

Outcomes Mapping

TECHNOLOGY & HEALTH DIVISION							
Program:	Building Automation Cert & Degree	# Courses: (if applicable)	10	Updated:	6/29/2015	Submitted by:	Darrow Soares

Institutional Level Outcomes (ILOs): <i>As a result of an educational experience with any aspect of the college, students will develop the following knowledge, skills, abilities, and attitudes:</i>									
1. Communication		2. Critical Thinking		3. Information and Technology Literacy		4: Personal, Social, Civic, & Environmental Responsibility			
Connect PLOs with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated following the completion of the program or educational experience.						PLO to ILO Alignment			
PLO Name	PLO Defined: <i>Upon successful completion of this program, students will be able to:</i>					1	2	3	4
1. Technical Competence	Program completers will identify the startup and operational sequence of a chiller plant.					P	P	P	
2. Technical Competence	Program completers will understand the purpose and Function of chiller plant economizers					P	P	P	
3. Technical Competence	Program completers will demonstrate the use and application of controlled devices					P	P	P	
4. Technical Competence	Program completers will develop programming strategies for a chiller plant					P	P	P	
5. Technical Competence	Program completers will evaluate the energy usage of a multi story commercial building					P	P	P	P

See the Outcomes Assessment website for definitions and examples of Mt. SAC's ILOs: <http://www.mtsac.edu/instruction/outcomes/ilos.html>

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: AIRC 20	Connect Outcomes with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
AIRC 20 course completers will properly handle refrigerants	P										P	I		M
AIRC 20 course completers will evaluate the mechanical operation of an air conditioning system.	I	I		I	P						P	P		
Construct mechanical air conditioning or refrigeration systems, set pressure switches and controls, identify the state of refrigerant at each point, and predict operating characteristics.	I	P	I	I	I							I		
Assess the operation of heat pumps based on gauge readings and measured sensible temperatures.	I	P		I	I						P	P		
Apply a deep vacuum to refrigeration systems in order to remove contaminants and check for refrigerant leaks.				I										
Charge and recover refrigerant from operational refrigeration systems.	I			I								I		P
Demonstrate the procedure for handling and containing refrigerants outlined in Section 608 of the Clean Air Act.	I										P	I		P
Explain how refrigerants used in the air conditioning and refrigeration industry cause ozone depletion and global warming.	P			P							P	I		P

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: AIRC 25	Connect Outcomes with an I , P , or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
AIRC 25 Course completers will understand the electrical sequence of operation for a five ton air conditioning system.	I	I	I	I	I						P	P		
Course completers will successfully use electrical meters commonly used in the Air Conditioning and Refrigeration industry.	I	I	I	I	I						P	P		
Compare and contrast the electrical designs and operation of air conditioning, refrigeration systems and heat pumps.	I	I	I	I	I							P		
Demonstrate the electrical operation and application of electro-mechanical components.	I	I	I	I	I							P		
Demonstrate the electrical operation of induction motors.	I	I	I	I	I							P		
Design electrical schematic diagrams.	I	I	I	I	I							P		
Assemble air conditioning systems, refrigeration systems and heat pumps from schematics.	I	I	I	I	I							P		
Evaluate electrical malfunctions in air conditioning, refrigeration systems and heat pumps.	I	I	I	I	I									

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: AIRC 31	Connect Outcomes with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
Completers will understand electrical sequence of operations of commercial refrigeration equipment.	P	P	P	P	I						I	P		
Students will monitor proper phasing for 3 phase power	P	P	P	P	I							P		
Wire on/off circuitry for commercial compressors.	P	P	P	P	I							P		
Wire wye and delta three phase motors and transformers.	P	P	P	P	I							P		
Design wiring schematics for a common commercial water chiller.	P	P	P	P	I						I	P		
Wire Drives to power sources and respective motors.	P	P	P	P	I							P		
Program various aspects of Drives for performance and efficiency.	P	P	I	I	I						I	P		

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: AIRC 34	Connect Outcomes with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
AIRC 34 course completers will evaluate the operation of a commercial refrigeration system	I	P	I		I						P	P	P	I
AIRC 34 course completers will modify the operation of a commercial refrigeration system.	I	P			I						P	P		I
Analyze the operation of refrigeration or air conditioning systems based on applying the refrigeration cycle to a pressure- enthalpy chart.	I	P		P	I						P	P		I
Determine the causes of refrigerant side malfunctions based on condensing temperatures, evaporator temperatures, and superheat and sub cooling sensible temperatures.	I	P	I	I	I						P	P		
Adjust refrigeration pressure controls to manipulate fixture temperatures, evaporator temperatures, condensing temperatures, and capacity controls.	I	P	I	I	I						P	P		
Identify and apply common evaporator defrost methods to medium and low temperature refrigeration systems.	I	P		I							P	P		
Select refrigeration equipment and components for a given application based on manufacturer's performance data.	I	P	I								P	P	P	I

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Calculate the balance point of refrigeration components selected from performance data to determine overall system capacity.		P		I									P		I
--	--	---	--	---	--	--	--	--	--	--	--	--	---	--	---

Key for Level of Learning
 (Use for Mapping SLOs/MOs to PLOs to ILOs)
 I = Knowledge/Skill Introduced
 P = Knowledge/Skill Practiced/Applied
 M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course:AIRC61	Connect Outcomes with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
AIRC 61 completers will understand the operation and function of the major components of a Central Plant. Method of Evaluation: Students will properly identify the major components that are critical to a Central Plant.	P	P	P	I	I						I	P	P	I
AIRC 61 course completers will understand the application and use of general purpose controllers and application specific controllers	P	P	P	I	I						I	P	P	I
Define the common terms related to pneumatic and digital controls.	I	P	I	I	I						I	I	I	
Compare and contrast pneumatic and digital control systems.	I	I	I	I	I						I	I	I	
Design and construct pneumatic control systems.	I	I	I	I	I						I	I	I	
Compare and contrast processing plant applications	I	I	I	I	I						P	P	I	
Demonstrate the application of controlled devices.	I	I	I	I							P	P	I	

See the Outcomes Assessment website for definitions and examples of Mt. SAC's ILOs: <http://www.mtsac.edu/instruction/outcomes/ilos.html>

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: AIRC 65	Connect Outcomes with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
AIRC 65 completers will successfully understand the setup procedure for a general purpose controller	P										I	P	P	I
Identify various programming methods used for building automation.	P										I	P	P	
Demonstrate effective programming	P										I	P	P	
Develop programming strategies.	P										I	P	P	
Evaluate programming methods	P										I	P	P	
Propose system and program designs.	P										I	P	P	
Produce program documentation	P										I	P	P	

See the Outcomes Assessment website for definitions and examples of Mt. SAC's ILOs: <http://www.mtsac.edu/instruction/outcomes/ilos.html>

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: AIRC 67	Connect Outcomes with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
AIRC 67 completers will understand the design of an energy model.											P	P	P	P
Recognize the need for energy management.											P	P	P	P
Differentiate between Energy Star and LEED programs											I	P	I	P
Discuss energy savings potentials											P	P	P	P
Propose energy savings methods.											P	P	P	P
Critique current energy usages											P	P	P	P
Calculate energy related problems.											P	P	P	P
Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Course: ELEC 11	Connect Outcomes with an I , P , or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
Students completing ELEC 11 will be able to produce an expense spreadsheet with a chart in Microsoft Excel.				I	I								P	
Students completing ELEC 11 will demonstrate the ability to produce a correctly formatted and error-free employment cover letter using Microsoft Word.					I						P		P	P
Demonstrate various features of the Windows operating system specifically used in electronic technology.				I	I						P		P	
Define and discuss common vocabulary words associated with technology and computers.				I	I						P		P	
Design and implement various word processing assignments including: memos, technical reports, and a resume.				I	I						P		P	
Design and implement various spreadsheet assignments including data in chart and graph form.				I	I						P		P	
Implement various database assignments including data manipulation, report generations.				I	I						P		P	
Identify features of computer presentation methods				I	I						P		P	
Demonstrate using the internet to research a given topic				I								P	P	

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: CNET 56	Connect Outcomes with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
Students completing CNET 56 will be able to identify and distinguish among the different media used in network communications.	I	I	I	I	I						I	P	P	
Students completing CNET 56 will be able to determine the most appropriate standards, protocols, and access methods for a given network.	I	I	I	I	I						I	P	P	
Students completing CNET56 will be able to correctly determine an IPv4 address, broadcast address, and network address from a binary IPv4 address and binary subnet mask.	I	I			I						P	P	P	
Identify components of a network and determine the type of network design appropriate for a given site.	I	I			I						I	P	P	
Identify and distinguish among the different media used in network communication, and determine how to use them to connect servers and clients in a network	I	I			I						I	P	P	
Compare the various networking standards, protocols, and access methods and determine which would be the most appropriate for a given network.	I	I			I						P	P	P	

Key for Level of Learning

(Use for Mapping SLOs/MOs to PLOs to ILOs)

I = Knowledge/Skill Introduced

P = Knowledge/Skill Practiced/Applied

M = Knowledge/Skill Mastered

Outcomes Mapping

Recognize and identify the primary network architectures and their major characteristics, and the most appropriate for a proposed network.	I	I			I							P	P	P	
Identify the primary functions of a network operating system and distinguish between a centralized computing environment and client/ server environment	I	I			I							P	P	P	
Implement and support the major networking components (including the server, operating system, and clients).	I	I			I							P	P	P	
Recommend a system for adequately securing data and protecting the system's components.	I	I			I							P	P	P	
Distinguish between LANs and WANs and identify the components used to expand a LAN into a WAN.	I	I			I							P	P	P	
Plan, layout, configure, and troubleshoot networks for a specific applications.	I	I										P	P	P	

Key for Level of Learning
 (Use for Mapping SLOs/MOs to PLOs to ILOs)
 I = Knowledge/Skill Introduced
 P = Knowledge/Skill Practiced/Applied
 M = Knowledge/Skill Mastered

Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: CISW 41	Connect Outcomes with an I, P, or M (see Key in Footer) identifying the level to which knowledge or a skill can be demonstrated in that portion of the course or service.													
SLOs, MOs, AUOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	ILO 1	ILO 2	ILO 3	ILO 4
Students completing CISW 41 - XML Secure Programming will be able to create a well-formed XML document.			I	P	I						I	P	P	
Students completing CISW 41 - XML Secure Programming will be able to reformat an XML document using XSLT.			I	P	I						I	P	P	
Students completing CISW 41 - XML Secure Programming will be able to format XML using Cascading Style Sheets.			I	P							I	P	P	
Identify all parts of an XML document.			I	P							I	P	P	
Create well-formed and valid XML documents.			I	P							I	P	P	
Transform XML documents to other XML documents using XSLT.			I	P							I	P	P	
Create XML Schemas.			I	P							I	P	P	
Create valid XHTML documents			I	P							I	P	P	

Key for Level of Learning
 (Use for Mapping SLOs/MOs to PLOs to ILOs)
 I = Knowledge/Skill Introduced
 P = Knowledge/Skill Practiced/Applied
 M = Knowledge/Skill Mastered