Physics 405 - Physical Principles of Telecommunications

Department of Physics, Spring, 2002.
DePaul University

Class will meet on Mondays from 6:00 PM to about 9:15 PM at the Naperville campus.
Lectures and discussion will be held from 6:00-8:00 pm.
The laboratory session will meet in the same room from about 8:15-9:15 pm.

Instructor

Rick Morrison, Ph.D.
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Office Hours

Approximately one-half hour before class on Mondays and after class.
No scheduled office hours at the physics department at Lincoln Park campus or Naperville campus.
Phone or email me at Distant Focus if necessary. (Most of the week I will be in Champaign.)

Required Text Book:

"Electricity and Electronics"; H. Gerrish and W. Dugger, (Goodheart-Willcox Co.)

Other References

"Electricity and Basic Electronics"; Stephen R. Matt, (Goodheart-Willcox Co.)

"Introduction to Telecommunication Electronics", A. M. Noll, (Artech House)

"Understanding Communications Systems"; D.L. Cannon and G. Luecke,
(Howard W. Sams & Co.)

"Understanding Electricity and Electronic Principles;" D.L. Heiserman,
(Howard W. Sams & Co.)

"Handbook of Modern Electronics and Electrical Engineering"; Edited by Charles Belove, (John Wiley and Sons). Approximately 2400 pages of explanations of how many electronic devices and systems work.

"Voice/Data Telecommunications Systems", Gurrie and O'Connor, (Prentice-Hall).

Tentative Schedule

CLASS	DATE	TOPIC	LABORATORY
1	4/1	Introduction. Basic Electronics, Safety.	Lab demonstration
2	4/8	Analog Electronics: Ohm's law, Resistors.	Lab #1 Digital Voltmeters
3	4/15	Analog Electronics: resistor circuits.	Lab #1 continued
4	4/22	Analog Electronics: AC, impedance.	Lab #2 The Oscilloscope
5	4/29	**EXAM**; Intro to semiconductors.	Lab #2 continued
6	5/6	Digital Electronics and Logic	Lab #3 Digital Electronics
7	5/14	Semiconductors, Diodes, Transistors.	Lab #4 Reactance/Resonance
8	5/20	Fundamentals of communication.	Lab #4 continued
9	5/27	**NO CLASS, MEMORIAL DAY**	
10	6/3	Transmission media - electronic + optical; review *	
11	6/10	**FINAL EXAM**	

* Potential **NO CLASS** if Instructor out of town for conference

Grade Assignment

Midterm Exam:	30%
Final Exam:	35%
Laboratory:	25%
Homework:	10%

Grades are roughly: A range: 85-100%, B range: 70-85%, and C range: below 70%.

Homework

Due at the beginning of class. Since answers are handed out immediately after homework collection, there is a 50% penalty for unexcused late assignments. Homework grading will be essentially binary (full credit or no credit).

Laboratory reports are due two weeks after lab completion.

Physical Principles of Telecommunications

Physics 405: Reading assignments.

“Electricity and Electronics”, Gerrish and Dugger (1999 edition).

Note: you are not required to read the “projects” or "experiments".

Readings related to Laboratory

chap 2: "Volt-Ohm-Milliammeter and Electrical Diagrams", p. 42-47.
optional: p. 33-41.
chap 10: "Oscilloscope", p. 152-156.

Analog Electronics

“Reference Section-Scientific Notation”, p 447.
chap 1: “Science of Electricity and Electronics”, p. 17-31.
chap 3: “Introduction to Basic Electrical Circuit Materials”, p. 51-68.
chap 4: “Energy”, p. 71-77.
chap 6: “Series Circuits”, p. 98-103.
chap 7: “Parallel Circuits”, p. 105-110.
chap 8: “Combination Circuits”, p. 112-118.
chap 14: “Inductance and RL Circuits”, p. 205-216.
chap 15: “Capacitance and RC Circuits”, p. 219-233.
chap 16: “Tuned Circuits and RCL Networks”, p. 237-240.

Semiconductors, diodes and transistors, Digital Logic

chap 17: “Introduction to Semiconsductors and Power Supplies”, p 253-262.
chap 18: "Transistors", p. 283-292.
chap 19: “Integrated Circuits”, p 305-311.
chap 20: “Digital Circuits”, p. 319-329.

Communication Fundamentals

chap 22: “AM and FM Radio Communications”, p 351-357.
"Amplitude and Frequency Modulation", p.361-365.
chap 16: "Filtering Circuits", p 244-250.

Transmission Media

chap 23: " Television", p. 389-404.
chap 24: "Fiber Optics and Lasers", p. 407-419.