	Unit 1 Fundamentals																								Unit 10 Microprocessors						Unit 2 Number Systems				Unit 3 Gates			Unit 4 Boolean Algebra								Unit 5 Boolean Algebra and Circuit Design												Unit 6 Adding			Unit 7 Flip-Flops								Unit 8 Shift Registers and Counters							Unit 9 Families and Specifications			
Digital Electronics	Students will be able to identify hazards in the lab and know locations of the safety equipment and how to use it	Students will understand the causes of and the dangers from electric shock and explain methods to prevent it.	Students will understand that the process of designing an electronic circuit takes into account many factors, incl	Students will be able to label the parts of the atom.	Students will explain the relationship of quantum energy required to strip away electrons from atoms to being cla	Students will learn how to apply Kirchhoff's voltage and current laws to closed loops.	Students will be able to define and explain the difference between direct and alternating currents.	Students will be able to re-write any number using conventional prefix definitions.	Students will understand the material makeup of resistors and how they are used in circuit design.	Students will understand the symbols associated with resistors.	Students will be able to correctly setup lab equipment to measure resistor values in order to compare measured	Students will calculate the tolerance levels of various resistors to determine if the measured value is within spec	Students will be able to draw and label the parts of a simple circuit.	Students will build and test a variety of series and parallel circuits, using simulation software and proto-boards, t	Students will correctly select and utilize electrical meters to determine voltage, resistance and current in simple c	Students will calculate the resistance, current and voltage in a circuit using Ohm's Law.	Students will describe the component parts of a capacitor and describe how a capacitor holds a static charge.	Students will use and understand the units of measurement for capacitors.	Students will be able to calculate the value of capacitors mathematically and through the use of instrumentation.	Students will be familiar with different types of capacitors and their voltage polarity requirements.	Students will be able to draw a digital waveform and identify the anatomy of the waveform.	Students will differentiate between digital and analog signals when given the waveforms.	Students will wire and test a free-running clock circuits using a 555 timer.	Students will calculate the output frequency of a clock circuits using observations and the oscilloscope.	Students will be able to formulate a flow chart to correctly apply basic programming concepts in the planning of	Students will be able to design and create a program, using correct syntax, to evaluate data and make decisions	Students will create an interface to allow them to inspect, evaluate and manage program parameters in the micr	Students will be able to design and create a program in correct syntax allowing a microprocessor to evaluate ext	Students will appropriately select, size, and implement interface devices to control external devices.	Students will design and create programming to control the position of stepper motors.	Students will understand numerical place value.	Students use mathematical symbols to represent different bases and will communicate concepts using different	Students will demonstrate the relationship of binary and hexadecimal to bits and bytes of information used in co	Students will convert values from one number system to another.	Students will use schematics and symbolic Algebra to represent digital gates in the creation of solutions to desig	Students will identify the name, symbol, and function and create the truth table, and Boolean Expression for the	Students will apply logic to design and create, using gates, solutions to a problem.	Students will recognize the relationship between the Boolean expression, logic diagram, and truth table.	Students will be able to create Boolean Expressions, logic circuit diagrams or truth tables from information provi	Students will appropriately select the Sum-of-Products or the Product-of-Sums form of a Boolean Expression to	Students will apply the rules of Boolean algebra to logic diagrams and truth tables to minimize the circuit size ne	Students will use DeMorgan's Theorem to simplify a negated expression and to convert a SOP to a POS and vic	Students will formulate and employ a Karnaugh Map to reduce Boolean expressions and logic circuits to their si	The students will create circuits to solve a problem using NAND or NOR gates to replicate all logic functions.	The students will apply their understanding of the workings of NOR and NAND gates to make comparisons with	The students will restate and simplify a digital design problem as part of the systematic approach to solving a proble	Students will design, construct, build, troubleshoot, and evaluate a solution to a design problem.	Students will present an oral report presenting a solution and evaluation of a design problem of their choice.	Students will discover the code to create numbers on a seven segment display by experimentation.	Students will design a circuit to control a seven segment display with a decimal to BCD encoder and a display d	Students will control the flow of data by utilizing Multiplexers and Demultiplexers.	Students will be able to design and implement combinational logic circuits using reprogrammable logic devices.	Students will create PLD logic files that define combinational circuit designs using Boolean Expressions.	Students will understand and use logic compiler software to create JEDEC files for programming PLDs.	Students will demonstrate understanding of binary addition and subtraction by designing circuits to produce corr	Students will create and prove the truth table for both half and full adders.	Students will design, construct and test adder circuits using both discrete gates and MSI gates.	Demonstrate understanding of binary addition and subtraction by designing circuits to produce correct answers.	Create and prove the truth table for both half and full adders.	Design, construct and test adder circuits using both discrete gates and MSI gates.	Students will construct and test simple latches and flip-flops from discrete gates.	Students will interpret, design, draw, and evaluate circuits using the logic symbols for latches and flip-flops.	Students will be able to interpret waveform diagrams from circuits they construct and compare them with combi	Students will compare and contrast operation of synchronous with asynchronous flip-flop circuits they construct.	Students will be able to create and interpret timing diagrams and truth tables for J-K Flip-Flops.	Students will understand the different types of triggers used by latches and flip-flops and select the appropriate c	Students will analyze timing diagrams that reflect triggering to identify distinguishing characteristics.	Students will conduct experiments with clock pulse width to determine the effect on the accuracy of data transmi	Students will conduct experiments to determine the basic principles of how shift registers work.	Students will evaluate the use of shift registers in product design and the speeds at which those products run.	Students will create a circuit using discrete flip-flops to discover the operation and characteristics of asynchrono	Students will design, simulate, build and test Mod counters using discrete gates in the solution to a design probl	Students will design, simulate, build and test asynchronous Mod counters using an integrated counter chip (MSI)	Students will design, simulate, build and test synchronous Mod counters using discrete gates to solve a problem	Students will design, simulate, build and test synchronous Mod counters using an integrated counter chip in the	Students will be able to interpret the graphs, charts and written materials contained in a data sheet and apply it t	Students will be able to correctly setup and use an oscilloscope to observe and measure propagation delay in a	Students will be able to define, calculate, and measure noise margin, drive capabilities, fan-out and propagation	Students will be able to list safety precautions for handling CMOS chips.
Michigan Grades 9-12 Grade Math Strands/Standards Linked																																																																															
MATH GRADES 9-12: http://www.michigan.gov/mde/0,1607,7-140-38924_41644_42668---,00.html										x		x	x					x							x	x					x	x		x	x	x	x	x	x		x								x						x	x		x	x			x			x											x			
STRAND 1: QUANTITATIVE LITERACY AND LOGIC												x						x							x	x					x	x				x	x	x	x		x															x			x																			
STANDARD L1: REASONING ABOUT NUMBERS, SYSTEMS, AND QUANTITATIVE SITUATIONS												x													x	x					x	x																																														
QSNS1.1 Number Systems and Number Sense																															x																																																
QSNS1.1.1 Know the different properties that hold in different number systems, and recognize that the applicable properties change in the transition from the positive integers, to all integers, to the rational numbers, and to the real numbers.																															x																																																
QSNS1.1.5 Justify numerical relationships (e.g., show that the sum of even integers is even; that every integer can be written as 3m+k, where k is 0, 1, or 2, and m is an integer; or that the sum of the first n positive integers is n (n+1)/2).																															x																																																
QSRR1.2 Representations and Relationships												x													x	x						x																																															
QSRR1.2.1 Use mathematical symbols (e.g., interval notation, set notation, summation notation) to represent quantitative relationships and situations.												x																				x																																														
QSRR1.2.2 Interpret representations that reflect absolute value relationships (e.g. | x - a | ¡Ü b, or a ¡Ä b) in such contexts as error tolerance.												x																																																																		
QSRR1.2.4 Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.																									x	x																																																							
STANDARD L3: MEASUREMENT AND PRECISION																		x																																																													
QSMP3.1.1 Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly.																		x																																																													
STANDARD L4: MATHEMATICAL REASONING, LOGIC, AND PROOF																																				x	x	x	x		x															x			x																			
QSMRLP4.1 Mathematical Reasoning																																					x																																										
QSMRLP4.1.2 Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic.																																					x																																											
QSMRLP4.2 Language and Laws of Logic																																				x		x	x		x															x			x																			
QSMRLP4.2.1 Know and use the terms of basic logic (e.g., proposition, negation, truth and falsity, implication, if and only if, contrapositive, and converse).																																						x																																									
QSMRLP4.2.2 Use the connectives NOT, AND, OR, and IF, THEN, in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives.																																				x			x		x															x			x																			
STRAND 2: ALGEBRA AND FUNCTIONS										x																								x	x																				x			x				x			x											x			
STANDARD A1: EXPRESSIONS, EQUATIONS, AND INEQUALITIES										x																									x																																												
AFEEI1.1.1 Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables.																																			x																																												
STANDARD A2: FUNCTIONS										x																																													x			x				x			x											x			
AFF2.1 Definitions, Representations, and Attributes of Functions										x																																																			x			x											x			
AFF2.1.1 Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function; and identify its domain and range.																																																													x																		
AFF2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations.										x																																																					x														
AFF2.1.7 Identify and interpret the key features of a function from its graph or its formula(e), (e.g. slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, average rate of change over an interval, and periodicity).																																																																												x			
AFF2.2 Operations and Transformations																																																							x			x																					
AFF2.2.1 Combine functions by addition, subtraction, multiplication, and division.																																																							x			x																					
STANDARD A3: MATHEMATICAL MODELING																																		x																																												
AFMM3.1 Models of Real-world Situations Using Families of Functions.																																		x																																												
AFMM3.1.2 Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. In the example above, substitute the given values P0 = 300 and a = 1.02 to obtain P = 300(1.02)t.																																		x																																														
STRAND 3: GEOMETRY AND TRIGONOMETRY													x																																				x																																		
STANDARD G1: FIGURES AND THEIR PROPERTIES																																																	x																																		
GTFP1.1 Lines and Angles; Basic Euclidean and Coordinate Geometry																																																	x																																		
GTFP1.1.3 Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using straightedge and compass.																																																	x																																		
STRAND 4: STATISTICS AND PROBABILITY													x												x	x																																																				x			
STANDARD S1: UNIVARIATE DATA – EXAMINING DISTRIBUTIONS													x												x	x																																																				x			
SPUD1.1 Producing and Interpreting Plots													x												x	x																																																							
SPUD1.1.1 Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics.													x												x	x																																																				x			
SPSSE3.1.2 Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates.																																														x																																					