FD '01

CHAMINADE UNIVERSITY OF HONOLULU

PHYSICS 301 & 301L **INSTRUMENTATION ELECTRONICS I**

Fall Semester, 2001

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SYLLABUS

A. OBJECTIVE OF COURSE: The course is a introduction to instrumentation electronics. The course builds on the basic circuit theory as presented in the physics 152/252 courses (or their equivalent), and takes you through network analysis, both for DC and AC circuits, discrete semiconductor devices, amplifiers, transducers, logic devices, boolean algebra, and on into discussion of the principles of operation of microprocessors and microcontrollers. This course is the prerequisite for taking Physics 302.

B. TEXT: "PRINCIPLES OF ELECTRONIC INSTRUMENTATION", by Diefenderfer and Holton

You are expected to take the responsibility for reading the text yourself. Each chapter should be read quickly just prior to our meeting - in order that you acquaint yourself with the main ideas that are in each chapter, and to get a good idea of the words and principles that we are to discuss. This first reading could consist of a ten-minute skim. Then, as the material is currently being discussed, read through each section more carefully, making sure that you understand the detail of the work, and follow through the discussions and examples presented by the author.

C. CONTENT OF COURSE:

The material covered in the course is drawn from chapters 1 through 12 of the text. Approximately one chapter per week and a half will be studied. se chapters cover the following topics, which will give you a good working knowledge of the following topics (here shown by chapter):

1. DC circuit analysis – basic principles, network analysis techniques including use of the meshloop method, as well as Thevenin's theorem and Norton's theorem.

2. Circuits involving capacitors and inductors – RC and RL circuits, signal differentiation and integration.

3. AC circuits – Phasor diagram, Reactance, impedance.

4. Transformer, complex waveforms

5. Diodes – rectification, power supplies, zener diodes, diode uses.

6. Test equipoment – oscilloscope, AC source, analog and digital meters

7. Transducers – types, principles and uses.

8. Transistors – function, types and uses.

9. Operational amplifiers

10. Waveform generators and shapers, integrated circuit waveform generators

11. Digital circuit basics – types, digital gates, Boolean algebra

12. Digital circuits – counters, registers, multivibrators, logic circuits

D. LABORATORY COMPONENT: Because of the nature of the course, the class work and lab overlap heavily, and practical lab work will often take place during class time, and vice versa. There will be a series of practical lab assignments through the semester, with notes being issued as required. Towards the end of the semester you will be working on a practical project of your choosing - designing and building some kind of device or system that you will take from the idea through the conceptual design stage, right through to constructing, proving and documenting the final product. You will have plenty of time and help to select a project.

4. EVALUATION:

A quiz will be held on each chapter's material, and as best suited to the nature of the material being studied, occasional take-home exams will also be given. Two preliminary exams will be held during the course of the semester, on dates mutually agreeable to all members of the class.

Grade assessment: Grades are based on homework, quizzes, exams, etc, to the extent presented here:	Take home exams:	10%
	Quizzes:	30%
	Prelim. Exams	30%
	Final Exam	30%
	TOTAL:	100%

A separate lab grade is awarded which depends on your performance in the lab assignments and the final project.