COWLEY COLLEGE
& Area Vocational Technical School

COURSE PROCEDURE FOR

INSTRUMENTATION AND CONTROL
MEC3487 3 CREDIT HOURS

Student Level:
This course is open to high school and post-secondary level students.

Catalog Description:

MEC 3487 - INSTRUMENTATION & CONTROL (3 hrs)
The student will learn terminology and demonstrate system operations by proper measurement and control techniques of flow, pressure, temperature, and automation control.

Prerequisites:
None

Controlling Purpose:
This course is designed to help the student increase their knowledge regarding a technician approach to the field of instrumentation, by taking a systems approach to integrating instruments into a complex control system. The student will better understand how to install instruments and protect them from damaging environmental conditions.

Learner Outcomes:
Upon completion of the course, the student will be able to demonstrate a proficiency in identifying various types of instrumentation and controls, and understand their functions within a Mechatronics environment.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

Units Outcomes and Criterion Based Evaluation Key for Core Content:
The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:
A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.

B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.

C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.

D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.

F = Failing, will be computed in GPA and hours attempted.

N = No instruction or training in this area.

UNIT 1: Instrumentation Overview

Outcomes: Upon completion of this unit, the student will be able to successfully identify basic instrumentation and techniques.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Define process instrumentation and identify important present day trends in the instrumentation field.
						Identify sources of training for instrumentation professionals.
						Identify common industry and standard organizations.

UNIT 2: Fundamentals of Process Control

Outcomes: Upon completion of this unit, the student will be able to successfully identify basic control techniques.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Define process control and identify the kinds of variables found in process control.
						Describe the difference between process automation and factory automation.
						Identify the control elements of a process control system and explain their functions.
						Compare the static and dynamic performance characteristics of a control system.
						Define a control loop and identify the types of control loops.
						Define a control strategy and compare the common types of control strategies.

UNIT 3: Piping and Instrumentation Diagrams

Outcomes: Upon completion of this unit, the student will be able to successfully understand how to use piping diagrams.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Define a piping and instrumentation diagram and explain its function.
						Describe the means of identifying instruments on a piping and instrumentation diagram.

UNIT 4: Temperature, Heat, and Energy

Outcomes: Upon completion of this unit, the student will be able to successfully apply the concept of energy to work and heat.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Identify temperature and the most common temperature scales.
						Define and compare the three types of heat transfer.
						Identify the common units of heat energy.
						Define specific heat.

UNIT 5: Thermometers

Outcomes: Upon completion of this unit, the student will be able to successfully apply thermometer usage to a system.

A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Describe the principals of thermal expansion.
						Compare the types of thermometers that use the principles of thermal expansion.
						Explain how pressure-spring effects bulb location.

UNIT 6: Practical Temperature Measurement and Calibration Outcomes: Upon completion of this unit, the student will be able to successfully identify and apply temperature sensing instruments.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Define thermocouple and identify the phenomena that govern the behavior of thermocouples.
						Describe the purpose of a cold junction and explain how cold junction compensation is used.
						Describe the construction of a thermocouple.
						List several factors that affect the choice of thermocouple wires.
						List and define typical thermocouple measurement circuits.
						Define resistance temperature detector, describe its construction, and explain how it is used.
						Define thermistor, describe its construction, and explain how it is used.

UNIT 7: Automation Control Outcomes: Upon completion of this unit, the student will be able to successfully apply instrumentation and control techniques to automated controllers.						
A	B	C	D	F	N	Specific Competencies Demonstrate the ability to:
						Define automatic control and identify common terms associated with it.
						Explain process dynamics and define the terms associated with it.
						Identify the functions of controllers and define these functions.

Projects Required:
As assigned.

Textbook:
Contact Bookstore for current textbook.

Materials/Equipment Required:

None

Attendance Policy:
Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy:
The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:
Based on classroom occupancy

Course Timeframe:
The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

402.00 Academic Code of Conduct
263.00 Student Appeal of Course Grades
403.00 Student Code of Conduct

Disability Services Program:
Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.