

Administrative Master Syllabus

Course Information

Course Title	Process Instrumentation II
Course Prefix, Num. and Title	PTAC-2436 Process Instrumentation II
Division	Vocational Science
Department	Process Technology
Course Type	WECM Course
Course Catalog Description	Continued study of the instruments and control systems used in the processing industries; including terminology, process variables symbology, control loops, and troubleshooting.
Pre-Requisites	PTAC 1432
Co-Requisites	None

Semester Credit Hours

Total Semester Credit Hours (SCH): Lecture Hours:	4:3:2
Lab/Other Hours	
Equated Pay Hours	4
Lab/Other Hours Breakdown: Lab Hours	2
Lab/Other Hours Breakdown: Clinical Hours	Enter Clinical Hours Here.
Lab/Other Hours Breakdown: Practicum Hours	Enter Practicum Hours Here.
Other Hours Breakdown	List Total Lab/Other Hours Here.

Approval Signatures

Title	Signature	Date
Department Head:		
Division Chair:		
VPI:		

Additional Course Information

Topical Outline: Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, and clinical or other non-lecture instruction).

Lecture:

1. Review of Symbology, Control Loops and Process Diagrams	Two Weeks
2. Instrumentation and Troubleshooting	Two Weeks
3. Switches, Relays and Annunciators	One Week
4. Signal Transmission and Conversion	One Week
5. Controllers	Two Weeks
6. Control Schemes: Basic and Advanced	Two Weeks
7. Programmable Logic Controllers (PLCs)	One Week
8. Distributed Control Systems (DCS)	One Week
9. Instrument Power Supply	One Week
10. Emergency Shutdown and Interlocks	One Week
11. Instrumentation Malfunctions	One Week

Lab Work:

1. Review of Symbology, Control Loops and Process Diagrams	Two Weeks
2. Instrumentation and Troubleshooting	Two Weeks
3. Switches, Relays and Annunciators	One Week
4. Signal Transmission and Conversion	One Week
5. Controllers	Two Weeks
6. Control Schemes: Basic and Advanced	Two Weeks
7. Programmable Logic Controllers (PLCs)	One Week
8. Distributed Control Systems (DCS)	One Week
9. Instrument Power Supply	One Week
10. Emergency Shutdown and Interlocks	One Week
11. Instrumentation Malfunctions	One Week

Course Learning Outcomes:

Learning Outcomes – Upon successful completion of this course, students will:

1. Utilize advanced instrumentation principles and theories in process systems
2. describe a distributed control system and the various types of interlocks
3. Describe the lettering and numbering standards based on ISA instrumentation symbols.
4. Describe how to determine the instrument type from the symbol information.
5. Describe the standards for line symbols.
6. Using a legend, correctly identify instrumentation on a drawing.
7. Compare and contrast P& IDs and PFDs.
8. Given a PFD and P&ID and a legend, locate and identify various components.
9. Given a P&ID, trace a control loop
10. Describe the types of petrochemical and refining Industry drawings that contain instrumentation.
11. Given a P&ID, explain the relationship of one piece of instrumentation to another.

12. Given a drawing that has major system equipment add control loops:

- flow
- level
- temperature
- pressure.

13. Sketch instrumentation control loops on available trainer resources.

14. Explain that different facilities have different practices related to process technicians troubleshooting process instruments.

15. Identify typical malfunctions found in primary sensing elements and transmitters.

16. Explain the importance of process knowledge in troubleshooting.

17. Define and Identify switches, relays, regulators, interlocks, permissives and annunciators on P&IDs.

18. Troubleshoot various instrument problems on both the Skid and the simulator programs

19. Demonstrate knowledge of Proportional, Integral and Derivative on small skids.

20. Discuss in detail, control schemes, both basic and advanced, digital control, PLCs, DCS system, instrument power supplies (UPS)

21. Identify and discuss Emergency Shutdown (ESDs), Interlocks and Protective Devices.

22. Discuss and identify instrument malfunctions

23. Describe the types of petrochemical and refining Industry drawings that contain instrumentation.

Methods of Assessment:

Major Exam and Daily Quizzes

Required text(s), optional text(s) and/or materials to be supplied by the student:

1. Instrumentation (PTEC), Pearson Custom Publishing, 75 Arlington Court, Suite 300, Boston, MA 02116, (A CAPT book)
2. Drafting or Engineering Template

Suggested Course Maximum:

20

List any specific or physical requirements beyond a typical classroom required to teach the course.

1. Room 115 Skid Room for Glass Distillation Column and Batch Reactor
2. Room 114 Instrument Room for Review of Controllers
3. Outside for training on the HOT Skid Equipment
4. Room 116 for training on equipment cutaways
5. Room 118 for instrumentation control training

Course Requirements/Grading System: Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course.

1. Quizzes, homework assignments and class participation

25%

2. Cross Disciplinary Skills (Lab, project, attendance, cooperation, work ethic, safety, teamwork, housekeeping, attitude, etc.) 25%

3. Mid-term Exam

25%

4. Final Examination

25%

90 to 100: A

80 to 89: B

70 to 79: C

60 to 69: D

0 to 59: F

Note: For the additional NUCP certificate, the student must complete the course with a minimum of 80%.

Curriculum Checklist:

- Administrative General Education Course** (from ACGM, but not in WCJC Core) – No additional documents needed.
- Administrative WCJC Core Course** – Attach the Core Curriculum Review Forms
 - Critical Thinking
 - Communication
 - Empirical & Quantitative Skills
 - Teamwork
 - Social Responsibility
 - Personal Responsibility
- WECM Course** – If needed, revise the Program SCANS Matrix and Competencies Checklist