Point Loma Nazarene University

EGR 352-01: Analog Electronics **Course Syllabus, Fall 2017**

2 Credit Hours

Prerequisites or Co-requisites - PHY 142 or 242 University Physics; with analytic, and calculus-based study of mechanics, waves, and thermodynamics.

Instructor: Ronald DeLap
E-mail: rondelap@pointloma.edu

Text: *Main text*: Practical Electronics for Inventors, by Scherz, P., and Monk, S., McGraw Hill, 2013, 3rd Edition, ISBN 978-0-07-177133-7.
Supplemental text: Foundations of Analog and Digital Electronic Circuits ISBN #9781558607354, Argawal, A., Lang, J., Elsevier Inc., 2005, 1st edition. Available in paperback, Kindle, and electronic format (downloadable).

Office: Rohr Science 210
Office hours: MWF 3 – 4PM, and by appointment
Phone: 619-849-2375 Cell: 903-736-9140

Class Meeting Time: Lecture: (RS 219) M/W/F 8:30 - 9:35 a.m.
Lab: (RS 213) TH 3:00-4:55 p.m.

Course Description

AC/DC circuit analysis, transients, characteristics of equivalent circuits for diodes, transistors, power supplies, transistor/operational amplifiers, and feedback applications.

Course Learning Outcomes - The objectives of the course are to:

- Understand the concepts of the theory of electronics; current, voltage, resistance, electrical power supplies, inductance, and capacitance.
- Be able to apply Ohm's Law, Kirchhoff's laws, Superposition, and Thevenin's and Norton's theorems, to analyze electric circuits of various designs of components.
- Understand DC and AC circuits, their differences, RMS Voltage, power and how AC current is generated.
- Understand the effects of current in capacitors, inductors and the concept of electromagnetism, and transients.
- Understand complex circuits with complex numbers, resonant circuits, input and output impedance, components, semiconductors (diodes, transistors, rectifiers and integrated circuit packages.
- Understand feedback circuits, characteristics of equivalent circuits for diodes, transistors, power supplies, transistor/op amplifiers, and feedback applications.

Grading:

Homework – Homework is worth 15% of your final grade.

Submission: Written homework solutions should be worked neatly in clear logical steps. (Solutions and explanations should be clear enough that one of your peers could easily follow what you did if they had not worked the problem before.)

Collaboration: We expect and encourage collaboration between you and your peers while working on your homework, but your work should be your own original solutions. Allow adequate time to work and think about problems by yourself first before you work together with your peers or ask questions of me. When you sit down to write up a problem, you should not use notes copied from someone else. The guideline is that you should have no trouble explaining or repeating work that you turn in. Quizzes and exams will be based in large part on assigned homework.

Late Submission*:* Up to two assignments will be accepted late with a 10% reduction in grade for every day they are late. This begins with a 10% reduction for an assignment turned in later in the day after this homework has been collected at the beginning of class.

Lab – You will participate in a lab designed to give you hands-on experience with the concepts covered in the class meetings. Lab will also provide an opportunity for you to use instruments common to the physical sciences, perform measurements, and analyze data using the scientific method. Labs will be completed in small groups, with each member of the team completing his or her own worksheet. Labs comprise 20% of your final grade. You must pass the lab portion of the class to pass the course.

Exams – Examinations will be given in class, which count toward 45% of your final grade, consisting of three midterms. The final exam is comprehensive and counts for 20% of your grade. Exams will be closed book. Partial credit will be given for correct reasoning at any step of the problem, but only if it is communicated clearly enough for me to understand. For problems that call for a solution or explanation, no credit will be given for an answer alone; the method or reasoning must also be shown. **Missed exams cannot be made up** without permission of the instructor for valid reasons. Validity is determined on a case-by-case basis and is not guaranteed.

Final Grades – The grade you earn in this course is roughly based on the following scale: 100%-92% A, 92%-89% A-, 89%-87% B+, 87%-82% B, 82%-79% B-, 79%-77% C+, 77%-72% C, 72%-69% C-, 69%-67% D+, 67%-60% D, 60%-55% D-. **The points you receive during the course are weighted accordingly: homework: 15%, labs: 20%, exams (3): 45%, final exam: 20%.**

PLNU University Mission

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

PHY/EGR Department Mission

The Physics and Engineering Department at PLNU provides strong programs of study in the fields of Physics and Engineering. Our students are well prepared for graduate studies and careers in scientific and engineering fields. We emphasize a collaborative learning environment which allows students to thrive academically, build personal confidence, and develop interpersonal skills. We provide a Christian environment for students to learn values and judgment, and pursue integration of modern scientific knowledge and Christian faith.

Attendance and Participation: Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day.

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de- enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class Attendance
in the Undergraduate Academic Catalog.

Class Enrollment: It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) will result in a grade of F on the official transcript.

Canvas:

The online resource Canvas is integral for this course, and you are expected to login regularly. You need a reliable internet connection to be able to use this resource.

Class Preparation – Studying analog electronics requires active learning and participation during class. In preparation for class meetings there will often be a reading assignment. To maximize your learning and participation during our meetings it is very important that you have read this material before class. Quizzes will be given from time to time on the assigned reading for the class.

Class Conduct – Attendance and punctuality are requirements for the course to help the student maximize his overall learning experience. Class exercises, questions and other elements of participation are factors in the students' overall grade assessment. The student is accountable for *all material* covered in class. In addition, students need to respect the classroom environment, and activity such as cell phone use, talking during the class lecture portions (when not engaged in questions and answers) and/or any other related behavior that interferes with the learning experience will be addressed to the student by the instructor.

Academic Honesty – Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic Honesty
for definitions of kinds of academic dishonesty and for further policy information.

Academic Accommodations: If you have a diagnosed disability, please contact PLNU's Disability Resource Center (DRC) within the first two weeks of class to demonstrate need and to register for accommodation by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. See Disability Resource Center and the PLNU catalog for additional information. For more details see the PLNU catalog: http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#AcademicAccommodations

Students with learning disabilities who may need accommodations should discuss options with the instructor **during the first two weeks** of class.

Final Exam: Date and Time: The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor

authorized to consider changing the exam date and time for that particular student. The Final Exam will be held on Monday, October 16, 2017 from 7:30 – 9:30 a.m

Copyright Protected Materials
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Credit Hour: In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 2-unit class delivered over 8 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Questions are always welcome and encouraged. The best way to learn is to ask questions and challenge what you are being taught. Feel free to talk to me after class or via email or text if you have any questions. I hope you enjoy this course.

Tentative Course Outline

Date	Topic	Reading	Lab (Thursday)
T 08/29/17	Introduction / Charge, Current, Voltage, Power, Energy	2.2, 2.3.1-3,2.5,2.7,2.10	
W 08/30/17	Resistors in Series and Parallel	2.11,2.12,2.13,2.14,2.16	Basic Lab instruments, simple circuit setup and analysis
F 09/01/17	DC Circuit analysis for Resistive Circuits	2.17,2.18,2.19	
M 09/04/17	No Class: Labor Day		
W 09/06/17	Capacitors and Inductors	2.23.1-4,2.23.7-11 2.24.4,.6-7,.9-11,.16	DC Circuit Analysis
F 09/08/17	RLC Circuit Analysis – DC Circuits		
M 09/11/17	**Test 1**		
W 09/13/17	AC Signals - Representation	Handout on Euler's identities	AC Circuit Analysis
F 09/15/17	Phasors	2.27-29	
M 09/18/17	Phasors	2.27-29	
W 09/20/17	AC Circuit Analysis		AC Circuit Analysis
F 09/22/17	AC Circuit Analysis		
M 09/25/17	**Test 2**		
W 09/27/17	Diodes and Transistors	4.2, 4.3	Transistors and Diodes
F 09/29/17	Diodes and Transistors	4.2, 4.3	
M 10/02/17	Op Amps	8.3-5, Table 8.1, 8.16	
W 10/04/17	Feedback systems	Handouts	Op Amp Circuits
F 10/06/17	Feedback systems		
M 10/9/17	**Test 3**		
W 10/11/17	Review		No Lab
F 10/13/17	Review		
M 10/16/17	**Final Exam**		