Dordt College
EGR 220, PHYS 206, Linear Circuits and Electronics

Fall 2017 Syllabus

2016-17 Catalog Data:	**EGR 220 Linear Circuits and Electronics (4 credit hours)** (Fall) **PHYS 206 Linear Circuits and Electronics (4 credit hours)** (Fall) Assumes a prerequisite knowledge of DC electrical circuits, including the definitions of electrical quantities, circuit elements (sources, resistors, capacitors, inductors), understanding of Kirchhoff's laws and basic concepts in AC circuits such as frequency and phase. Topics in this course include: general linear circuit analysis including Norton's and Thevenin's theorems; superposition; nodal and loop analysis; natural and forced responses in RLC circuits; and sinusoidal steady state analysis. The course also gives introductions to operational amplifier circuits, single stage BJT and FET transistor circuits and steady-state balanced 3-phase power calculations. The lab includes a formal design project. Prerequisite: Engineering 117 or Physics 202 or Physics 216. Corequisite: Mathematics 204. [Cross listed: Physics 206, Engineering 220]
Course Application	This course is required of all engineering students. It is usually taken in the second year.
Prerequisites by topic:	Calculus including techniques of integration, sequences, and series. Basics of DC circuits.
Textbook and other required materials:	Alexander and Sadiku, *Fundamentals of Electric Circuits*, 6th ed., McGraw-Hill, 2017, ISBN 978-0-07-802822-9 NCEES approved calculator. See http://ncees.org/exams/calculator/ for details.
References:	Horowitz and Hill, *The Art of Electronics*, 3rd ed., Cambridge University Press. Edminister, Joseph, *Schaum's Outlines—Electric Circuits*
Instructor:	Dr. Douglas De Boer, P.E.; Professor of Engineering, Douglas.DeBoer@Dordt.edu, telephone 712-722-6245. Office hours generally 8:00 AM to 5:00 PM weekdays. Details at http://homepages.dordt.edu/ddeboer/
Methods of Instruction	Three lectures per week, MWF from 1:00 to 1:50 PM. One Lab per week from 2:00 to 5:00 PM on either Monday or Tuesday. About one homework assignment per class period. Two tests during the semester and a final exam.
Course Objectives and Outcomes:	*Creational Structure*: Students will understand electrical theory to the extent that they will be able to apply systematic techniques of linear circuit analysis as described in the college catalog. This means that students will be able to represent a circuit via a well labeled schematic drawing, derive appropriate equations from the schematic, and know how to solve those equations. This will be the main goal of this course. *Creational Development*: Students will be able to recount several of the important historical contributions in the development of the modern techniques of circuit analysis. This includes knowledge of the names of some of the persons who made these important contributions. *Contemporary Response*: Students will relate to career pathways in electrical engineering such as in power systems engineering and signal processing engineering by working problems in these areas.
Laboratory:	The laboratory meets for three hours each week. Three weeks are used to cover basic instrumentation, measurement uncertainties, and loading effects. One week is provided to introduce circuit simulation (SPICE-based). A design project takes about three weeks. Transients in first and second-order circuits take two weeks. Topics in electronics: operational amplifiers, diodes and rectifiers, and single transistor circuits take about five weeks.
Computer use:	Orcad-Pspice is used for circuit simulation. Students are encouraged to use programs such as Mathcad or Matlab for homework solutions when appropriate. Most assignments and handouts are available via Dordt's course management system, https://instructure.dordt.edu (also known as "Canvas@Dordt").
Academic Integrity:	Students must do their own work. Students may discuss homework but may not show un-graded papers to each other. This course is subject to the policies on academic integrity as published in the Student Handbook. Some additional policies that apply to this course are on later pages of this document.
Accommodations:	Students who require assistance or accommodations based on the impact of a documented disability must contact Marliss Van Der Zwaag, the Coordinator of Services for Students with Disabilities to access accommodations. Telephone 722-6490, e-mail Marliss.VanDerZwaag@dordt.edu
Means of Evaluation:	Homework (10%), Two Tests (23% each), Lab Reports, Lab Quizzes, and other non-homework-type Lab Activities (20 %), Final Exam (24%). Grades are calculated using grade points. A = 4, B = 3, etc. For more detail see http://homepages.dordt.edu/F15/GDS.HTM

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Dates			Class	Laboratory (M or Tu.)
	1/11	1/13	Basics—mostly review of EGR 117 *Text Chapter 1.*	(no lab)
1/16	1/18	1/20	More Basics Meters, Dependent Sources, Switches, KVL, KCL *Text: Chapter 2, 3 and class notes*	1.) Safety and introduction to the instrumentation
1/23	1/25	1/27	Methods of Circuit Analysis: Review of nodal and mesh analysis. New content includes supernodes and supermeshes. *Text Chapter 3.*	2.) Uncertainty, Tolerances, and Loading Effects
1/30	2/01	2/03	Circuit Theorems: Superposition, Source Transformations, Thevenin's, *Text: Chapter 4 through Section 4.3*	3.) Introduction to the oscilloscope and signal generator
2/06	2/08 **Wed, 2/08 Test** (no class Friday, 2/10)		Circuit Theorems: Norton's, Maximum Power Transfer *Text: Chapter 4, Section 4.4 to end of chapter.* **Test on Wednesday covers through Chapter 3** (No class Friday, Reading day	4.) Introduction to circuit simulation
2/13	2/15	2/17	Ideal Operational amplifiers. *Text: Chapter 5 to the end of Section 5.3*	5.) Project (1st of 3 weeks)
2/20	2/22	2/24	Operational amplifiers. *Text: Chapter 5*	Project (2nd of 3 weeks)
2/27	3/01 (no class Friday, 3/03)		Capacitors and inductors. *Text: Chapter 6 through Section 6.3* (Spring Bk 3/03 – 3/13)	Project (3rd of 3 weeks)
	3/15 (no class Monday, 3/13)	3/17	First order circuits. *Text Chapter 7*	6.) (Spring Break)
3/20	3/22	3/24	Second order circuits. *Text Chapter 8*	7.) Op amps
3/27	3/29 **Wed, 3/29 Test**	3/31	Sinusoids and Phasors, *Text Chapter 9* **Test on Wednesday covers through Chapter 8**	8.) RL and RC circuits, step and pulse responses
4/03	4/05	4/07	Sinusoidal Steady-State Analysis, *Text Chapter 10*	9.) RLC circuits
4/10	4/12	4/14	Introduction to AC steady-state power, *Text Chapter 11.*	10.) Diodes and Rectifiers
4/17 (no class 11/25, 11/27)	4/19	4/21	AC steady-state power, transformers, diodes, rectifier circuits. *Text Chapter 11, Chapter 13.*	11.) Sinusoidal Steady-State and Phasors
4/24 (no class 11/30)	4/26	4/28	Three-Phase circuits. *Text Chapter 12.*	12.) Transistors
Wednesday, 5/03			Final exam, 3:30 p.m. – 5:30 p.m.	

Note: Schedule may vary by up to two weeks in order to accommodate the dynamics of this particular cohort of students.
The lab schedule here is entirely tentative for general reference. Any information from Prof. Saarloos (Lab Instructor) supersedes this document.

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Spring 2017 Syllabus

The information on this and the following page is mostly copied from the Student Handbook as per policy in Dordt College's "Syllabus Checklist." *There is some additional information specific to this course as well. Additional information is in italic face.*

Academic Integrity

Dordt College is committed to developing a community of Christian scholars where all members accept the responsibility of practicing personal and academic integrity in obedience to biblical teaching. For students, this means not lying, cheating, or stealing others' work to gain academic advantage; it also means opposing academic dishonesty.

Academic Dishonesty. Students found to be academically dishonest will receive academic sanctions from their professor (from a failing grade on the particular academic task to a failing grade in the course), who will report the incident and the sanction given to the Student Life Committee for possible institutional sanctions (from a warning to dismissal from the college).

Appeals in such matters will be handled by the student disciplinary process as outlined in the Student Handbook.

Definitions

Academic dishonesty at Dordt College includes, but is not limited to, the following behaviors:

Stealing / Plagiarizing: copying another's work or ideas and creating the impression that they are one's own by failing to give proper credit or citation. This includes reading or hearing another's work or ideas and using them as one's own; quoting, paraphrasing, or condensing another's work without giving proper credit; purchasing or receiving another's work and using, handling, or submitting it as one's own work.

Cheating: unauthorized use of any study aids, equipment, or another's work during an academic task. This includes using unauthorized aids or other equipment during an examination; copying or looking at another individual's examination; taking or passing information to another individual during or after an examination; taking an examination for another individual; allowing another individual to take one's examination; stealing examinations.

All graded academic tasks are expected to be performed on an individual basis unless otherwise stated by the instructor.

An academic task may not be submitted by a student for course credit in more than one course without the permission of all instructors.

Lying / Fabricating: the intentional, unauthorized falsification or invention of any information or citation during an academic task. This includes changing or adding an answer on an examination and resubmitting it to change the grade; inventing data for a laboratory exercise or report.

Facilitating Academic Dishonesty: knowingly allowing or helping another individual to plagiarize, cheat, or fabricate information.

Students must do their own work. In Prof. De Boer's courses students may verbally discuss homework but may not show un-graded papers to each other. Detail on this policy can be found on the web at http://homepages.dordt.edu/ddeboer/F15/HWSTDF15.HTM#DYOW *This policy applies to the whole course, not just homework.*

Attendance

Students are expected to be present for every class and laboratory period. Penalties for absence from class are left to the instructor. No designated number of skips is permitted.

Student Responsibility: Students shall notify each professor concerning the reason for absence prior to or immediately upon returning to class or in accordance with the instructor's method of accounting for absences. Students shall notify student services concerning all illnesses.

Unexcused absences are defined as failing to notify the instructor of the reason for the absence, or if the instructor deems the reason as illegitimate.

Faculty initiatives: The instructor may contact student services to check on the illness record of the students. They should also alert student services and contact the student directly concerning excessive absences, and must, if asked, report attendance patterns. Any instructor may, after due

warning and according to guidelines established in the class syllabus, penalize the student by reducing the semester grade by a given percentage.

Student Services Responsibility: Normally, student services does not notify instructors concerning student illness. Student services may alert instructors to serious problems. Decisions to inform instructors about serious problems will be made balancing the need to respect confidentiality and the responsibility to keep instructors appropriately informed about their students. Any student with serious problems is strongly advised to work closely with student services and follow the process to insure adequate communication between all parties in as efficient a way as possible.

Excused Absence for Activities: Students have obligations in many realms, so special care shall be taken not to demand commitments for participation in extra-curricular events that cause neglect in other areas. Sponsors/coaches shall inform students from the beginning of the time and effort expected of them. Sponsors/coaches shall demand a minimum of absences from other classes, restrict student involvement to only those crucially involved, and make efforts to choose a time/date for the event that is least invasive of classroom or lab time. In the case of conflicts, resolution shall be the responsibility of the sponsor/coach and the instructor with no penalty to the student (The appeals process outlined in the section titled Complaints Regarding Instruction in the Student Handbook shall be used if needed). The sponsor shall email faculty and student services a list of names, dates, and activities in advance of the event. The student must contact the instructor and make arrangements for any missed work.

Professor De Boer expects to be notified at least a day in advance if you can reasonably be expected to have known that far in advance of a time when you will have to miss a class for a scheduled event of higher priority. In addition to the options listed above, missing classes without notification or for insubstantial reasons could be cause for being classified as an "uncooperative student" which could lead to dismissal from the course. Professor De Boer will give one warning before invoking the uncooperative student process.

Late work

Anything handed in late will be accepted for possible grading, but usually no grade will be entered in the grade book, the work will not be returned to you, and the empty grade will function as a zero or an "F." Usually the item will never be graded. If, in the judgment of Prof. De Boer, grading the late item might improve the course grade, and if the reasons for the late work seem acceptable and if there is no pattern of carelessness, then Prof. De Boer may choose to estimate a grade or actually grade the late work and replace the empty grade(s) in the grade book with the estimates or actual grade(s). Prof. De Boer may make a decision to estimate or fully grade a late item at any time after the item is handed in, but usually will do so only at the end of the course after all student course activities are complete. Additionally, if a pattern of late work develops, the professor will warn the student. After that warning if the problem is not resolved, a reduced course grade might result and/or the student may be classified as "uncooperative" which could lead to dismissal from the course.

Missed Tests or Exams

Professor De Boer announces his test schedule in the first week of classes. During the first two or three weeks of classes and possibly at other times, if there is good cause, students may negotiate to change the test date(s) for the entire class to avoid a conflict for any one student. However in the week before a test Prof. De Boer is very reluctant to negotiate the date because this can cause hardship for those who have been carefully planning. If you realize that you have a schedule conflict with a test date, discuss this with Prof. De Boer as soon as possible. If your reasons are sound, Prof. De Boer may schedule a special test time just for you. This special test time will usually be in advance of the regular test date.

If you are late to a test you must still finish at the scheduled time.

If you miss a test entirely the test will go in the grade book as a blank score which will count as an "F." At the end of the semester after all your course work is complete Prof. De Boer will reassess the situation and might choose to estimate what he thinks you might have earned on the test based on any evidence he can find relevant to the situation. If an estimated grade is granted, it may still be discounted to a lower grade than the other tests and exams you completed if negligence is a partial cause for missing the exam. A dead cell phone battery that causes you to miss an alarm is an example of negligence. If a test is missed due to illness (fever, nausea, etc., not just a "bad cold") then be sure to report the illness to student services before the test or during the test period. If student services can verify your illness to Prof. De Boer, an estimated grade that is non-punitive will be given at the end of the semester.

Class Participation

Professor De Boer does not grade class participation—it is expected. If your participation is a problem Prof. De Boer will talk about it privately with you. Usually mere attendance prompts adequate participation, presuming you are not sleeping in class or hung over. If sleeping in class, etc, the attendance policy will apply.