Outcomes Mapping

TECHNOLOGY & HEALTH DIVISION							
Program:	Electronics & Computer Eng. Tech. (AS degree and cert.)	# Courses: (if applicable)		Updated:	6/18/2015	Submitted by:	J. Hymer

Institutional Level Outcomes (ILOs): ***As a result of an educational experience with any aspect of the college, students will develop the following knowledge, skills, abilities, and attitudes:***			
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: Upon successful completion of this program, students will be able to:*	1	2	3	4
1. Breadth of study	Apply knowledge of electronic principles to the areas of communications, industrial electronics, and microcontrollers.		P		
2. Use of test equipment	Demonstrate proper use of electronic test equipment and associate measurement results with circuit behaviors in the laboratory.		M		
3. Quantitative analysis	Quantitatively determine unknown electrical parameters from given or measured values and use these results to assess or troubleshoot faults in circuit and system operation.	P	P		
4. Communication	Communicate, both verbally and in writing, knowledge of electrical concepts and their application to the observed behaviors of circuits and systems.	P	P		
5. High-level thought	In advanced courses, connect concepts learned in introductory courses to more general principles applicable in the employment context.	P	P		
6.					
7.					

Key for Level of Learning
(Use for Mapping SLOs/MOs to PLOs to ILOs)
I = Knowledge/Skill Introduced
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Outcomes Mapping

Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: ELEC 10	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
ELEC 10 students will demonstrate proficiency in the assembly of an electromechanical system. (SLO)	I	I	I									I		
ELEC 10 students will be able to recognize standard symbols used in electronic schematic diagrams. (SLO)														
Know terms and vocabulary associated with electronic and mechanical circuits.				I							I			
Analyze operation of systems that incorporate both electronic and mechanical circuits.		I	I									I		
Recognize symbols used on electronic schematics.	I										I			
Compare and contrast analog vs. digital processing technologies.	P												I	
Demonstrate proper assembly techniques of robotic circuits.	I	I	I									I		
Evaluate effectiveness of various industrial process technologies.	I												I	

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Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
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. (SLO)	I		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. (SLO)	I			P	P						P		P	P
Demonstrate various features of the Windows operating system specifically used in electronic technology.	I			P							P		P	
Define and discuss common vocabulary words associated with technology and computers.	P			P							P		P	
Design and implement various word processing assignments including: memos, technical reports, and a resume.	P			P							P		P	
Design and implement various spreadsheet assignments including data in chart and graph form.	P		P	P								P	P	
Implement various database assignments including data manipulation, report generations.	P			P	P							P	P	
Identify features of computer presentation methods.	P			P							P		P	
Demonstrate using the internet to research a given topic.				P							P		P	

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Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: ELEC 12	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
Course completers will demonstrate the ability to isolate defective components on physical (as opposed to simulated) circuit boards. (SLO)		P	P		P							P		
Using MultiSim students will construct and simulate a discrete-component analog circuit. (SLO)	P		P	P								P		
Using MultiSim students will be able to locate hidden faults in an analog circuit. (SLO)			P		P							P		
Demonstrate basic computer operating skills.		P										P		
Analyze operational circuit parameters when component values are changed.		P	P									P		
Analyze circuits for faults.			P		P							P		
Demonstrate how to troubleshoot circuits, and replace faulty components through simulation.		P	P		P							P		
Predict circuit operating parameters based on simulated characteristics.			P									P		

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Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: ELEC 50A	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 50A will be able to make accurate readings of voltage, current, and resistance using analog and digital multimeters. (SLO)	I	P	I	I							I	I		
As a consequence of significant program modification in which electronics math concepts will be covered in the ELEC 50A theory course, students in ELEC 50A will be able to numerically analyze a series-parallel circuit. (SLO)			I									I		
Define common terms and recognize symbols used in DC electronic circuits.	I											I		
Explain circuit operation of various DC circuitry.				I							I			
Analyze from problems various DC unknown quantities.			I									I		
Analyze from schematics various DC unknown quantities.			I	I								I		
Predict unknown electronic quantities before solving electronic formulas.			I									I		
Measure and record electrical quantities.		**P**												
Demonstrate proper use of test equipment.		**P**												
Troubleshoot various defects in DC circuitry.	**I**		**I**								**I**	**I**		
Calculate unknown electrical quantities in DC circuits.			**I**											

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Student Learning Outcomes (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: ELEC 50B	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 will be able to accurately measure amplitude and time parameters of a periodic waveform displayed on the oscilloscope screen. (SLO)		I	I	I								P		
Students completing ELEC 50B will be able to employ polar and/or rectangular notation to determine the magnitude and phase shift of an unknown circuit parameter (voltage, current, impedance, and/or power). (SLO)			P	P							P	P		
Define common terms and recognize symbols used in AC electronics. (MO)			I								P	P		
Analyze operation of AC circuits. (MO)	P		P	P							P	P		
Calculate unknown electrical quantities in AC circuits. (MO)			P									P		
Measure and record AC electrical quantities. (MO)		P	P									P		
Demonstrate the proper use of test equipment (oscilloscope, function generator, frequency counter) when measuring electrical quantities in a lab exercise. (MO)			I										P	
Compare and contrast characteristics of series versus parallel AC circuits. (MO)				P	P						P	P		
Evaluate the characteristics of frequency selective circuits. (MO)	P		P	P								P		

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Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: ELEC 51	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 51 will be able to determine voltage gain and bandwidth characteristics of a common-emitter transistor amplifier. (SLO)		P	P		I							P		
Students completing ELEC 51 will be able to determine expected gain and bandwidth of an operational amplifier. (SLO)			P		I							P		
Explain operating parameters of various semiconductor devices and circuits.				P							P	P		
Explain system application of various semiconductor devices and circuits.				P							P	P		
Analyze troubleshooting techniques of various semiconductor devices and circuits.			P									P		
Measure electrical quantities.			M									M		
Analyze various op-amp design parameters.			P									P		
Compare and contrast various oscillator types.				P							P	P		
Analyze switching circuits and timers.			P									P		

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Course: ELEC 53	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 53 will be able to interpret amplitude and frequency characteristics of signals displayed on the spectrum analyzer screen. (SLO)		P	P								P	P		
Students completing ELEC 53 will be able to calculate the bandwidth and power characteristics of frequency-modulated signals using the table of normalized Bessel functions. (SLO)			P									P		
Define common communication terms used in telecommunication circuits.	I				I							I		
Explain circuit operation of various communication circuits.	P			P							P	P		
Demonstrate effective use of test equipment during measurements on various communication circuits.		P										P		
Calculate and analyze various modulation characteristics using a variety of modulation principles.			P	P								P		
Compare and contrast various parameters of different modulation principles.				P							P			
Measure and record parameters of several modulated sources.		P									P			
Evaluate and measure the reception effectiveness of several modulated sources.		P	P	P								P		

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Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: ELEC 54A	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 will be able to explain the operation of industrial electronic components in circuits. (SLO)	I		P	P	P						P	P		
Students will be able to make comparative assessments of direct-current (DC) motor controls. (SLO)	P	P	P		P						P	P		P
Define common industrial electronic terms.	I			P							P			
Explain circuit operation of various industrial electronic components.	P		P	P							P			
Explain circuit applications of various industrial components and basic circuits.	P			P							P	P		
Analyze various parameters of industrial components and basic circuits.	P	P	P									P		
Identify various principles of optoelectronic components.					P						P			
Compare and contrast various principles of power sources.			P	P	P						P	P		P
Compare and contrast various DC and AC motor controls.			P	P	P						P	P		P
Measure circuit parameters for various motor control circuits.		P	P		P							P	P	
Explain operation and applications of various transducers.	P			P	P						P	P		

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Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: ELEC 54B	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 will be able to describe the key operational advantages of a PLC factory environment, including input, output, and communication protocols.	P			P	P						P	P	P	P
Students completing ELEC 54B will be capable of assessing the quality of a programmable logic control (PLC) program. (SLO)	P				P							P	P	
Define common industrial electronic terms.	I			P							P			
Explain circuit operation of various industrial electronic circuits.	P			P							P			P
Explain system applications of various industrial electronic circuits.	P			P							P			
Identify Programmable Logic Controller components.	P			P							P		P	
Differentiate number systems and codes used with common PLCs.			P										P	
Demonstrate PLC programming methods.					P						P		P	
Compare and contrast PLC programming methods.			P		P						P	P	P	P
Synthesize the program (software) to the appropriate hardware electrical connection.		P			P							P	P	

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Course: ELEC 55	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 55 will be able to use the Smith chart to match line and load impedances. (SLO)	P		P		P							P		
Using laboratory equipment students will demonstrate the presence of standing waves on a microwave transmission line. (SLO)		P										P		
Define common microwave terms.				I							P			
Explain circuit operation of various microwave components.	P				P						P	P		
Explain system applications of various microwave components.	P				P						P			
Calculate and analyze various microwave characteristics.			P									P		
Plot graphically and analyze various microwave characteristics on the Smith Chart.	P				P						P	P		
Compare and contrast Smith Chart values from those obtained by formula.			P									P		
Measure common microwave parameters using microwave test equipment.		M										P		

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Student Learning Objectives (SLOs), Measureable Objectives (MOs), Administrative Unit Objectives (AUOs)														
Course: ELEC 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
Using the design algorithm, students will design and build a combinational logic control circuit. (SLO)		P	P									P		
Using a state machine design, students will construct a synchronous counter that counts a random number sequence and then repeats. (SLO)		P	P									P		
Recognize logic symbols and logic interpretation.	I											P		
Analyze combinational logic circuits and waveforms.			P									P		
Demonstrate reduction techniques of combinational logic.			P									P		
Analyze sequential logic circuits and wave forms.			P									P		
Evaluate logic circuit parameters from truth tables.											P	P		
Troubleshoot logic circuits and find faults.		P										P		
Measure logic circuit input and output signals using a variety of testing techniques.		P										P		

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Course: ELEC 61	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 will demonstrate the ability to assemble an electronic circuit board to approved industry standards (IPC7711/7721). (SLO)	I											I		
Students completing ELEC 61 will demonstrate the ability to capture a schematic and render a printed circuit board phototool from an instructor-supplied list of component requirements. (SLO)	I											I	I	
Demonstrate the proper manufacturing techniques of soldering and de-soldering.	I											I		
Differentiate between types of assembly techniques and justify the merits of one versus the other.	I											I		
Design a printed circuit board using computer-aided drafting (CAD).	I	I										I		
Define or explain various terms used in assembly and manufacturing processes.				I							I			
Recognize acceptable assembly connections from unacceptable ones.				I							I	I		

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Course: ELEC 62	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 will demonstrate the ability to solder a surface-mount electronic circuit board to approved industry standards (IPC7711/7721). (SLO)	P											P		
In a laboratory setting, students will perform component removal, desoldering, and rework tasks to industry standards. (SLO)	P		P									P		
Recognize chip components and packaging outlines.	P				P								P	
Compare and contrast various assembly techniques on SMT components.	P				P						P	P		
Demonstrate knowledge of rework techniques on SMT components.	P										P			
Evaluate finished assemblies for proper application of approved industry soldering standards.	P		P									P		P
Evaluate solderability and preparation methods for SMT.	P				P							P		

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Course: ELEC 74	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 74 will be able to install programs and development tools into microcontrollers or companion personal computers. (SLO)	I												I	
Students completing ELEC 74 will be able to describe the relationship between hardware and software in a microcontroller. (SLO)	I	I	I								I			
Students in ELEC 74 will use different types of microcontroller platforms (such as Arduino or Fubarino) to implement projects of their own design. (SLO)		P			P						P	P	P	
Program a PIC microcontroller using a development board.	I													
Compare and contrast various features of different process control circuits.				P	P						P	P		
Demonstrate the use of interfacing devices in circuit operation.	P	P										P		
Compare and contrast various features of different interfacing devices.												P		
Program the PIC using the C programming language.	I												I	
Demonstrate a functional interface control circuit for a process control circuit.	P	P										P		
Compare and contrast features of various types of PLDs.	P											P		

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Course: ELEC 76	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 76 will successfully pass Elements 1 and 3 of the Federal Communications Commission General Radiotelephone Operator License examination. (SLO)					M							M		
Students attempting to obtain a ship-radar endorsement will successfully complete NARTE examination. (SLO)					M							M		
Identify the requirements of the various FCC communication licenses.				I							P			
Apply electronic principles as they apply to the Element 3 license.	M		M		M							M		
Explain pertinent communications-related rules and regulations covered in the Element 1 license examination.				P							P			
Solve electronic math problems.			M									M		
Identify circumstances where possession of GROL is federally mandated for communications technicians in the marine and aviation radio services.				P							P			

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Course: ELEC 81	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 will demonstrate the ability to perform research necessary to obtain information sufficient to complete a semester project of the student's choosing. (SLO)	P			P	P						P		P	
Students will demonstrate the ability to produce a project timeline showing procedural steps, critical tasks, and goals. (SLO)				P	P						P	P		
Select a project idea that meets the need of the student.				P	P								P	
Research requisite information required to complete the project.				P	P								P	
Demonstrate proper use of lab equipment while working on project.		M										P		
Plan procedural steps in order to facilitate project completion.				P	P							P		
Demonstrate completed project and report outcomes.				P							P	P		

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Course: ELEC 91	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
Employers of Electronics & Computer Technology Work Experience students will rate the technical skills of their students as above average. (SLO)	M				M									M
Employers of Electronics & Computer Technology Work Experience students will rate the work habits of their students as above average. (SLO)	M				M									M
Demonstrate job competence of assigned duties while at the job site.	M				M									M
Expand responsibilities or learning opportunities beyond those experienced during previous employment.	M				M									M
Develop an occupational goal to which the work experience will contribute.	M				M									M
Demonstrate correct operation of equipment.	M				M									M
Demonstrate good work habits.	M				M									M
Follow procedures and protocols already in practice at the work site.	M				M									M

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Course: TECH 60	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 TECH 60 will demonstrate the ability to answer questions in a positive manner in a mock job interview.	P			P	P						P	P	P	
Students completing TECH 60 will be able to identify qualities employers seek in new hires.	P		P	P							P	P	P	P
Describe the benefits of using effective customer contact skills.	P			P							P			P
Demonstrate proper customer and team interactions.	P													P
Identify and use customer contact tools.	P			P							P			P
Evaluate the effectiveness of appropriately used customer contact tools.	P		P		P							P		
Know and use effective questioning techniques.	P			P							P			
Compare and contrast ethical decisions made.	P				P							P		P
Compare and contrast hard skills versus soft skills.	P			P	P						P	P	P	
Know and use effective communication skills.	P			P							P			P
Demonstrate proper responses and appropriate attire in an interview.	P			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