2/10/2023 DATE
☑ REQUIRED COURSE
☑ ELECTIVE COURSE

Technology DIVISION
☑ NEW COURSE
☑ REVISION

Lake Land College

Course Information Form

COURSE NUMBER:	PLC-040		TITLE: *(30 Characters Max)*		Fundamentals of Instrumentation						
SEM CR HRS:	3	Lecture:	3		Lab:	0				ECH:	3
Course Level:	☐ Gen Ed / IAI ☐ Baccalaureate /Non-IAI		☑ Career/Technical ☐ Dev Ed/ Not in Degree Audit		Clinical Practicum:	0	SOE/ Internship:	0		SOE ECH:	0
COURSE PCS #	12 15.0303		IAI Code						Contact Hours (Minutes Per Week)		
Repeatable (Y/N):	N	Pass/Fail (Y/N):	N	Variable Credit (Y/N):	N	Min:		Max:		16 Wks 150	8 wks 300
Prerequisites:											
Catalog Description: (40 Word Limit)	Fundamentals of instrumentation: Basic types of sensors, actuators, and controls used in instrumentation are studied.										

List the Major Course Segments (Units)	Contact Lecture Hours	Contact Lab Hours	Clinical Practicum	Non-Clinical Internship/ SOE
Control Systems	3			
Calibration	3			
Pressure	3			
Flow	3			
Liquid Level	3			
Temperature	3			
Pneumatics and Actuators	3			
Controllers	2			
Control Systems	3			
Analytical pH Measurement	3			
Smart Instrument Communicators	3			
Smart Instrument Calibration	3			
Instrument Installation	3			
Instrument Maintenance	3			
Instrument Tubing	2			
Documentation	2			
TOTAL	45	0	0	0

EVALUATION							
QUIZZES	☑	EXAMS	☑	ORAL PRES	☐	PAPERS	☑
LAB WORK	☐	PROJECTS	☐	COMP FINAL	☑	OTHER	☐

COURSE MATERIALS		
TITLE:	Fundamentals of Instrumentation	
AUTHOR:		
PUBLISHER:	Cengage Learning	
VOLUME/EDITION/URL:	2nd	
COPYRIGHT DATE:	2008	

MAJOR COURSE SEGMENT	HOURS	LEARNING OUTCOMES
		The student will be able to:
Control Systems	3	Describe the purpose of a control system. Describe the process and variables that can be measured in a control system.
Calibration	3	List the calibration standards required for the calibration process. Explain the purpose of the calibration procedure.
Pressure	3	List the types of elements used to measure pressure. Describe the functions of pressure elements.
Flow	3	Describe pressure measurement systems. Determine the function of pressure-sensing devices. Identify a pressure-operating element. Explain the characteristics of flow meters.

Liquid Level	3	Describe level measurement properties and measurement principles. Show mathematically level relationships.
Temperature	3	Explain the operation of temperature measurement devices. List four temperature scales used in temperature measurement. Describe how a thermistor measures temperature indirectly.
Pneumatics and Actuators	3	Describe the purpose and use of pneumatic amplifiers. Explain the operation of the nozzle-flapper system. Describe the purpose and operation of positioners. Explain the operation of limit, reed, potentiometers, and linear variable differential transformer valve position indicators.
Controllers	2	Compare the concepts of automatic control and manual control. Describe the field I/O used by a controller. List signal types received by a controller.
Control Systems	3	Identify and explain the operation of open and closed loop control. Explain the effects of resistance, capacity, dead time, and transfer lag.
Analytical pH Measurement	3	Describe the operation of analytical pH measurement. Explain the cleaning process of the measurement probes.
Smart Instrument Communicators	3	Explain the objectives for using a smart communicator. List the features of a smart communicator.
Smart Instrument Calibration	3	List the three steps required to calibrate a smart instrument. Identify a multi-drop configuration for digital communication devices.
Instrument Installation	3	List the required areas of concern for installing an instrument. Describe the proper installation methods for process tubing and connections.
Instrument Maintenance	3	Determine the cause of error signals and develop corrective actions to address them. Demonstrate knowledge of device and control loop process.
Instrument Tubing	2	Describe correct installations of process tubing. Explain the purpose of using impulse tubing.
Documentation	2	Describe the different drawings available for instrument installation and maintenance. Determine the revision number of drawings provided.
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	45	

COURSE OUTCOMES*	At the successful completion of this course, students will be able to:
	• Describe the purpose of a control system
	• List the calibration standards required for the calibration procedure.
	• Compare the concepts of automatic control and manual control.
	• Describe the required areas for installing and maintaining an instrument.
	• Explain the safety concerns involved when working in industry.

** Course Outcomes will be used in the Assessment Software for Outcomes Assessment. Limit to 3 - 5.*