

<b>DEPARTMENT: TECHNOLOGY EDUCATION</b>	<b>COURSE TITLE: ELECTRONICS I</b> <b>COURSE NUMBER: 507</b>
<b>GRADE(S): 9-12</b>	<b>PRE-REQUISITES (IF ANY): ALGEBRA I</b>

<b>UNIT</b>	<b>LENGTH</b>	<b>CONTENT</b>	<b>SKILLS</b>	<b>METHODS OF ASSESSMENT</b>	<b>FRAMEWORK STRAND(S) &amp; STANDARD(S)</b>
I. Basic Principles	1 week	<ul style="list-style-type: none"> <li>History and development/timeline of electronics</li> <li>Applications of electronics</li> <li>Electronic components and schematic symbols</li> </ul>	Students will: <ul style="list-style-type: none"> <li>Read texts and journals</li> <li>Draw and interpret schematic symbols</li> <li>Report in writing and orally</li> <li>Use common hand tools</li> </ul>	<ul style="list-style-type: none"> <li>Chapter outline (written)</li> <li>Construction and analysis of operation of simple motor</li> <li>Component ID lab</li> <li>Quiz</li> </ul>	STE-S4,9/10-1.2, 1.3, 1.5, 6.5
II. Atomic Structure	1 week	<ul style="list-style-type: none"> <li>Structure of the atom</li> <li>Coulomb as a unit of charge</li> <li>Static and moving charge</li> <li>Definitions of voltage, current and resistance</li> <li>Simple circuits; ac vs DC current; safety</li> </ul>	Students will: <ul style="list-style-type: none"> <li>Read texts</li> <li>Use test equipment (bench power supply and DMM)</li> <li>Use soldering equipment and hand tools</li> </ul>	<ul style="list-style-type: none"> <li>Complete chapter outline (written)</li> <li>Homework problems</li> <li>Unit test</li> <li>Power supply and soldering lab work.</li> </ul>	STE-S4,9/10-5.1, 5.2, 5.5, 5.6
III. Resistance and Resistors	3 weeks	<ul style="list-style-type: none"> <li>Resistance of materials</li> <li>Resistor color code</li> <li>Measuring and testing resistors</li> <li>Rheostats and potentiometers</li> <li>Power dissipation in resistance</li> </ul>	Students will: <ul style="list-style-type: none"> <li>Read texts</li> <li>Use ohmmeter</li> <li>Interpret color code values</li> <li>Calculate tolerance (%)</li> <li>Calculate power (algebra)</li> </ul>	<ul style="list-style-type: none"> <li>Chapter outline</li> <li>Homework problems</li> <li>Unit test</li> <li>Resistor testing and potentiometer calibration labs</li> <li>Tech writing</li> </ul>	STE-S4,9/10-5.5
IV. Ohm's and Joules Laws	2 weeks	<ul style="list-style-type: none"> <li>Relationships between voltage, current, resistance and power (Ohm's and Joule's laws)</li> <li>Linear and non-linear response</li> <li>Electric power and shock</li> <li>Open and short circuits</li> </ul>	Students will: <ul style="list-style-type: none"> <li>Read texts</li> <li>Use voltmeter, ammeter and ohmmeter</li> <li>Calculate algebraically involving Ohm's and Joule's laws</li> <li>Graph and interpret graphs (slope calc.)</li> <li>Construct circuits on solderless breadboards</li> </ul>	<ul style="list-style-type: none"> <li>Chapter outline</li> <li>Homework problems (short answer and algebra problems)</li> <li>Quiz, unit test</li> </ul>	STE-S4,9/10-5.2, 5.3, 5.4
V. Series Circuits	2 weeks	<ul style="list-style-type: none"> <li>Total resistance, voltage drops and current flow in series resistance circuits</li> <li>Calculating power in series circuits</li> <li>Series aiding and opposing voltages</li> <li>Troubleshooting series circuits</li> <li>Applications of series circuits</li> </ul>	Students will: <ul style="list-style-type: none"> <li>Read texts</li> <li>Use voltmeter, ammeter and ohmmeter</li> <li>Predict (algebraic calc.) and measure current and voltage drops</li> </ul>	<ul style="list-style-type: none"> <li>Chapter outline</li> <li>Homework problems (short answer and algebra problems)</li> <li>Quiz, unit test</li> </ul>	STE-S4,9/10-5.4, 5.5

			<p>as well as total resistance in series circuit</p> <ul style="list-style-type: none"> <li>• Construct circuits on solderless breadboards</li> <li>• Troubleshoot series circuits</li> </ul>		
VI. Parallel Circuits	2 weeks	<ul style="list-style-type: none"> <li>• Total resistance, branch currents, voltage drops, and power losses in parallel circuits</li> <li>• Conductance; troubleshooting parallel circuits</li> <li>• Applications of parallel circuits</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Read texts</li> <li>• Use voltmeter, ammeter and ohmmeter</li> <li>• Predict (algebraic calc.) and measure branch currents, voltage drops and total resistance in parallel circuits</li> <li>• Calculate (algebra) conductance from resistance</li> <li>• Construct circuits on solderless breadboards</li> <li>• Troubleshoot parallel circuits</li> </ul>	<ul style="list-style-type: none"> <li>• Chapter outline</li> <li>• Homework problems (short answer and algebra problems)</li> <li>• Quiz, unit test</li> </ul>	STE-S4,9/10-5.4, 5.5
VII. Series-Parallel Circuits	2 weeks	<ul style="list-style-type: none"> <li>• Total resistance, voltage drops, currents and power losses in series-parallel circuits</li> <li>• Wheatstone bridge analysis</li> <li>• Chassis -ground connections; troubleshooting series-parallel circuits</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Read texts</li> <li>• Use voltmeter, ammeter and ohmmeter</li> <li>• Predict (algebraic calc.) and measure current, voltage and resistance in series-parallel circuits</li> <li>• Construct and testing circuits (solderless breadboards and models)</li> </ul>	<ul style="list-style-type: none"> <li>• Chapter outline</li> <li>• Homework problems (short answer and algebra problems)</li> <li>• Quiz, unit test</li> </ul>	STE-S3, 9/10-5.1-5.5 STE-S4,9/10-5.3, 5.4, 5.5
VIII. Cells and Batteries	2 weeks	<ul style="list-style-type: none"> <li>• General features of electrochemical cells</li> <li>• Series and parallel cells</li> <li>• Internal resistance; matching load resistances</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Read texts</li> <li>• Conduct on-line data search/retrieval</li> <li>• Predict and calculate cell/battery voltage, current and charge capacities</li> <li>• Calculate, measure and graph internal resistance values</li> </ul>	<ul style="list-style-type: none"> <li>• Chapter outline</li> <li>• Homework problems (short answer and algebra problems)</li> <li>• Quiz, unit test</li> <li>• resistance lab</li> </ul>	STE-S3, 9/10-5.1-5.5
IX. Magnetism and Electromagnetism	3 weeks	<ul style="list-style-type: none"> <li>• Magnetic fields; domain model</li> <li>• Magnetic poles and laws</li> <li>• Flux, flux density, shielding, induction; types of magnets</li> <li>• Oersted's and Faraday's laws</li> <li>• Permeability</li> <li>• Lenz' law; motors and generators</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Read texts</li> <li>• Conduct on-line data search/retrieval</li> <li>• Map and describe magnetic fields</li> <li>• Calculate flux density (algebraically)</li> <li>• Use Ohm's law for magnetic circuits</li> </ul>	<ul style="list-style-type: none"> <li>• Chapter outline</li> <li>• homework problems (short answer and calc.)</li> <li>• Quiz, unit exam</li> <li>• Labs involving magnetism, electromagnetism, motors and</li> </ul>	STE-S3, 9/10-5.4-5.5

			<ul style="list-style-type: none"> <li>Calculate induced voltages using Faraday's laws</li> </ul>	generators (genecon)	
X. Alternating Current Sources and Characteristics	3 weeks	<ul style="list-style-type: none"> <li>Alternating current sources and applications</li> <li>Ohm's and Joule's laws for ac circuits; sine wave analysis (period frequency, wavelength and amplitude)</li> <li>Phase angle; peak, PP and RMS values; the 60 Hz power line</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Read texts</li> <li>Understand National Electric Code (reference)</li> <li>Use algebra and trigonometry to analyze and describe ac waveforms</li> <li>Use of oscilloscope to measure and verify ac waveforms.</li> </ul>	<ul style="list-style-type: none"> <li>Chapter outline</li> <li>Homework problems (short answer and algebraic/trig. calculations)</li> <li>Quiz, unit exam</li> <li>Labs involving RMS, peak, PP values; electrical equivalent of heat</li> </ul>	STE-S3, 9/10-5.1-5.5, 6.1 & 6.2
XI. Inductance and Transformers	3 weeks	<ul style="list-style-type: none"> <li>Effects of inductance on ac and DC current flow/voltages</li> <li>Mutual inductance and self-induced voltages</li> <li>Transformers</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Read texts</li> <li>Use algebra to calculate induced currents and voltages</li> <li>Use algebra to calculate voltage and current transfer in transformers</li> <li>Calculate efficiency (%)</li> <li>Use voltmeter to measure primary and secondary transformer voltages</li> </ul>	<ul style="list-style-type: none"> <li>Chapter outline</li> <li>Homework problems (short answer and algebraic calc.)</li> <li>Quiz, unit exam</li> <li>Transformer lab</li> <li>Research paper</li> </ul>	STE-S4, 9/10-5.4, 5.5