DEPARTMENT: TECHNOLOGY EDUCATION	COURSE TITLE: DIGITAL ELECTRONICS (I AND II) COURSE NUMBERS: 508B, 510B
GRADE(S): 10-12	PRE-REQUISITES (IF ANY): ELECTRONICS I OR PERMISSION OF TEACHER

UNIT	LENGTH	CONTENT	SKILLS	METHODS OF ASSESSMENT	FRAMEWORK STRAND(S) & STANDARD(S)
I. Review Electronics	2 weeks	• Ohm's and Joule's laws • Series, parallel and series-parallel circuits • Non-linear I-V relationships • ac waveforms and calculations • Using test equipment	Students will: • Interpret and draw schematic diagrams • Use algebra and trigonometry for problem solving • Use DMM, oscilloscope, function generator and bench power supply	• Problem sets (both in-class and homework) • Lab exercises and lab practical exam • Unit exam	STE-S-4, 9/10-5.1, 5.2, 5.3, 5.4, 5.5, 5.6
II. Digital Overview	1.5 weeks	• Safety in electronics • Characteristics and classification of digital and analog circuits • Digital signal measurements	Students will: • Interpret and draw block and schematic diagrams • Build and analyze (using logic probe, DMM and oscilloscope) astable oscillator circuit • Use algebra to predict (calculate) period, frequency and duty cycle of waveforms	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written unit exams.	
III. Math for Digital Electronics	1.5 weeks	• Binary, octal, hexadecimal and decimal number systems: structure and conversions • IC decimal to binary encoder circuitry	Students will: • Convert numbers from one system (decimal, binary, octal & hex) into any of the others • Wire, test (troubleshoot if necessary) and explain the operation of a decimal to binary encoder circuit	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written unit exams	
IV. Binary Logic Gates	2 weeks	• Logic functions, gates, truth tables and Boolean expressions	Students will: • Identify, draw and interpret logic symbols, truth tables, and Boolean expressions for the eight basic logic gates • Draw and interpret logic circuit diagrams • Use a breadboard system	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written unit exams	STE-S-4, 9/10-1.5

			and logic probe for building and testing logic circuits		
V. Combinational Logic	2 weeks	• Multiple logic gate circuits • Simplifying complex Boolean expressions using Karnaugh mapping	Students will: • Construct truth tables, logic diagrams, Boolean expressions and working circuits for combinational logic systems • Use a breadboard and logic probe to build and test logic circuits	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written unit exams	STE-S-4, 9/10-1.5
VI. Encoding/Decoding Circuits and 7-segment Display	2 weeks	• BCD and ASCII codes; 7 segment LED and LCD displays • Decoder-driver IC's and related circuitry	Students will: • Utilize tables for ASCII alpha-numeric conversions • Write and interpret numbers in BCD code; wire and test a decoder-driver-7 segment LED display circuit including use of leading zero blanking	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written exams	
VII. Review/Exam/Class Presentation	2 weeks	• Review of course content to date • Tech writing • Preparation of summary (student) presentation to class.	Students will: • Outline including material review techniques • Organize and present brief report to class (including written abstract)	• Project presentation and abstract • Written (trimester) exam	
TRIMESTER "B"					
I. Flip-Flops	2 weeks	• RS, clocked-RS, D and JK flip-flops	Students will: • Draw and interpret block diagram symbols for flip-flops (including all I/O designations) • Predict flip flop operations depending on input conditions; wire and test flip-flop circuits	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written unit exams	STE-S-4, 9/10-1.5, 5.1, 5.2, 5.5
II. Counters	2 weeks	• Ripple up and down counters • Waveform drawing and interpretation; frequency dividers • Modulo-N counters	Students will: • Draw and/or interpret (from memory) circuit diagrams for ripple up and down, and modulo-N counters, frequency dividers • Draw and/or interpret timing diagrams for mod-N counters	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written unit exams	STE-S-4, 9/10-1.5, 5.1, 5.2, 5.5

III. Shift Registers	2 weeks	• Serial and parallel loading shift registers • Shift-left, shift-right and re-circulating registers	Students will: • Draw and/or interpret (from memory) circuit diagrams, wire and test circuits for shift-left, shift-right, serial and parallel loading and re-circulating shift registers using flip-flops and IC registers • Draw and/or explain timing diagrams for these circuits	• Text and lab manual review questions; lab practices (use of equipment, construction, analysis and troubleshooting of circuits) • Lab practical and written unit exams	STE-S-4, 9/10-1.5, 5.1, 5.2, 5.5
IV. Arithmetic Circuits	2 weeks	• Half and full adder and subtractor circuits • Math operations of addition and subtraction using binary numbers • Parallel adder and subtractor circuits	Students will: • Draw (from memory) block diagrams for half adder and subtractor, and full adder and subtractor circuits • Convert block diagrams to logic diagrams • Wire and test these circuits • Solve binary math problems involving addition and subtraction	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written unit exams	STE-S-4, 9/10-1.5, 5.1, 5.2, 5.5
V. Memory Devices	2 weeks	• Semiconductor, magnetic-core and bulk storage memory • RAM organization, data storage and read/write cycles	Students will: • Draw and explain the organization and programming (R/W) of a 32x8 semiconductor memory device; wire and test a 16x4 RAM memory device • Write a description of various devices (RAM, ROM, EEPROM etc.) • List and describe computer bulk storage methods	• Text and lab manual review questions • Lab practices (use of equipment, construction, analysis and troubleshooting circuits) • Lab practical and written unit exams	STE-S-4, 9/10-1.5, 5.1, 5.2, 5.5
VI. Student Project and Class Presentation	2 weeks	• The final project provides the opportunity for students to utilize the skills and knowledge gained from their study of digital electronics to design/devise a circuit, application or modification of an established lab activity.	Students will: • Apply information (reference materials, circuit design), and practical skills (wiring, testing and troubleshooting) • Design and present a final project	Assessment will be based on the completed paper (including diagrams and bibliography) and presentation (with possible additional visual aides (O/H transparencies, power point, etc.)	STE-S-4, 9/10-1.5, 5.1, 5.2, 5.5