EEO 304: Electronic Instrumentation and Operational Amplifiers

Fall 2013

2013-2014 Catalog Description:

Design of electronic instrumentation: structure of basic sensors and measurement systems, transducers, analysis and characteristics of operational amplifiers, analog signal conditioning with operational amplifiers, sampling, multiplexing, A/D and D/A conversion; digital signal conditioning, data input and display, and automated measurement systems.

Course Designation: Elective

Text Books: S. Franco, Design with Operational Amplifiers and Analog IC, McGraw-Hill, Third Edition, 2002

Prerequisites: EEO 315

Coordinator: Michael Gouzman

Goals: Teach students how to use Op.Amp. based circuits as basic elements for creation electronic systems for measurement, analog processing and conversion into different analog and digital formats.

Course Learning Outcomes: To increase understanding of connections between science and engineering, provide a basic training in the area of solving engineering problems and teach how to use the techniques, skills, and modern engineering tools necessary for engineering practice

Topics Covered:

Week 1.	Technology of Electrical Measurements
Week 2.	Electrical Sensors and Operational Amplifier Fundamentals
Week 3.	Circuits with Resistive Feedback
Week 4.	Static Op Amp Limitations
Week 5.	Dynamic Op Amp Limitations
Week 6.	Application of Operational Amplifier
Week 7.	Active Filters. Part I – First Order Filters
Week 8.	Active Filters. Part II – Second Order Filters
Week 9.	Nonlinear Circuits Part I – Comparators.
Week 10.	Nonlinear Circuits Part II – Signal Converters

Week 11.	Signal Generators. Part I - Sinusoidal
Week 12.	Signal Generators. Part II – Non-sinusoidal
Week 13.	Voltage References and Voltage Regulators
Week 14	D-A and A-D Converters

Class Schedule: Lecture: 3 lecture hours per week.

Student Outcomes	% contribution
❑ (a) an ability to apply knowledge of mathematics, science and engineering	25
❑ (b1) an ability to design and conduct experiments	0
❑ (b2) an ability to analyze and interpret data	0
❑ (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	25
❑ (d) an ability to function on multi-disciplinary teams	0
❑ (e) an ability to identify, formulate, and solve engineering problems	25
❑ (f) an understanding of professional and ethical responsibility	0
❑ (g) an ability to communicate effectively	0
❑ (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	0
❑ (i) a recognition of the need for, and an ability to engage in life-long learning	0
❑ (j) a knowledge of contemporary issues	0
❑ (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	25
❑ (l) an ability to communicate and/or collaborate effectively online	

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