Department of Electrical and Electronic Engineering, California State University, Sacramento

EEE 120 Instrumentation*, 4 units – Lecture 3 units, Lab 1 unit*
Fall 2015, Section 1, Call No. 85738, Mon/Wed 1:00 – 1:50 P.M. Riverside Hall, Room 3017
Fall 2015, Section 2, Call No. 85739, Tue 9:00 – 11:40 A.M. Riverside Hall, Room 3017

Course Content: The fundamental principles of the sensors and instrumentation systems will be emphasized, together with their electrical implementation, such as biasing and signal processing circuits. Devices that will be discussed include temperature, force, pressure, and mechanical sensors. Optical sensors including a brief introduction to light sources and detectors will also be discussed. This course provides an introduction to various sensors and instrumentation applicable to biomedical engineering and industrial control.

Prerequisite: EEE 117 – Network Analysis

Corequisite: EEE 108
.
Textbook: ***Introduction to Instrumentation and Measurements***, Robert Northorp, 2th Edition, 2005, CRC Press, Taylor and Francis Group, ISBN: 0-8493-3773-9

Reference: ***Bioinstrumentation***, John Webster, 2004, Wiley & Sons, ISBN: 0-471-26327-3

Instructor: Russ Tatro   Office: Riverside 5030
                email: rtatro@csus.edu   Website: www.csus.edu/indiv/t/tatror
                Office Phone: 278-4878
                Office Hours: See my website for current office hours.

Grading: Midterm   30%
                Final Exam   30%
                Laboratory   40%
Lectures: The course is a combination of online activities and in-class work. Lectures are on Mondays and Wednesday in person at the assigned classroom. The Friday time will used for online activities including reading assignments, homeworks and exams.

Homework: Problems shall either be from the textbook or created by the instructor. Check my website for homework assignments. All homework material is testable whether covered in class or only in the homework assignment. The homework will not be collected nor graded.

Exams: There shall be one midterm exam and a final exam during the semester. Each shall have similar formats and will be closed book. **Prior** permission is required for all make-up exams. Be prepared to show your student ID (one card) in order to take the exam.

Grading Policy: Grades may be curved at the instructor's discretion. The class average will be in the C+ range. Typical grades ranges are:
        A - 90 and above   C - 70 - 79   F – Below 60
        B - 80 – 89   D - 69 - 60

EEE 120 - Lecture - Section 1 - Course Outline – Fall 2015

Week	DATE	Chapter	TOPICS
1	8-31 9-02 9-04	1.1 1.1 – 1.2	Introduction Measurement systems
2	9-07 9-09 9-11	Campus Clsd 1.3 – 1.4	Labor Day Holiday – Campus Closed Errors and standards
3	9-14 9-16 9-18	2.1 2.2	Intro to Analog Signal Conditioning Differential Amplifiers
4	9-21 9-23 9-25	2.3 2.5	Operational Amplifiers Instrumentation Amplifiers
5	9-28 9-30 10-02	3.1 – 3.2 3.3 – 3.4	Random Noise in Circuits Noise factors
6	10-05 10-07 10-09	3.5 – 3.6 3.7	Spot Noise and Output SNR Noisy Amplifiers
7	10-12 10-14 10-16	9.1 – 9.3 9.4 – 9.5	Digital Interface in Measurement Systems Analog-to-Digital Converters
8	10-19 10-21 10-23	**Midterm Exam** 3.8	Chapters 1, 2, 3 (Chapter 3 up to 3.7) and 9 Noise Limited Resolution
9	10-26 10-28 10-30	3.9 – 3.10 4.1 – 4.2	Low Noise Amps and Coherent Interference DC Null Measurement
10	11-02 11-04 11-06	4.3 – 4.5 5.1 – 5.2	Kelvin Bridge and Potentiometers AC Null Measurements
11	11-09 11-11 11-13	5.3 – 5.4 Campus Clsd	AC Wheatstone 11/11 Veterans Day – No Class
12	11-16 11-18 11-20	5.5 6.1 – 6.2	AC Bridges Categories of Sensor Inputs
13	11-23 11-25 11-27	6.3	Resistive Sensors Thanksgiving Holiday travel day – No class
14	11-30 12-02 12-04	6.4 6.5 – 6.6	Voltage Generating Sensors Magnetic and Capacitive Sensors
15	12-07 12-09 12-11		ECG Project Presentations Wrap-up and Review
16	12-14	**Final Exam**	**12:45 p.m. – 2:45 p.m.** **Chapters 3 (partial), 4, 5, and 6**

EEE 120 - Lab - Section 02 - Course Outline – Fall 2015

Week	DATE	LAB	TOPICS
1	09-01	1	LabView Introduction
2	09-08	2	Instrumentation OpAmp
3	09-15	2	Instrumentation OpAmp
4	09-22	3	Custom IOA Lab 2 Report due
5	09-29	3	Custom IOA
6	10-06	4	AD/DC Quantization Lab 3 Report Due
7	10-13	5	Thermistor Lab 4 Report Due
8	10-20	5	Labview readout of a thermistor
9	10-27	5	Fluid Temperature Control System
10	11-03	5	Fluid Temperature Control System
11	11-10	5	Fluid temp control system presentation
12	11-17	6	Biomedical Project – Rapid Design and Testing Lab 5 Report Due
13	11-24	6	Biomedical Project – lab work
14	12-01	6	Biomedical Project – lab work
15	12-08	6	Biomedical Project – Project Demonstration Lab 6 Report Due
16	12-15		Exam week – no lab.