

INDUSTRY AND TECHNOLOGY
Institutional (ILO), Program (PLO), and Course (SLO) Alignment

Program: Air Conditioning and Refrigeration	Number of Courses: 11	Date Updated: 09.18.2014	Submitted by: SueEllen Warren, ext. 4519 Renee Newell, ext. 3308
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ILOs	1. Critical Thinking <i>Students apply critical, creative and analytical skills to identify and solve problems, analyze information, synthesize and evaluate ideas, and transform existing ideas into new forms.</i>	2. Communication <i>Students effectively communicate with and respond to varied audiences in written, spoken or signed, and artistic forms.</i>	3. Community and Personal Development <i>Students are productive and engaged members of society, demonstrating personal responsibility, and community and social awareness through their engagement in campus programs and services.</i>	4. Information Literacy <i>Students determine an information need and use various media and formats to develop a research strategy and locate, evaluate, document, and use information to accomplish a specific purpose. Students demonstrate an understanding of the legal, social, and ethical aspects related to information use.</i>
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SLO-PLO-ILO ALIGNMENT NOTES:

Mark boxes with an 'X' if: SLO/PLO is a major focus or an important part of the course/program; direct instruction or some direct instruction is provided; students are evaluated multiple times (and possibly in various ways) throughout the course or are evaluated on the concepts once or twice within the course.

DO NOT mark with an 'X' if: SLO/PLO is a minor focus of the course/program and some instruction is given in the area but students are not formally evaluated on the concepts; or if the SLO/PLO is minimally or not at all part of the course/program.

PLOs	PLO to ILO Alignment			
	<i>(Mark with an X)</i>			
	1	2	3	4
PLO #1 Safety Knowledge and Skills Students successfully completing air conditioning and refrigeration program, whether in the certificate program or degree program, will acquire and be able to use specific safety knowledge and skills relating to the air conditioning and refrigeration discipline and will be able to apply those skills to specific job requirements.	X		X	X
PLO #2 Installing Servicing and Repairing Systems Upon completion of a course of study in air conditioning and refrigeration, a student will be able to install, service, and repair ACR systems as required by the industry guidelines.	X			X
PLO #3 Pressure Testing and Charging Systems Upon completion of a course of study, students in air conditioning and refrigeration will be able to properly pressure test, evacuate, and charge ACR system.	X			X
PLO #4 Attaining Certificates, Degrees, Transferring and Attaining Jobs Students completing a course of study in air conditioning and refrigeration will successfully earn a certificate/graduate/transfer to 4 year universities and will successfully compete for jobs in which they can apply their knowledge and communicative skills acquired in the air conditioning and refrigeration program.		X	X	

SLOs	SLO to PLO Alignment <i>(Mark with an X)</i>				COURSE to ILO Alignment <i>(Mark with an X)</i>			
	P1	P2	P3	P4	1	2	3	4
ACR 20 Solar Energy Applications-Photovoltaics and Solar Thermal: SLO #1 Parts of Solar Thermal Units After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories by naming the parts of a Solar Thermal unit in correct sequence and know how a Solar Thermal unit converts solar energy into hot water. Naming the parts of a Photovoltaic (PV) unit in correct sequence and know how a PV unit converts solar energy into electrical energy.		X	X	X				
ACR 20 Solar Energy Applications-Photovoltaics and Solar Thermal: SLO #2 Solar Energy Application Students completing this course will apply their knowledge to the proper application of solar energy and solar thermal systems.		X	X		X	X	X	X
ACR 20 Solar Energy Applications-Photovoltaics and Solar Thermal: SLO #3 Solar System Operation & Installation After completing this course student will gain the basic skills necessary to evaluate solar systems operation and installation requirements.	X	X						
ACR 21 Air Conditioning Fundamentals: SLO #1 Window Air Conditioning Manifold Gauges After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories placing refrigeration manifold gauges on a window air conditioning unit and check for correct charge of an operating system based on the type of refrigerant used in the system.	X	X	X					
ACR 21 Air Conditioning Fundamentals: SLO #2 Component Brazing After completion of this course, students will acquire the skills necessary to successfully braze refrigeration components to meet basic industry standards.		X	X	X	X	X	X	
ACR 21 Air Conditioning Fundamentals: SLO #3 Basic HVACR Service After completion of this course, students will have the knowledge necessary to perform basic HVACR service in a safe manner.	X	X	X					
ACR 22 Basic Refrigeration: SLO #1 Refrigeration Manifold Gauges After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories placing refrigeration manifold gauges on a refrigerator and check for the correct charge of an operating refrigerator based on the type of refrigerant used in the system.		X						
ACR 22 Basic Refrigeration: SLO #2 Soldering & Brazing After completion of this course, students will apply their knowledge to soldering and brazing to copper to copper and copper to steel components within the refrigeration system.	X	X	X		X	X	X	X
ACR 22 Basic Refrigeration: SLO #3 Tools of the Trade Students completing this course will apply their knowledge to the proper use of tools of the HVACR trade.				X				

SLOs	SLO to PLO Alignment <i>(Mark with an X)</i>				COURSE to ILO Alignment <i>(Mark with an X)</i>			
	P1	P2	P3	P4	1	2	3	4
ACR 23 Commercial Refrigeration Applications: SLO #1 Proper Freezer Temperatures After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories to an operating low temperature walk-in freezer. Students will check proper freezer temperatures, amperage draw on the operating compressor, subcooling and superheat temperatures.		X			X			X
ACR 23 Commercial Refrigeration Applications: SLO #2 Special System Components Students completing this course will apply their knowledge to the application, service and testing of special refrigeration system components.		X	X					
ACR 23 Commercial Refrigeration Applications: SLO #3 Troubleshooting with Diagrams & Schematics Students completing this course will apply their knowledge to service and troubleshooting using electrical diagrams and schematics specific to commercial refrigeration.		X	X					
ACR 25 Energy Efficient Residential, Commercial and Industrial Air Conditioning: SLO #1 Taking Readings and Applying Data After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories to an operating 2 ton 13 SEER Air Conditioning Package Unit. Students will take air temperature readings, compressor amperage draw, subcooling and superheat readings and apply the data to the appropriate lab exercise.	X	X	X		X	X	X	X
ACR 25 Energy Efficient Residential, Commercial and Industrial Air Conditioning: SLO #2 Human Senses Function Test After reading the textbook and participating in classroom discussions, students will apply their knowledge of how to check an A/C unit by using their senses to see if it operating close to what it should be. Instruments and tools will determine if the A/C units are operating correctly. These are quick checks to see if a unit is not operating.		X	X					
ACR 25 Energy Efficient Residential, Commercial and Industrial Air Conditioning: SLO #3 Charging an A/C Unit After reading the textbook and participating in classroom discussions, students will apply their knowledge of how to properly charge an A/C unit.		X		X				

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ACR 27 Heating Technologies: SLO #1 High Efficiency Gas Furnaces After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories to an operating High Efficiency Gas Furnace. Students will take gas pressure readings with a manometer and record the readings with the appropriate lab assignment and compare the reading with manufacturer's specifications.	X	X						
ACR 27 Heating Technologies: SLO #2 Strip-Heating System Ladder Diagram After reading the textbook and participating in classroom discussions, students will apply their knowledge of electric strip-heating system. Students will draw a ladder diagram of an electric strip-heating system. They will collect and analyze data, and present the sequence of operations of the system.	X	X		X	X	X	X	X
ACR 27 Heating Technologies: SLO #3 HVAC Charging Checklist After reading the textbook and participating in classroom discussions, students will apply their knowledge of air source heat pump systems to collect data on the unit using a HVAC charging checklist.	X	X						
ACR 30 Electric Controls: SLO #1 Control Boards After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories to an operating Air Conditioning Control Board. Students will check an A/C wire schematic for proper wiring of the board and energize the board taking electrical readings at each control device.	X	X						
ACR 30 Electric Controls: SLO #2 Electrical Board Ladder Diagram, VOM Check After reading the textbook and participating in classroom discussions, students will apply their knowledge to draw a ladder diagram from an electrical board that simulates an air conditioning system, know the parts of the air conditioning system and use a VOM to check each part.	X	X		X	X	X	X	X
ACR 30 Electric Controls: SLO #3 Electrical Board Troubleshooting After reading the textbook and participating in classroom discussions, students will apply their knowledge of a ladder diagram to diagnose and troubleshoot the wiring and operation of an electrical board.		X						
ACR 32 Fundamentals of Pneumatic Controls: SLO #1 Calibrating Thermostats After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories to a pneumatic thermostat. Student will calibrate the thermostat to the manufacturer's specification and check the proper operation of thermostat and the pneumatic actuator.		X						
ACR 32 Fundamentals of Pneumatic Controls: SLO #2 Hot Water Heating System After reading the textbook and participating in classroom discussions, students will apply their knowledge of pneumatics to gather data and analyze a pneumatic controlled hot water heating system and know the sequence of operations of the heating system.		X			X			X
ACR 32 Fundamentals of Pneumatic Controls: SLO #3 Electric-Pneumatic Systems After reading the textbook and participating in classroom discussions, students will apply their knowledge of electric-pneumatic systems to collect data and analyze data from a schematic diagram and present the sequence of operations of the system.		X						

SLOs	SLO to PLO Alignment <i>(Mark with an X)</i>				COURSE to ILO Alignment <i>(Mark with an X)</i>			
	P1	P2	P3	P4	1	2	3	4
ACR 34 HVAC Customer Service: SLO #1 Irate Customer After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate communication skills to calm down an irate customer who is complaining that it took too long for the technician to arrive and it is very hot due to an air conditioning system not cooling.	X			X				
ACR 34 HVAC Customer Service: SLO #2 Air Conditioning Estimate After participating in classroom discussions, students will apply their knowledge of appropriate communicating skills to estimate an air conditioning job with labor, parts, and taxes including an explanation of all costs to the customer.	X			X	X	X	X	
ACR 34 HVAC Customer Service: SLO #3 Selling a PM Plan After participating in classroom discussions, students will apply their knowledge of appropriate communicating to sell a PM plan to a customer with all the positives of a PM. Students must know the difference in plans for the different seasons.	X			X				
ACR 5 Electrical Applications: SLO #1 Troubleshooting Units After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories by troubleshooting a faulty air conditioning unit with the use of a wiring schematic and voltmeter. After finding the problem they will run the unit and make sure it is operating at the manufacturer's specifications.	X	X						
ACR 5 Electrical Applications: SLO #2 Simple Wiring Diagrams After completion of this course students will have the basic skills necessary to read and interpret simple wiring diagrams in order to effectively troubleshoot and repair simple HVACR control and power related problems.	X	X			X		X	X
ACR 5 Electrical Applications: SLO #3 HVACR Systems and Components Upon completion of this course, students will apply knowledge gained on diagrams and component operation to identify HVACR systems and components sequencing and operating conditions.	X	X						
ACR 6 Refrigeration and Air Conditioning Control Systems: SLO #1 Electrical Control Relays After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories by observing and testing the proper operation of an air conditioning electrical control relay.		x		X				
ACR 6 Refrigeration and Air Conditioning Control Systems: SLO #2 Microprocessor Controls Students completing this course will gain the knowledge necessary to perform basic testing of HVACR system microprocessor controls.		X			X	X	X	X
ACR 6 Refrigeration and Air Conditioning Control Systems: SLO #3 Ladder & Schematic Diagrams Upon completion of this course students will apply the basic knowledge and skills learned to service and troubleshoot microprocessor controls using ladder and schematic diagrams.		X		X				