

Program Overview

This program prepares the student to be employed at the technician level or higher on computers, industrial computer networks, programmable logic controllers (PLCs), and instruments. PLCs are often the heart of the control portion of the manufacturing process. The student will have both classroom and hands-on laboratory instruction with several systems to help students understand computer and PLC interfacing, control systems, network installation, and administration.

Campus:

New Richmond



Special Feature

This program is unique in the state. The first year of the Industrial Automation, Controls, and Networking program and the first year of the Information Technology - Network Specialist program at New Richmond are closely aligned. Second-year students have the option to continue with the Industrial Automation, Controls, and Networking program or pursue the Information Technology - Network Specialist program (see page 104 for more information on the Information Technology - Network Specialist program).

Admission Requirements

Students in this program must:

- Complete application form and submit with fee (fee waiver may apply if previously submitted)
- Complete Accuplacer entrance assessment to determine placement (waiver may apply with acceptable alternative test scores and/or postsecondary degree completion)
- Complete admissions interview with a WITC counselor (above requirements should be completed prior to interview)

Program-Specific Requirement

Students in this program must:

- Complete the SmarterMeasure Learning Readiness Indicator assessment for online learning at: <http://www.witc.edu/online/smartermeasure.htm>.

Student Profile

Industrial Automation, Controls, and Networking students should be able to:

- Apply scientific principles and technical knowledge
- Perform mathematical computations accurately
- Evaluate data from tests and observations
- Work with precise standards
- Enjoy scientific and technical work
- Enjoy mechanical work requiring precision
- Work independently and with others
- Communicate clearly
- Be self-motivated

Preparation for Admission

Students should strive to reach a comfort level in the following courses or skills:

- Algebra/Geometry
- English/Speech/Creative Writing
- Economics/Business
- Basic computer skills

Program Outcomes

Employers will expect Industrial Automation, Controls, and Networking graduates to be able to:

- Identify controls systems and network requirements
- Make recommendations for hardware and software
- Perform installations and supportive functions for LAN/communication busses
- Perform installations and maintenance of controls hardware/software/cabling
- Develop system documentation
- Maintain system documentation
- Troubleshoot hardware/software of PLCs, instrumentation, and control systems
- Integrate controls systems
- Perform programming and configuration of distributed control systems

Collegewide outcomes and indicators will also be addressed to develop personal awareness, career effectiveness, and professionalism. See page 5 for a list of collegewide outcomes and indicators.

Career Outlook

The Industrial Automation, Controls, and Networking graduate will be ready to start a career as a(n):

- Computer Technician
- Network Technician
- Field Service Technician
- Control Systems Technician
- Instrument Technician
- Programmable Logic Controller (PLC) Technician
- Industrial Automation Technician

Curriculum

Number	Course Title	Credits
Technical Studies Courses		
10150111	Cisco Networking Fundamentals	3
10150113	Cisco Switching and Wireless ▲	3
10150117	MS LAN Administration - Infrastructure ▲	3
10150121	Hardware/Software Installation ▲	2
10150138	IT Essentials	3
10154102	Operating Systems 1	2
10154103	Operating Systems 2	3
10605167	Electricity 1 ▲	2
10605168	Electricity 2 ▲	2
10631100	Introduction to Process Control ▲	2
10631102	Industrial Power Electronics ▲	2
10631103	Process Control and Instrumentation ▲	3
10631104	Smart Instruments ▲	2
10631105	Industrial Networks and Communication Busses	2
10631106	Supervisory and Distributed Control Systems ▲	3
10631107	Industrial Automation Case Project ▲	1
10631108	PLC Programming and Interfacing ▲	3
10631109	Industrial AC, Motor Control, and Pilot Devices ▲	3
10631110	Advanced PLC Programming and Interfacing ▲	3
		<u>3</u>
		47
General Studies Courses ▽		
10801195	Written Communication ▲	3
10801196	Oral/Interpersonal Communication	3
10801197	Technical Reporting ▲	3
10804113	College Technical Mathematics 1A ▲	3
10804114	College Technical Mathematics 1B ▲	2
10809166	Introduction to Ethics: Theory and Application or	3
10809172	Race, Ethnic, and Diversity Studies	
10809195	Economics	3
10809198	Introduction to Psychology	3
		<u>3</u>
		23
	PROGRAM REQUIREMENTS	70

▲ Requires a prerequisite and/or corequisite that must be completed with a grade point of 2.0 or better.

▽ See page 40 for General Studies course descriptions.

Course Descriptions

(See page 40 for General Studies course descriptions)

10150111

Cisco Networking Fundamentals - Credits: 3

This course introduces the components, functions, and design of communication networks including the Internet. It uses the OSI and TCP/IP network models to examine the services provided by different layers of the model. The course examines the protocols used by the application, transport, network, datalink, and physical layers of the OSI model. TCP, IP, and Ethernet will be examined in detail. Learning will be reinforced by the creation and configuration of TCP/IP networks. Network addressing will be covered in detail as well.

10150113

Cisco Switching and Wireless - Credits: 3

This course helps students develop an in-depth understanding of how switches operate and are implemented in the LAN environment for small and large networks. Beginning with a foundational overview of Ethernet, this course provides detailed explanations of LAN switch operation, VLAN implementation, Rapid Spanning Tree Protocol (RSTP), VLAN Trunking Protocol (VTP), Inter-VLAN routing, and wireless network operations. Students analyze, configure, verify, and troubleshoot VLANs, RSTP, VTP, and wireless networks. Campus network design and Layer 3 switching concepts are introduced. PREREQUISITE: 10150111 Cisco Networking Fundamentals.

10150117

MS LAN Administration - Infrastructure - Credits: 3

This course provides students with training in the configuration of services in a Microsoft Server environment. Students will learn how to setup and troubleshoot DHCP, DNS, printing, file sharing, and remote access services. Microsoft file permissions will be examined and Active Directory will be introduced. Other topics include Windows Firewall, Network Access Protection, and IPv6. PREREQUISITE: 10154102 Operating Systems 1.

10150121

Hardware/Software Installation - Credits: 2

This course will prepare students to install hardware and software. You will learn to properly install various types of hardware and software on an IBM-compatible personal computer. This lecture- and lab-based course will use both group and individual activities. PREREQUISITE: 10154102 Operating Systems 1.

10150138

IT Essentials - Credits: 3

IT Essentials covers the fundamentals of computer hardware and software as well as advanced concepts. Students who complete this course will be able to describe the internal components of a computer, assemble a computer system, install an operating system, and troubleshoot using system tools and diagnostic software.

10154102

Operating Systems 1 - Credits: 2

A review of the most common command line operations and study of more advanced commands necessary to configure the Windows 2000 operating system for a variety of environments. Topics to be studied include creating directories, batch files, menus, custom configurations, file management, multitasking, windowing, security, and disk management utilities. There will be an introduction to usage, configuration, and tools of the Windows 9.X operating system.

10154103

Operating Systems 2 - Credits: 3

In this course the Linux operating system is examined in-depth with emphasis on features, capabilities, tools, and configurations including an introduction to network configurations. Additional topics will examine other operating systems like MAC OS.

10605167

Electricity 1 - Credits: 2

Electricity 1 is a lecture/hands-on course designed to introduce students to basic electrical terminology, laws, concepts, instrumentation, and application. Hands-on activities will be stressed to reinforce electrical concepts related to practical applications dealing with computer networks. Topics covered will include electrical safety, terminology and symbols, electrical laws, basic circuits, multimeter use, DC power supplies, and troubleshooting. Critical-thinking skills are emphasized to develop competencies in problem solving and troubleshooting. COREQUISITE: 10804113 College Technical Mathematics 1A.

10605168

Electricity 2 - Credits: 2

This course is designed to introduce students to the basic concepts of alternating current. Emphasis is placed on circuit analysis and problem-solving skills necessary for the maintenance of modern industrial electric systems. PREREQUISITE: 10605167 Electricity 1.

10631100

Introduction to Process Control - Credits: 2

The Introduction to Process Control course explains the function of basic devices for measuring and controlling different kinds of variables in process control. It introduces closed-loop control, PID functions, analog and digital devices, and control system applications. It also covers instrumentation symbols and the interpretation and use of process diagrams. PREREQUISITE: 10605167 Electricity 1.

10631102

Industrial Power Electronics - Credits: 2

The Industrial Power Electronics course is a hands-on course dealing with the electronics that are used to control, power, and operate machines and processes in the modern manufacturing plant. The course includes the study and use of the oscilloscope and digital multimeter, thyristors, AC, DC, stepper and servo motor drive systems, photoelectric switches, and miscellaneous field devices. PREREQUISITE: 10605167 Electricity 1 or equivalent.

10631103

Process Control and Instrumentation - Credits: 3

The Process Control and Instrumentation course offers hands-on skill exercises on controlling and manipulating temperature, pressure, flow, and level in the manufacturing process. Students will be able to identify, connect, operate, troubleshoot, and perform preventive maintenance on the components that form a process control system. PREREQUISITE: 10605167 Electricity 1 or equivalent and COREQUISITE: 10631100 Introduction to Process Control.

10631104

Smart Instruments - Credits: 2

The Smart Instruments course introduces students to smart instruments including temperature devices, pressure devices, and smart control valves. Students will be able to calibrate, configure, and troubleshoot smart devices. Students will be able to identify appropriate applications for smart instruments. PREREQUISITE: 10631100 Introduction to Process Control or equivalent.

10631105

Industrial Networks and Communication Buses - Credits: 2

This course introduces networks, communication buses, and protocols used in industrial applications. Students will be able to discuss strengths and weaknesses of each communications solution and pick the most appropriate for given applications.

10631106

Supervisory and Distributed Control Systems - Credits: 3

This course will provide an overview exposure to networked distributed control systems and data acquisition systems. Included are PLCs, data acquisition systems, Single Loop Controllers, Smart Devices, and Distributed Control Systems. Students will connect, configure, and operate a simulated process that includes the elements of distributed control and data acquisition systems. PREREQUISITES: 10631100 Introduction to Process Control and 10631108 PLC Programming and Interfacing or equivalent.

10631107

Industrial Automation Case Project - Credits: 1

The primary focus of this course is to have the students receive exposure and experience with an industrial process control or manufacturing automation system. Students will complete a project or research dealing with an existing process in an area industry or complete an advanced project in the lab dealing with applications of industrial networks, sensors, control, and data acquisition. PREREQUISITES: 10631100 Introduction to Process Control; 10631102 Industrial Power Electronics; 10631103 Process Control and Instrumentation; 10631108 PLC Programming and Interfacing; and 10631109 Industrial AC, Motor Control, and Pilot Devices.

10631108

PLC Programming and Interfacing - Credits: 3

PLC Programming and Interfacing offers students a hands-on approach to implementing industrial control by integrating typical plant floor electrical components with microprocessor-based controllers. Students will learn to identify and connect field inputs and outputs; communicate with, and program microprocessor-based controllers. Students will also connect, communicate with, and develop displays for computer-based operator interfaces. PREREQUISITE: 10605167 Electricity 1 or 32414358 (A) AC/DC Circuits or 32414359 (B) AC/DC Circuits.

10631109

Industrial AC, Motor Control, and Pilot Devices - Credits: 3

This course gives students the opportunity to learn about AC theory, circuits, and control devices used in industry. The course begins with an overview of AC theory including resistance, inductance, and capacitance. The course includes topics on AC and DC motors, motor controls, and pilot devices. The student will engage in hands-on activities with real industrial components to enable them to recognize, select, apply, and troubleshoot industrial electrical control circuit components. PREREQUISITE: 10605167 Electricity 1 or equivalent.

10631110

Advanced PLC Programming and Interfacing - Credits: 3

Advanced PLC offers students a hands-on approach to implementing industrial control using modern controllers to implement programs that utilize advanced functions. Students will complete hands-on activities with Allen Bradley ControlLogix PLCs. The course will examine the use of basic instructions and addressing with RSLogix 5000 as well as more advanced PLC instructions in Ladder Logic and Function Block. Other topics include PLC configuration and commissioning, communications with RSLinx, OPC, and RSNetwork, HMI configuration using Wonderware and/or RSView. PREREQUISITE: 10631108 PLC Programming and Interfacing.

Graduate Employment Information

(WITC Graduate Survey Responses 2009-2010; for most recent data, go to witic.edu)

Number of graduates	5	Number employed	3	% employed in WITC district	33%
Number of responses	5	Percent employed	75%	Range of yearly salary	\$34,317-\$50,400
Number available for employment	4	Employed in related field	3	Average yearly salary	\$40,025

career vision