Instrumentation & Control Engineering Technology

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Program Description

This program will provide graduates with the necessary training and technical foundation to become a skilled instrumentation & control technologist. Instruments and process control systems are used in the industry to measure and control variables such as pressure, flow, temperature, level, motion, force and chemical composition. Physical event detector, signal conditioning and transmitter, analyzer, controller and final control element such as control valve and electric motor are part of an automated control loop. The automation is applicable to the process industries including, petrochemical, pharmaceutical, and food processing as well as, controlling environmental conditions in a variety of industrial and commercial buildings. Students will acquire the technical skills of reading and designing piping and instrumentation diagrams, creating operator graphics and schematics, configuring and tuning of control loops, and performing instrument and control system documentation according to standards and codes. The hands-on laboratory component is designed to enable participants to install, configure, calibrate, troubleshoot, and maintain instruments (pneumatic, analog, digital) and control systems in a variety of replicated industrial settings.

Co-op Schedule

FALL	WINTER	SUMMER	FALL	WINTER	SUMMER	FALL	WINTER	SUMMER	FALL
Academic Term 1	Academic Term 2	Summer Vacation	Academic Term 3	Academic Term 4	**CO-OP TERM 1**	**CO-OP TERM 2**	Academic Term 5	**CO-OP TERM 3**	Academic Term 6

Courses

ACADEMIC TERM 1	ACADEMIC TERM 2	ACADEMIC TERM 3
Introductory Applied Chemistry	Introduction to Sustainable development	Introduction to Industrial Chemical Processes
Electric Circuits I	Electric Circuits II	Introduction to Business
Fundamentals of Instrumentation I	Fundamentals of Instrumentation II	Process Instrumentation I
Mathematics I	Mathematics II	Mathematics III
Communication for Technology I	Communications for Technology II	Electronic Devices and Circuits I
College Orientation	Physics I	Digital Logic
		Job Search and Success
Co-op Term– Between Academic Terms 4 & 5 and 5 & 6		
ACADEMIC TERM 4	**ACADEMIC TERM 5**	**ACADEMIC TERM 6**
Process Stream Analysis	Chemistry Eng. Calculations & Operations I	Advanced Process Control
Process Instrumentation II	Process Control Systems	Introduction to Robotics
Introduction to AutoCAD for Instrumentation and Control	Process Analyzer Systems	Electrical Systems and Control II
Mathematics IV	Instrumentation Systems Practice	Process Control/Systems Troubleshooting
Computer Science	Programmable Logic Control	
Electrical Systems and Control I		

Student Capabilities

The list below indicates capabilities that students from the *Instrumentation and Control Engineering Technology* program (ICET) should possess.

Capabilities	End of Academic Term		
	4	5	GRAD
Calibrate process instruments to required specifications in accordance with the recommended procedures and manufacturers directives.	✓		✓
Familiar with basic business and sustainability principles	✓		✓
Calibrate and configure control valves and actuators for a specified application.	✓		✓
Write technical reports based on the collection and study of technical data.	✓		✓
To apply various analytical process variables.	✓		✓
To develop and interpret calibration curves for instrumentation equipment.	✓		✓
Able to select appropriate transmitters to measure pressure, temperature, levels, and flows.	✓		✓
To analyze and construct simple AC and DC circuits.	✓		✓
Use test equipment such as DC and AC meters and oscilloscope.	✓		✓
To use AutoCAD on microcomputers to prepare Instrumentation and Mechanical drawings.	✓		✓
Able to Solve problems using spreadsheets.	✓		✓
Skilled at writing computer programs in C language.	✓		✓
Proficient at breadboard and test power-supplies, amplifiers, oscillators, etc., using diodes, bipolar transistors, field-effect transistors, and/or integrated circuits.	✓		✓
Can Knowledgeably discuss digital techniques and logic circuits for control applications.	✓		✓
Ability to perform single-phase and three-phase power and torque calculations involving AC and DC motors/generators, and power transformers.	✓		✓

Capabilities	End of Academic Term		
	4	5	GRAD
Knowledge of principles of operation and control, using protective relays and PLC of various types of rotating electrical machines.		✓	✓
Knowledge of size orifice plates for low metering.		✓	✓
Calculate line pressure-drop through fluid-flow systems.		✓	✓
Size basic process equipment such as pumps and shell-and-tube exchangers.		✓	✓
Describe the fundamental principles of chromatography, spectrophotometry, pH and various other chemical analyzers.		✓	✓
Analyze simple control-loop behaviour.		✓	✓
Select appropriate tuning techniques to optimally tune 3-mode process controllers.		✓	✓
Basic understanding of the principles behind multiple loop control such as cascade and ratio control.		✓	✓
Perform process identifications and analyze simple control loop behavior.		✓	✓
Trouble-shoot on-line analyzer sampling-systems for both gas and liquid streams.		✓	✓
Select, program and apply PLC to appropriate applications.		✓	✓
Apply statistical techniques to achieve quality control.		✓	✓
Implement feed forward-feedback control schemes using various distributed control systems.		✓	✓
Program robot arms and interface with a variety of industrial automation types of sensors, including vision systems.		✓	✓
Interpret industrial power feed system diagrams, and have knowledge of the purpose of components in 3-phase electrical systems.		✓	✓
Program a microcomputer-based chromatographic analyzer system.		✓	✓
Calculating scaling-factors for multi-variable control systems.		✓	✓
Configure multiple-loop control strategies for DeltaV, Experion, and Foxboro IA distributed-control systems.		✓	✓
Apply feed forward-control, taking into account dynamic lead/lag compensation, to various operations including: distillation, reactors, fired-heaters etc.		✓	✓
Analyze, configure, and troubleshoot common industrial networks.		✓	✓