COURSE SLO ASSESSMENT 4-YEAR TIMELINE

Unit Name	Course SLO Assessment Cycle	Course ID	Course Name	Course SLO Title	Course SLO Statement
El Camino: Course SLOs (IND) - Air Conditioning and Refrigeration	2013-14 (Spring 2014)	ECC: 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.
	2013-14 (Spring 2014)	ECC: 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.
	2013-14 (Spring 2014)	ECC: 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.
	2013-14 (Spring 2014)	ECC: 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.
	2013-14 (Spring 2014)	ECC: 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.
	2013-14 (Spring 2014)	ECC: 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.
	2014-15 (Fall 2014)	ECC: 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 air conditioning system and check for correct charge of an operating system based on manufactures specification.
	2014-15 (Fall 2014)	ECC: 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.
	2014-15 (Fall 2014)	ECC: 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.
	2014-15 (Summer 2015)	ECC: 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
	2015-16 (Fall 2015)	ECC: 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,

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	2015-16 (Fall 2015)	ECC: ACR 23	Commercial Refrigeration Applications	SLO #1 Proper Freezer Temperatures	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.
	2015-16 (Fall 2015)	ECC: 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.
	2015-16 (Fall 2015)	ECC: 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.
	2015-16 (Fall 2015)	ECC: 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.
	2015-16 (Spring 2016)	ECC: 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.
	2015-16 (Spring 2016)	ECC: 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.
	2015-16 (Summer 2016)	ECC: 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.
	2015-16 (Summer 2016)	ECC: ACR 31	HVAC Electronics	SLO #1 Electronic Board on a High Efficiency System	After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories to an electronic board on a High Efficiency system. Students will check for the proper function of the electronic board and study the LED indicator lights for an improper function of the operating system.
	2015-16 (Summer 2016)	ECC: 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

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	2015-16 (Summer 2016)	ECC: ACR 34	HVAC Customer Service	SLO #2 Air Conditioning Estimate	conditioning job with labor, parts, and taxes including an explanation of all costs to the customer.
	2016-17 (Fall 2016)	ECC: 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.
	2016-17 (Fall 2016)	ECC: 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.
	2016-17 (Fall 2016)	ECC: 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.
	2016-17 (Fall 2016)	ECC: ACR 61	Fundamentals of Automation Systems	SLO #1 Multi-site Control System	After reading the textbook and participating in class discussions, students will apply their knowledge of automation systems to propose, develop, plan, justify, and create component, architecture, and design document to support a multi-site control system. This system will include lighting, air-conditioning, refrigeration, security and refrigeration systems.
	2016-17 (Spring 2017)	ECC: 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 air conditioning system and check for correct charge of an operating system based on manufactures specification.
	2016-17 (Spring 2017)	ECC: 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.
	2016-17 (Spring 2017)	ECC: 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.
	2016-17 (Spring 2017)	ECC: 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.
	2016-17 (Spring 2017)	ECC: 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.
	2016-17 (Spring 2017)	ECC: ACR 62	Energy Control and Optimization Systems	SLO #1 Develop an energy and control optimization	After reading the textbook, participating in class discussions and laboratory exercises students will apply their knowledge toward

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	2016-17 (Spring 2017)	ECC: ACR 62	Energy Control and Optimization Systems	strategy for a single building control system	developing an energy and control optimization strategy for a single building control system.
	2016-17 (Summer 2017)	ECC: ACR 31	HVAC Electronics	SLO #2 Basic Entry Level Industry Standards in Automation Systems	After completion of this course students will have the basic knowledge and skills necessary to meet basic entry level industry standards in automation systems. Students will apply the skills learned in identifying and defining communication protocols, automation system components, and motor controls.
	2016-17 (Summer 2017)	ECC: 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.
	2017-18 (Fall 2017)	ECC: 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.
	2017-18 (Fall 2017)	ECC: 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.
	2017-18 (Fall 2017)	ECC: 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.
	2017-18 (Fall 2017)	ECC: ACR 61	Fundamentals of Automation Systems	SLO #2 BACnet and LON Communication Networks	After completing this course students will apply their knowledge to identify, evaluate, and troubleshoot BACnet and LON communication networks. Student identification will include the ability to differentiate the communication protocols and their architecture. The evaluation of the communicating networks will include the ability to evaluate network stability, structure, and configuration. Network troubleshooting skills will include the basic ability to identify network communication protocol signatures and monogramming characteristics.
	2017-18 (Spring 2018)	ECC: ACR 62	Energy Control and Optimization Systems	SLO #2 Proportional Integral Derivative (PID) Strategy	Students in this course will apply a Proportional integral derivative (PID) strategy to the control of a variable speed fan and a 3 stage compressor air-conditioning system.
	2017-18 (Summer 2018)	ECC: 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.
	2017-18 (Summer 2018)	ECC: 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.
	2017-18 (Summer 2018)	ECC: ACR 31	HVAC Electronics	SLO #3 Basic Electronic	Students completing this course will gain the knowledge and skills

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	2017-18 (Summer 2018)	ECC: ACR 31	HVAC Electronics	Components, Controllers, and Systems	necessary to identify basic electronic components, controllers, and systems. Students will apply knowledge gained to read and interpret sequencing, logic and electronic schematics.
	2018-19 (Fall 2018)	ECC: ACR 61	Fundamentals of Automation Systems	SLO #3 Commissioning Skills	Students completing course readings and active participation in classroom activates will have ability to apply their knowledge in effective system commissioning. Student commissioning skills will include the ability to evaluate system component operation, calibration, and integration.v Commissioning skills will also include the ability to interpret, evaluate and comply with commissioning documentation requirements.
	2018-19 (Spring 2019)	ECC: 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.
	2018-19 (Spring 2019)	ECC: 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.
	2018-19 (Spring 2019)	ECC: 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.
	2018-19 (Spring 2019)	ECC: ACR 62	Energy Control and Optimization Systems	SLO #3 DDC Controllers	Students completing course requirements will demonstrate the ability to setup and configure a programmable and configurable controller inputs, outputs, virtual points, and perform simple logic programming on DDC controllers.
	2018-19 (Summer 2019)	ECC: 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.
	2018-19 (Summer 2019)	ECC: ACR 31	HVAC Electronics	SLO #1 Electronic Board on a High Efficiency System	After reading the textbook and participating in class discussions, students will apply their knowledge of appropriate lab practices, concepts and theories to an electronic board on a High Efficiency system. Students will check for the proper function of the electronic board and study the LED indicator lights for an improper function of the operating system.
	2019-20 (Fall 2019)	ECC: 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.

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	2019-20 (Fall 2019)	ECC: ACR 27	Heating Technologies	SLO #1 High Efficiency Gas Furnaces	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.
	2019-20 (Fall 2019)	ECC: 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.
	2019-20 (Fall 2019)	ECC: 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.
	2019-20 (Fall 2019)	ECC: ACR 61	Fundamentals of Automation Systems	SLO #1 Multi-site Control System	After reading the textbook and participating in class discussions, students will apply their knowledge of automation systems to propose, develop, plan, justify, and create component, architecture, and design document to support a multi-site control system. This system will include lighting, air-conditioning, refrigeration, security and refrigeration systems.
	2019-20 (Spring 2020)	ECC: 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 air conditioning system and check for correct charge of an operating system based on manufactures specification.
	2019-20 (Spring 2020)	ECC: 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.
	2019-20 (Spring 2020)	ECC: 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.
	2019-20 (Spring 2020)	ECC: ACR 62	Energy Control and Optimization Systems	SLO #4 Using different network architecture in system automation and intelligent control systems	Students completing this course will have the skills necessary to assess the performance and energy efficiency impact of using different network architecture in system automation and intelligent control systems.
	2019-20 (Summer 2020)	ECC: 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.
	2019-20 (Summer 2020)	ECC: ACR 31	HVAC Electronics	SLO #2 Basic Entry Level	After completion of this course students will have the basic

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	2019-20 (Summer 2020)	ECC: ACR 31	HVAC Electronics	Industry Standards in Automation Systems	knowledge and skills necessary to meet basic entry level industry standards in automation systems. Students will apply the skills learned in identifying and defining communication protocols, automation system components, and motor controls.
	2019-20 (Summer 2020)	ECC: 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
	2019-20 (Summer 2020)	ECC: 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.
	2020-21 (Fall 2020)	ECC: 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.
	2020-21 (Fall 2020)	ECC: 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.
	2020-21 (Fall 2020)	ECC: 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.
	2020-21 (Fall 2020)	ECC: ACR 61	Fundamentals of Automation Systems	SLO #2 BACnet and LON Communication Networks	After completing this course students will apply their knowledge to identify, evaluate, and troubleshoot BACnet and LON communication networks. Student identification will include the ability to differentiate the communication protocols and their architecture. The evaluation of the communicating networks will include the ability to evaluate network stability, structure, and configuration. Network troubleshooting skills will include the basic ability to identify network communication protocol signatures and monogramming characteristics.
	2020-21 (Spring 2021)	ECC: 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.
	2020-21 (Spring 2021)	ECC: 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.
	2020-21 (Spring 2021)	ECC: ACR 62	Energy Control and Optimization Systems	SLO #1 Develop an energy and control optimization	After reading the textbook, participating in class discussions and laboratory exercises students will apply their knowledge toward

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	2020-21 (Spring 2021)	ECC: ACR 62	Energy Control and Optimization Systems	strategy for a single building control system	developing an energy and control optimization strategy for a single building control system.
	2020-21 (Summer 2021)	ECC: 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.
	2020-21 (Summer 2021)	ECC: ACR 31	HVAC Electronics	SLO #3 Basic Electronic Components, Controllers, and Systems	Students completing this course will gain the knowledge and skills necessary to identify basic electronic components, controllers, and systems. Students will apply knowledge gained to read and interpret sequencing, logic and electronic schematics.
	2020-21 (Summer 2021)	ECC: 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.
	2021-22 (Fall 2021)	ECC: 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.
	2021-22 (Fall 2021)	ECC: 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.
	2021-22 (Fall 2021)	ECC: 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.
	2021-22 (Fall 2021)	ECC: ACR 61	Fundamentals of Automation Systems	SLO #3 Commissioning Skills	Students completing course readings and active participation in classroom activates will have ability to apply their knowledge in effective system commissioning. Student commissioning skills will include the ability to evaluate system component operation, calibration, and integration.v Commissioning skills will also include the ability to interpret, evaluate and comply with commissioning documentation requirements.