

# A.A.S. Energy Systems Instrumentation Engineering Technology

(2 Years)

## Program Objectives:

1. Solve technical problems typical of those encountered in the instrumentation engineering technology discipline by using critical thinking skills, current technology, principles of mathematics, and applied science.
2. Work and communicate effectively in multidisciplinary teams in both industrial and academic settings.
3. Understand current professional issues and the need to pursue lifelong learning.

## Student Outcomes:

1. Demonstrate safe work practices on industrial equipment.
2. Work and communicate effectively in a diverse team environment.
3. Utilize test equipment to troubleshoot and analyze electrical, electronic, and instrumentation related circuits.
4. Analyze alternating current (AC) and direct current (DC) electronic circuits and logic fundamentals.
5. Create schematics to document electrical, electronic, and process control systems.
6. Design and troubleshoot circuits for motor controls and associated devices.
7. Install, troubleshoot, and maintain electrical AC and DC motors, generators, and variable frequency drives.
8. Install, configure, calibrate, and troubleshoot pressure, temperature, level, flow, and analytical instrumentation.
9. Configure, troubleshoot, and optimize Proportional-integral-Derivative (PID) control loops.
10. Use the fundamentals of pump and valve operation to troubleshoot final element issues.
11. Utilize the fundamentals of fluid dynamics and thermodynamics to troubleshoot and maintain process control associated with industrial plants.
12. Design, implement, and troubleshoot Programmable Logic Controllers (PLC) programs and associated Human Machine Interface (HMI) applications for industrial processes.
13. Utilize the fundamentals of networks and digital communications to troubleshoot and maintain distributed plant automation and Supervisory Control and Data Acquisition (SCADA) systems.

Graduates will have a fundamental knowledge of energy systems, thermodynamics, electronics and electrical systems. They will have extensive hands-on experience setting up and troubleshooting single and three-phase motor controls, variable frequency drives, programmable logic controllers, sensors, relays, timers, solenoids, and human machine interface stations. They will be able to install, troubleshoot and calibrate instrumentation that measures and controls temperature, level, flow, pressure and other process variables.

Students must register concurrently for the lab course associated with each theory course.

## Program Admissions Requirements

Official test scores must be dated within one year of program admission.

Placement Test	Math
ALEKS	30

## General Education

The listing below includes program requirements that also fulfill General Education requirements.

Code	Title	Credits
Objective 1- ENGL 1101, or ENGL 1102 <sup>1</sup>		3
Objective 2		3
Objective 3 - Choose MATH 1143, MATH 1147, MATH 1153, MATH 1160, MATH 1170, or MGT 2216 <sup>1</sup>		3-5
Objective 5 - PHYS 1101 & PHYS 1101L, or CHEM 1100		4
Objective 6		3
<b>Total Credits</b>		<b>16-18</b>

<sup>1</sup> "P" courses are equivalent to the original course.

## Major Requirements

Code	Title	Credits
<b>Required Courses:</b>		
ESET 1100	Engineering Technology Orientation	1
ESET 1100L	Introduction to an Industrial Environment Laboratory	1
ESET 1101	Electrical Circuits I	4
ESET 1101L	Electrical Circuits I Laboratory	4
ESET 1102	Electrical Circuits II	5
ESET 1102L	Electrical Circuits II Laboratory	5
ESET 1110	Introduction to Process Control	1
ESET 1110L	Introduction to Process Control Laboratory	1
ESET 1140	Applied Technical Intermediate Algebra	5
INST 2281	Electrical Automation Theory	8
INST 2282	Electrical Automation Laboratory	5
INST 2293	Process Measurement and Control Laboratory	4
INST 2295	Process Measurement and Control Theory	6
INST 2296	Process Dynamics	4
TGE 1159	Internship Strategies	1
<b>Choose one of the following Objective 1 courses:</b>		<b>3</b>
ENGL 1101	Writing and Rhetoric I	

ENGL 1102	Writing and Rhetoric II	
<b>Choose one of the following Objective 3 courses:</b>		<b>3-5</b>
MATH 1143	Precalculus I: Algebra	
MATH 1147	Precalculus	
MATH 1153	Statistical Reasoning	
MATH 1160	Survey of Calculus	
MATH 1170	Calculus I	
MGT 2216	Business Statistics	
<b>Choose one of the following Objective 5 courses:</b>		<b>4</b>
PHYS 1101 & 1101L	Elements of Physics and Elements of Physics Laboratory	
CHEM 1100	Concepts of Chemistry	
<b>Total Credits</b>		<b>65-67</b>

## Degree Totals

Code	Title	Credits
	Program Admission Requirements	0
	General Education	16-18
	Major Requirements (Required General Education credits removed.)	55
	Free Electives	
<b>Total Credits</b>		<b>71-73</b>

ISU Degree Requirements (<https://coursecat.isu.edu/undergraduate/degreerequirements/>)

ISU General Education for College of Technology (<https://coursecat.isu.edu/undergraduate/technology/#text>)

Major Academic Plan (MAP)