Dordt College EGR 220, PHYS 206, Linear Circuits and Electronics Spring 2018 Syllabus

2017-18 Catalog	EGR 220 Linear Circuits and Electronics (4 credit hours) PHYS 206 Linear Circuits and Electronics (4 credit hours)	(Spring) (Spring)	
Data:	Assumes a prerequisite knowledge of DC electrical circuits, including the definitions of electrical of circuit elements (sources, resistors, capacitors, inductors), understanding of Kirchhoff's laws and be in AC circuits such as frequency and phase. Topics in this course include: general linear circuit and Norton's and Thevenin's theorems; superposition; nodal and loop analysis; natural and forced resp circuits; and sinusoidal steady state analysis. The course also gives introductions to operational am single stage BJT and FET transistor circuits and steady-state balanced 3-phase power calculations. includes a formal design project. Prerequisite: Engineering 117 or Physics 202 or Physics 216. Co Mathematics 204. [Cross listed: Physics 206, Engineering 220]	quantities, basic concepts lysis including bonses in RLC plifier circuits, The lab brequisite:	
Course Application	This course is required of all engineering students. It is designed as a second-year (sophomore-level) course.		
Prerequisites by topic:	Calculus including techniques of integration, sequences, and series. Basics of DC circuits.		
Textbook and other required materials:	Alexander and Sadiku, <i>Fundamentals of Electric Circuits</i> , 6th ed., McGraw-Hill, 2017, ISBN 978-0-07-802822-9 NCEES approved calculator. See http://ncees.org/exams/calculator/ for details. Convenient computer access to Canvas and other general Web resources is also a requirement.		
References:	Horowitz and Hill, <i>The Art of Electronics</i> , 3rd ed., Cambridge University Press, 2015. website: <u>https://artofelectronics.net/</u> Edminister, Joseph, <i>Schaum's Outlines—Electric Circuits</i>		
Instructor:	Dr. Douglas De Boer, P.E.; Professor of Engineering, Douglas.DeBoer@Dordt.edu, telephone 712-722-6245. Office location, SB1638; office hours, Monday and Wednesday mornings, For more detailed information see Prof. De Boer's Web page: <u>https://dfdeboer.github.io</u>		
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 or Wednesday. About one homework assignment per class period. Two tests during the semester exam.	either Monday r and a final	
Course Objectives and Outcomes:	<i>Creational Structure</i> : 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. (This relates to ABET outcomes a, e and k.)		
	<i>Creational Development</i> : Students will be able to recount several of the important historical contribut development of the modern techniques of circuit analysis. This includes the ability to recite the name the persons who made these important contributions. (This relates to ABET outcome h.)	tions in the nes of some of	
	<i>Contemporary Response.</i> Students will relate to career pathways in electrical engineering such as in pore engineering and signal processing engineering by working problems in these areas. (This relates to outcome j.)	ower systems ABET	
Laboratory:	The laboratory meets for three hours each week. Three weeks are used to cover basic instrumental measurement uncertainties, and loading effects. One week is provided to introduce circuit simula (SPICE-based). A design project takes about three weeks. Transients in first and second-order circuit weeks. Topics in electronics: operational amplifiers, diodes and rectifiers, and single transistor circuit five weeks.	ation, tion rcuits take two uits take about	
Computer use:	Orcad-Pspice is used for circuit simulation. Students are encouraged to use programs such as Math for homework solutions when appropriate. Most assignments and handouts are available via Dormanagement system, <u>https://dordt.instructure.com</u> (also known as "Canvas@Dordt").	ncad or Matlab dt's course	
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. Marliss Van Der Zwaag, the Coordinator of Services for Students with Disabilities to access according Telephone 722-6490, e-mail Marliss.VanDerZwaag@dordt.edu	y must contact nmodations.	
Means of Evaluation:	Homework (10%), Two Tests (23% each), Lab Reports, Lab Quizzes, and other non-homework-Activities (20%), Final Exam (24%). Grades are calculated using grade points. A = 4, B = 3, etc. For more detail see https://dfdeboer.github.io/GDS.HTM	type Lab	

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

Spring 2018 Syllabus, Course Outline

Dates			Class (MWF 1:00 – 1:50 PM)	Lab	(M or W, 2–5 PM)
	1/17	1/19	Basics—mostly review of EGR 117 Text Chapter 1.		(no lab)
1/22	1/24	1/26	Meters, Dependent Sources, Switches, KVL, KCL, Nodal and mesh analysis, supernodes and supermeshes. <i>Text: Chapter 2, 3 and class notes</i>	1.)	Safety and introduction to the instrumentation
1/29	1/31	2/02	Superposition, Linearity, Additivity, Scaling, Source transformations, Thevenin's and Norton's theorems. <i>Text Chapters 3, 4</i>	2.)	Uncertainty, Tolerances, and Loading Effects
2/05	2/07	2/09	One-port "inverted selection," Maximum Power Transfer, Efficiency, Op-amps, Decibels <i>Text: Chapters 4, 5</i>	3.)	Introduction to the oscilloscope and signal generator
2/12 2/14 Wed, 2/14 Test (no class Friday, 2/16)		Test 1, 2/16)	Intro to capacitors <i>Text: Chapter 6</i> Test on Wednesday covers through Chapter 3 (No class Friday, Reading day	4.)	Introduction to circuit simulation
2/19	2/21	2/23	Capacitors—energy storage, series, parallel. Inductors—energy storage, series, parallel. First order RC and RL circuits <i>Text: Chapter 7</i>	5.)	Project (1st of 3 weeks)
2/26	2/28	3/02	Singularity functions, $\delta(t)$, $u(t)$, $r(t)$, Modeling switches. Integrals involving $\delta(t)$, the sifting property. <i>Text: Chapter 7</i>		Project (2 nd of 3 weeks)
3/05	3/07	3/09	2 nd order circuits: Over-Critically-Underdamped The operator method, 2 nd order Op-amp circuits <i>Text: Chapter 8</i> (Spring Bk 3/10 – 3/19)		Project (3 rd of 3 weeks)
3/21 3/23 (no class Monday, 3/19)		3/23 ay, 3/19)	Review Trig, Review Complex Numbers Introduction to Phasors. <i>Text Chapter 9</i>	6.)	(no lab, spring break)
3/26	3/28	3/30	Definition of Impedance, Phasor transform examples. <i>Text Chapter 10</i>	7.)	Op amps
4/02 4/04 4/06 Wed, 4/04 Test		4/06 I Test	Power Factor; Peak, Avg, Effective, RMS values Leading PF, Lagging PF, PF correction, Complex Pwr. <i>Text Chapter 11</i> Test on Wednesday covers through Chapter 8	8.)	RL and RC circuits, step and pulse responses
4/09	4/11	4/13	Complex power triangle, apparent power, Measuring power and billing for power <i>Text Chapter 11</i>	9.)	RLC circuits
4/16	4/18	4/20	Three-Phase Power Text Chapter 12.	10.)	Diodes and Rectifiers
4/23 (no cla	4/25 ass 4/26)	4/27	Transformers, Autotransformers, Diodes, Rectifiers. <i>Text Chapter 13.</i>	11.)	Sinusoidal Steady-State Phasors
4/30	5/02	5/04	Complex Transformation Ratio. Text Chapter 13.	12.)	Transistors
Wednesday, 5/09		/09	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.

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

Spring 2018 Syllabus

Some of 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 a serif typeface and has a black line down the left margin.

Academic Dordt College is committed to developing a community of Christian scholars where all members Integrity 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 https://dfdeboer.github.io/S18/HWSTDS18.HTM#DYOW This policy applies to the whole course, not just homework.

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

Attendance

Dordt College EGR 220, PHYS 206, Linear Circuits and Electronics Spring 2018 Syllabus

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 when 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.
Late work	Anything handed in late will be accepted for possible grading, but 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 adjust the grade(s) in the grade book. 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. If you realize that you have a schedule conflict with a test date, discuss this with Prof. De Boer as soon as possible.
	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. Lack of participation can be a cause for adjusting your course grade downward, even to an "F."