, branches, and sources. (ESSO a,e)
2. use the rules for connecting electrical measuring instruments to electrical circuits for the measurement of voltage, current, and power. (ESSO a, b, k)
3. analyze and design simple DC and AC circuits. (ESSO a, b, c)
4. use the concept of equivalent circuits to determine voltage, current and power using analytical methods. (ESSO a, b, k)
5. write differential equations for circuits containing inductors and capacitors. (ESSO a)
6. convert time-domain sinusoidal voltages and currents to phasor notation, and vice versa, and represent circuits using impedances. (ESSO a)
7. analyze simple first- and second-order electrical filters and determine their frequency response and filtering properties. (ESSO a, b,e)
8. compute the frequency response of a circuit and its graphical representation in the form of a Bode plot. (ESSO a, b)
9. analyze and design simple active filters using operational amplifiers. (ESSO a, b, c, e)
10. understand the basic principles underlying the physics of semiconductor devices in general, and of the *pn* junction in particular. (ESSO a, b, c)
11. identify semiconductor materials and their applications. (ESSO e)

12. use various circuit models of the semiconductor diode in simple circuits. (ESSO b, e)
13. identify circuit symbols and operations of logic gates. (ESSO a, e)
14. make observations of laboratory experiments and document observations in a clearly written format. (ESSO b, k)
15. use computational modeling tools to perform calculations, generate graphs, create simple, structured programs, and analyze circuit behavior. (ESSO k, l)
16. perform research, analysis, and design a solution to an engineering problem following the design steps. (ESSO a, b, c, d, e, k, l)
17. write a professional report to communicate the results of the design project. (ESSO l)
18. use the correct vocabulary necessary to communicate effectively with electrical engineers. (ESSO d, l)
19. prepare for a job or graduate school interview process by attending an Interview Workshop hosted by Career Services. (ESSO l)

Engineering Science Student Outcomes (assessed in this course)

a) Demonstrate an ability to apply knowledge of mathematics, science, and engineering.
b) Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
c) Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d) Demonstrate an ability to function on multidisciplinary teams.
e) Demonstrate an ability to identify, formulate, and solve engineering problems.
k) Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
l) Demonstrate an ability to compete for entry-level engineering positions in industry or engineering student positions in graduate school.

Policies

ADA Statement on Accommodations
Any student who wishes to request an accommodation is responsible to contact the Disability Education Office (DEO) to discuss his/her specific needs and the process to receive reasonable accommodation. Please contact the DEO Coordinator, Joyce Girod, located in the PLUS Center in Walter Hall #26 or call 740-826-6132 to arrange an appointment as soon as possible. At the appointment, the procedure to coordinate accommodations will be discussed. For more information please visit *www.muskingum.edu/deo*.

- **Attendance (Muskingum University Catalog)**
The academic program of Muskingum University operates on the assumption that learning is advanced by regular attendance at class and laboratory. It is the responsibility of the student to make the arrangements to make up, at the convenience of the instructor, class assignments or previously scheduled quizzes and/or exams missed due to absence. Timely (at least one week in advance) notice to professors when absence will be unavoidable is expected. **No instructor may deny a student the opportunity to make up coursework missed because of bona fide medical, personal or family emergency or, when timely notice is received, because of previously scheduled participation in sanctioned University activities.** Individual faculty members determine their own class attendance policy in accordance with the preceding paragraph. At the beginning of each semester, the faculty member is responsible for informing students of his/her attendance policy or expectations and of the consequences or penalties for excessive nonsanctioned absences. The faculty member must define "excessive."

- **Missed Work Due to Absence**
You will automatically receive a zero for missed work due to an absence. I'll give you an opportunity to make up the missed work or I'll excuse it (i.e., it won't be factored into the calculation of your course grade) if you provide me with a signed letter (not email) indicating the nature of your **bona fide emergency**. Additionally, you are allotted one unexcused absence from lab. For each unexcused absence thereafter, your course grade will be lowered by one increment (e.g. B+ to B).

- **Late Work**
  Late work will not be accepted.
- **Academic Dishonesty (Muskingum University Catalog)**
  Plagiarism, cheating, and other forms of academic dishonesty are serious offenses at Muskingum University, and the faculty member has the prerogative of invoking the severest penalty for an initial offense. Each department is responsible for developing its definition of plagiarism, but in general, plagiarism is the verbal, written, graphic, or three-dimensional presentation of borrowed material without citing its source. Students must cite the source for quotations, paraphrases, or borrowed ideas, models, information, or organization of material. Students who are uncertain about the need for citation should consult the faculty member for whom the work is being prepared. For a first offense, the minimum penalty for plagiarism and/or cheating is a failing grade on the assignment, paper, or examination; the maximum penalty in this instance is a failing grade in the course. In either case, the faculty member should submit a written report of the offense to either the Office of the Vice President for Academic Affairs or the Office of the Vice President for Graduate and Continuing Studies as appropriate. Plagiarized work is filed in the office of the Vice President for Academic Affairs or the Office of the Vice President for Graduate and Continuing Studies as appropriate. A grade given for academic dishonesty shall supersede any withdrawal. See additional information under "Order of Appeal."
- **Email**
  All email correspondence must be through your Muskingum University email address.
- **Personal Electronic Devices**
  Our classroom is a place to focus attentively, in collaboration, on learning. Unexpected beeps and ring tones distract us all. Thus, while you are permitted to bring personal devices (cell phones, PDAs, laptops, and other electronic devices) to class, they must only serve class needs. If you use your PED for any other purpose that interferes with the learning process, you will receive an absence for the day, and may be expelled from the room and not permitted to make up missed in-class work. **Please set your cell phones to "silent" mode before class begins.**
- **Cell Phone**
  If you <u>need</u> to place or take a call, leave the class and move far enough away from the classroom door so that you do not disturb class.

Grades
Your grade will be calculated according to the following weighted evaluations. All grades will be posted on Blackboard.

Evaluations	Weight
Exams (3)	30%
Homework	20%
Laboratory	20%
Design project	20%
Final exam	10%

*You are required to attend the **<u>Interview Workshop</u>** hosted by Career Services. You must provide a one-page written summary of the most important points addressed in the workshop. Failure to do so will result in an incomplete for the course.*

Your letter grade will be determined from your percent grade according to the following table. The letter grade that will be submitted to the registrar's office will also depend on your adherence to the **Missed Work Due to Absences** policy.

Percent Grade	Letter Grade	Percent Grade	Letter Grade
93 → 100	A	73 → 76.9	C
90 → 92.9	A-	70 → 72.9	C-
87 → 89.9	B+	67 → 69.9	D+
83 → 86.9	B	63 → 66.9	D
80 → 82.9	B-	60 → 62.9	D-
77 → 79.9	C+	0 → 59.9	F

Closing Comments:
- **Free** tutoring will be available. Times and locations will be provided ASAP. See http://www.muskingum.edu/dept/physicseng/students.html
- The department maintains a web page for physics and engineering resources. See http://www.muskingum.edu/dept/physicseng/resources.html
- The library also maintains a web page for physics and engineering resources. See http://libguides.muskingum.edu/physics?hs=a.

Syllabus for Electronics (PHEN 235)
Spring 2014

Tentative Schedule

Adjustments may be made in assignments, due dates, schedule, etc. to best achieve the educational goals of the course.

Week	Monday	Tuesday Lab	Wednesday	Friday
1	1/13 Introduction Overview of EE	1/14 Lab 1: Introduction to the Electronics Lab	1/15 Ch. 2 Fundamentals of Electric Circuits 2.1-2.4	1/17 Ch. 2 2.5-2.6
2	1/20 **MLK** No Classes	1/21 No Lab	1/22 Ch. 2 2.5-2.6	1/24 Ch. 2 2.7-2.9
3	1/27 Ch. 3 Resistive Circuits 3.1-3.2	1/28 Lab 2: Simple DC circuits	1/29 Ch. 3 3.3	1/31 Ch. 3 3.4-3.5
4	2/3 Ch. 3 3.6	2/4 Lab 3: Analysis of circuits using PSpice analysis	2/5 Ch. 3 3.6	2/7 Ch. 3 3.6
5	2/10 Ch. 3 3.7	2/11 Lab 4: Using the oscilloscope	2/12 Ch. 3 3.8	2/14 Ch. 4 C and L 4.1-4.2
6	2/17 Ch. 4 4.3	2/18 Lab 5: Analysis of capacitive and inductive circuits	2/19 Ch. 4 4.4	2/21 **EXAM 1 (Ch. 1→3)**
7	2/24 Ch. 4 4.5	2/25 Lab 6: AC analysis in Matlab	2/26 Ch. 5 Transient Analysis 5.1-5.2	2/28 Ch. 5 5.2
8	3/3 Ch. 5 5.3	3/4 Lab 7: AC analysis (cont.)	3/5 Ch. 5 5.4	3/7 Ch. 5 5.5
9	3/10	3/11 **Spring Break**	3/12	3/14
10	3/17 Ch. 5 5.5	3/18 Lab 8: Filters and Bode plots	3/19 Ch. 5 5.6	3/21 Ch. 6 SS AC Analysis 6.1
11	3/24 Ch. 6 6.2	3/25 **EXAM 2 (Ch. 4, 5)**	3/26 Ch. 6 6.2-6.3	3/28 Ch. 6 6.3
12	3/31 Ch. 6 6.6	4/1 Lab 9: Diodes	4/2 Ch 6 6.6	4/4 Ch. 7 Freq. Analysis 7.1-7.2
13	4/7 Ch. 7 7.3	4/8 Lab 10: OpAmps	4/9 Ch. 7 7.4	4/11 Ch. 8 Electronic Ckts. 8.1-8.2
14	4/14 Ch. 8 8.3	4/15 **EXAM 3 (Ch. 6, 7)**	4/16 Ch. 8 8.4	4/18 *Easter Break*
15	4/21 Ch. 10 Digital Ckts. 10.1-10.2	4/22 Lab 11: Team work	4/23 Ch. 10 10.3-10.4	4/25 Ch. 10 10.4
16	4/28 Project work time	4/29 *Project Presentations*	4/30 Wrap up	

The final exam will be on Thursday, May 8, 2014 at 8:30 am in BSC 125.