NEW YORK CITY COLLEGE OF TECHNOLOGY
The City University of New York

DEPARTMENT:	Electrical and Telecommunications Engineering Technology
SUBJECT CODE AND TITLE:	EET4112 Applied Mechatronics
COURSE DESCRIPTION:	The course introduces multidisciplinary concept of mechanical, electrical, control system and computer software that is required for designing, analyzing and controlling a system. Integration of sensors, actuators, power electronics and control algorithms are emphasized. Application of various NI modules (AI and AO) are implemented for data acquisition
PREREQUISITE:	**EET 3212**
TEXTBOOK:	Mechatronics: Electronic control systems in mechanical and electrical engineering. (7th Edition, 2011) By Bolton, W. Analysis
COURSE OBJECTIVES/ COURSE OUTCOMES:	Upon completion of this course the student will be able to: 1. Acquire the theoretical knowledge of different kinds of sensors. (ABET Criteria 3.1, 3.2). 2. Acquire the theoretical knowledge of different kinds of actuators: such as DC motors, proportional valves, stepper motor and relays (ABET Criteria 3.1) 3. Acquire knowledge about microcontrollers and ICs such as operational amplifiers, A/D and D/A converters, counters, timer etc. (ABET Criteria 3.1). 4. Acquire knowledge in writing LabView Code (ABET Criteria PC a).
TOPICS:	Topics include dc, pulse, and ac analysis of first order and second order systems when solving the transient and steady state responses of a given network. Graphical plotting, analysis of findings are discussed.
CLASS HOURS:	2
LAB HOURS:	2
CREDITS:	3
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Revised by:	(Spring 2022)
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EVALUATION:

Exam #1	20%
Exam #2	20%
Lab/Labview code	20%
Final Exam	40%

Letter Grade	Numerical Grade Ranges	Quality
A	93-100	4.0
A-	90-92.9	3.7
B+	87-89.9	3.3
B	83-86.9	3.0
B-	80.82.9	2.7
C+	77-79.9	2.3
C	70-76.9	2.0
D	60-69.9	1.0
F	59.9 and below	0.0

Assessment	Assessment
The following assessment techniques are correlated to the course objectives as follows: In addition, each assessment technique incorporates one or more of the ABET Criteria 2 outcomes (3.1, 3.2, PC a). Course Objectives 1. Acquire the theoretical knowledge of different kinds of sensors such as: strain gages, thermocouples, transducers, proximity sensors, load cell, tachometer, motion detectors. 2. Acquire the theoretical knowledge of different kinds of actuators: such as DC motors, proportional valves, stepper motor and relays. 3. Acquire knowledge about microcontrollers and ICs such as operational amplifiers, A/D and D/A converters, counters, timer etc. 4. Acquire knowledge in writing LabView Code	The student will be able to: Students focus on the designing aspect of circuits that go in conjunction with these sensors. Using the Data Acquisition Board (DAQ) students will read the data from the sensors and display it on the monitor. Students will show skills in calculating and design circuits or use controllers to do simple tasks. They will be asked to write software that can communicate with these actuators. Students will be asked to use different sensors or actuators and ICs to read data by using microcontrollers/NI Modules. Design a system to measure and control various types of actuators devices. Students will design circuits that will include sensors, actuators, and write LabView codes to perform certain task

Week	***Lecture Topic***		***Laboratory***
1 & 2	1. Introducing Mechatronics 2. Sensors and Transducers • Analog position measurement • Digital position measurement • Temperature sensors. • Strain, stress, force measurement	Chapter 2: 2.3, 2.4, 2.5, 2.6, 2.9, 2.10	Lab 1. Lab 2
3-4	Signal Conditioning • The operational amplifier • Filtering • Wheatstone bridge • Pulse modulation	Chapter 3: 3.2, 3.4,3.5,3.6	Lab 3 Lab 4
5-6	Digital Signals • Analog and digital signal • Digital-to-analog (ADC) and Analog-to-digital (DAC) converter • Data acquisition	Chapter 4 4.2, 4.3, 4.5	Lab 5 Lab 6
7 & 8	Mechanical Actuation system: • Type of system • Kinematic chains • Gears	Chapter 8 8.1, 8.2, 8.3, 8.5	Lab 7 Lab 8
9 & 10	Electrical Actuation system • Electrical system • Solid-state-switches • Solenoids • DC Motors • Stepper Motor	Chapter 9 9.1, 9.3, 9.4, 9.5, 9.7 9.8	Lab 9 Lab 10
11 & 14	System Transfer Function • Transfer Function • First order System • Second Order System • System with feedback	Chapter 13 13.1,13.2,13.3, 13.5 and 13.6	Lab 11 Lab 12

Week	***Lecture Topic***		***Laboratory***
	• Effect of pole location on transient response		
15	Final Exam		

Contribution of course to meeting the requirements of ETAC/ABET Criterion 5:

EET 4112 meets criterion 5 by providing students with a strong foundation of analytical and theoretical knowledge of different types of sensors, actuators and analog and digital NI modules. The students acquire knowledge in writing LabView Code to control various types of actuators devices. Academic benchmarks, course outcomes, and assessment requirements have been established to determine students' ability of designing a circuit, breadboarding, and performing various tests and analyses. By fostering critical thinking, communications, and teamwork, the students develop the skills needed to solve problems in a laboratory environment, which later will serve them in their work place.

New York City College of Technology Policy on Academic Integrity

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.