Republic of the Philippines
Department of Education
DepEd Complex, Meralco Avenue
Pasig City

K to 12 Curriculum Guide

CREATIVE TECHNOLOGIES

(Grade 7 to Grade 10)

August 2017

CONCEPTUAL FRAMEWORK

Creative Technologies is a contextualized Technology and Livelihood Education (TLE) subject for stand-alone science high schools such as the Regional Science High School and the Legislated Science High School. Students in these schools are known to be mathematically and scientifically-inclined hence the topics included in this curriculum not only meet their interest and intellectually capacity, but also aim to support the research that these students will be doing in their junior or senior year.

Creative Technologies is a project-based curriculum where learners study the theoretical and social context of their projects and half of the students' study time is allocated for laboratory work developing new ideas or working on a range of projects to apply their ideas to different fields.

Since Creative Technologies is a TLE subject, it is geared toward the development of technological proficiency and is anchored on knowledge and information, entrepreneurial concepts, process and delivery, work values, and life skills. This means that it is built on adequate mastery of knowledge and information, skills and processes, and the acquisition of proper work values and life skills. It equips students with skills for lifelong learning. It is founded on the cognitive, behavioral, or psychomotor and affective dimensions of human development.

Just like the TLE Framework, entrepreneurial concepts also form part of the foundation. It is expected that the learners will imbibe the entrepreneurial spirit and consequently set up their own businesses.

TLE by its nature is dominantly a skill subject; hence the teacher must engage students in an experiential, contextualized, and authentic teaching-learning process. It is a subject in which students learn best by doing. It is integrative in approach. For instance, it integrates entrepreneurship with all the areas of TLE. It integrates concepts, skills, and values.

Key Stage Standards

7 – 10
At the end of Grade 10, the learner develops skills necessary to keep up with changes in technology and respond to new ideas or new ways of thinking through a range of projects like building a website, animation, inventing smart products, systems and services. Learners demonstrate understanding of the theoretical and social context of their projects and apply their ideas to different fields.

Grade Level Standards

GRADE LEVEL	STANDARDS
Grade 7	At the end of Grade 7, learners understand the processes involved in product design and development, perform product research, conception design, model creation, and ergonomic (user-friendly) design, and apply engineering design methodologies to real-world societal problems using the computer as the central design tool and 3D printer to produce the tangible output.
Grade 8	At the end of Grade 8, learners understand the processes involved in software for digital multimedia presentations, documents, and apply the elements and principles of arts and design through their own work. They will be introduced to computational thinking as a problem-solving tool in order to address issues relevant, not just to them, but to the world around them.
Grade 9	At the end of Grade 9, learners understand the processes involved in basic electricity, electronic circuits, specifications of electronic materials and components, instrumentation, power supply, digital, combination and sequential logic, and the processes involved in assembling intelligent machines.
Grade 10	At the end of Grade 10, the learners understand the processes involved in robotics technology with sensors, integrated development environment and control device such as relays, timers, counters, programmable logic controller, microcontroller unit and others. It is expected that the learners will present a project proposal that involves the creation of a functional robot.

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL (JHS) SPECIAL SCIENCE PROGRAM (SSP) – TLE (CREATIVE TECHNOLOGIES)

Grade Level: GRADE 7 **Quarter: FIRST**
Subject Title: DYNAMIC COMPUTER APPLICATIONS & INTERACTIVE GRAPHICS **No. of Hours: 30 hours/quarter**

Subject Description: The subject, ***Dynamic Computer Applications & Interactive Graphics***, helps learners understand the processes involved in product design and development, perform product research, conception design, model creation, ergonomic *(user-friendly)* design, and apply engineering design methodologies to real-world societal problems using the computer as the central design tool. It will prepare learners to effectively make, model, create, and innovate concepts and ideas using various Dynamic Computer Applications and Interactive Designs. Moreover, learners will learn techniques to present and evaluate their designed ideas through virtual prototyping and physical prototyping that demonstrate their abilities to design and modify graphical images through engineering analysis, animation, and diagnostic feedback from the customers, end users, and industry-partners.

LESSON 1: FUNDAMENTALS OF DYNAMIC COMPUTER APPLICATIONS & INTERACTIVE GRAPHICS (DCAI)				
CONTENT	**CONTENT STANDARD**	**PERFORMANCE STANDARD**	**LEARNING COMPETENCIES**	**CODE**
1. Fundamentals of Dynamic Computer Applications & Interactive Designs • Nature • History • Advantages • Functions and Applications	The learner demonstrates an understanding of the basic concepts and principles of Dynamic Computer Applications & Interactive Designs.	The learner independently designs an Advocacy Campaign Poster by applying the basic concepts and principles of Dynamic Computer Applications and Interactive Designs.	1.1. Define the concepts and principles in dynamic computer applications and interactive designs 1.2. Unfold the historical footprints of various computer applications and interactive designs 1.3. Discuss the importance of Dynamic Computer Applications and Interactive Designs *(Productivity and Presentation Tools such as Word Processing, Spreadsheet, Publisher, Powerpoint, Paint, Adobe Photoshop, and Graphic Interface Software)* 1.4. Use various dynamic computer applications and interactive designs in presenting an oral report	**SSP_TLE-CT7DCAI -Ia-1.1** **SSP_TLE-CT7DCAI -Ia-1.2** **SSP_TLE-CT7DCAI -Ia-1.3** **SSP_TLE-CT7DCAI -Ia-1.4**
LESSON 2: PERSONAL ENTREPRENEURIAL COMPETENCIES (PECS)				
1. Personal Competencies and Skills (PECs) vis-à-vis a practicing industry employee • Characteristics • Attributes • Lifestyle	The learner demonstrates an understanding of one's PECs that suit the industry demands.	The learner independently creates different infographics showing the importance of strengthening one's PECS.	1.1. Identify one's PECs (characteristics, attributes, lifestyle, skills, & traits) suited for industry demands 1.2. Do an oral presentation on the importance of PECs using productivity and presentations tools	**SSP_TLE-CT7PECS -Ib-1.1** **SSP_TLE-CT7PECS -Ib-1.2** **SSP_TLE-CT7PECS -Ib-1.3**

• Skills • Traits			1.3. Use different dynamic computer applications and editing tools in making infographics on PECs	
LESSON 3: USE AND MAINTAIN HAND TOOLS, COMPUTER EQUIPMENT AND ELECTRONIC SYSTEMS (MTCS)				
1. Hand Tools, Computer Equipment & Electronic Systems • Safety Measures, Proper Handling, & Borrowing Procedures • Cleaning, Tightening and Simple Repair Procedures • Common Malfunctions in Tools & Equipment	The learner demonstrates an understanding of the concepts and underlying principles of maintaining hand tools, computer equipment and electronic systems.	The learner independently performs maintenance, handling, and safety care of hand tools, computer equipment and electronic systems.	1.1. Identify different hand tools, computer equipment and electronic systems and their corresponding functions 1.2. Work collaboratively as a team in preparing a brochure on safety measures, proper handling, barrowing procedures of hand tools, computer equipment, and electronic system 1.3. Follow procedures in cleaning, tightening and simple repair of hand tools, computer equipment and electronic systems 1.4. Determine common malfunctions of hand tools, computer equipment and electronic systems during unplanned or unusual circumstances	**SSP_TLE-CT7MTCS -Ic-1.1** **SSP_TLE-CT7MTCS -Ic-1.2** **SSP_TLE-CT7MTCS -Ic-1.3** **SSP_TLE-CT7MTCS -Ic-1.4**
LESSON 4: OCCUPATIONAL HEALTH AND SAFETY PROCEDURES (OHS)				
1. Practice Occupational Health & Safety Procedures • Hazards and Risks Control in Workplaces • Hazards and Risks Warning Symbols • Safety Regulations and Contingency Measures • Operational Health and Safety Procedures, Practices and Regulations.	The learner demonstrates an understanding of concepts and principles of Occupational Health and Safety (OHS) Procedures in relation to hazards and risks in workplaces.	The learner independently performs an Operational Health & Safety (OHS) Procedural Plan using various Dynamic Computer Applications and Interactive Designs.	1.1. Unlock different occupational health and safety procedures for literacy and awareness using various dynamic computer applications 1.2. Enumerate the different hazards and risks that may occur in workstations and places through skit 1.3. Decode the meanings conveyed by different hazards and risks warning symbols and importance of Personal Protective Equipment (PPE) 1.4. Do a survey on the various safety regulations and contingency measures observed by schools, LGUs, and other offices in the locality 1.5. Use numerous dynamic computer applications and interactive designs in the	**SSP_TLE-CT7OHS -Id-1.0** **SSP_TLE-CT7OHS -Id-1.1** **SSP_TLE-CT7OHS -Id-1.2** **SSP_TLE-CT7OHS -Id-1.3** **SSP_TLE-CT7OHS -Id-1.4**

			observance of OHS Procedural Plan to avoid hazards and risks	
LESSON 5: COMPUTER OPERATIONS & INTERNET NAVIGATIONS (COIN)				
1. Basic Computer System (Hardware, Software Peopleware) • Data Flow of Hardware (Input, Process, Storage, Output) 2. Connection of Peripheral Devices and Software Operations • Hardware and Software operations and functions • Operating System Features 3. Basic Internet Terminologies Features and Functions • Online Help Functions • Internet Etiquette (Netiquette) • Browsers & Search Engines	The learner demonstrates an understanding of concepts and principles of basic computer operations and internet navigation.	The learner independently develops e-portfolios using Basic Computer Operations and Internal Navigations.	1.1. Identify the parts and functions of the computer system 1.2. Categorize and name input, output, process and storage devices 1.3. Discuss the data flow of computer hardware through a demo 2.1. Unfold and discuss the computer's peripheral devices 2.2. Check basic peripheral devices if properly connected 2.3. Perform basic hardware and software operations and functions 2.4. Observe proper start-up and shutdown of computer according to standard and procedures 2.5. Identify and comprehend operating system features and functions 3.1. Unlock basic internet terminologies, features and functions 3.2. Use available online help functions. 3.3. Observe internet etiquettes (netiquette) in using on-line sources 3.4. Use various dynamic computer applications and interactive designs in developing an e-portfolio	**SSP_TLE-CT7COIN -Ie-1.0** **SSP_TLE-CT7COIN -Ie-1.1** **SSP_TLE-CT7COIN -Ie-1.2** **SSP_TLE-CT7COIN -Ie-2.0** **SSP_TLE-CT7COIN -Ie-2.1** **SSP_TLE-CT7COIN -Ie-2.2** **SSP_TLE-CT7COIN -Ie-2.3** **SSP_TLE-CT7COIN -Ie-2.4** **SSP_TLE-CT7COIN -Ie-3.0** **SSP_TLE-CT7COIN -Ie-3.1** **SSP_TLE-CT7COIN -Ie-3.2** **SSP_TLE-CT7COIN -Ie-3.3**
LESSON 6: PREPARE AND INTERPRET TECHNICAL DRAWING (PITD)				

1. Basic Symbols and Fundamental Elements of Technical Drawing • Schematic Diagram • Flowcharts • Block Diagrams • Layout Plans • Loop Diagram • Image Structuring • Hierarchical Structure and Navigation	The learner demonstrates a holistic understanding of concepts and principles in preparing and interpreting technical drawings using available and appropriate Productivity Tools.	The learner independently designs a blueprint for a certain project using fundamental elements and principles in technical drawing enhanced through different productivity tools.	1.1. Identify and discuss the basic symbols used in preparing charts, diagrams, layout plans, and image structure using various Productivity Tools (e.g. Word Processing, Spreadsheet, Presentation, and Graphics Software) 1.2. Select and use technical drawing tools in accordance with the job and industry requirements 1.3. Decode and interpret symbols used in flow charting, schematic diagram, diagramming, plan layouting, and image structuring 1.4. Make flowcharts, diagrams, plan layouts and image structures using various productivity tools	**SSP_TLE-CT7PITD -If-g-1.1** **SSP_TLE-CT7PITD -If-g-1.2** **SSP_TLE-CT7PITD -If-g-1.3** **SSP_TLE-CT7PITD -If-g-1.4**
LESSON 7: DIGITAL IMAGING AND INTERACTIVE DESIGNING (DIID)				
1. Digital Imaging and Interactive Designing • Introduction to Digital Imaging & Interactive Graphics • Brief History of Computer Graphics • Overview of the Programmer's Model of Interactive Graphics and Advantages of Interactive Graphics • Image Editing and Processing • Interactive Graphics in the Future: Mode for Interaction	The learner demonstrates an understanding of the underlying theories and principles in Digital Imaging and Interactive Designing.	The learner independently creates an Intelligent Machine Graphics Design (IMaGeD) using raster and vector elements for digital and non-digital publishing to express ideas, insights, concepts, and imaginations.	1.1. Disclose the underlying theoretical backgrounds and principles governing Digital Imaging and Interactive Graphics 1.2. Define Digital Imaging and Interactive Graphics using graphic organizers and infographics 1.3. Trace the historical footprints of Computer Graphics through an oral report using infographics and/or multimedia presentation 1.4. Present the overview of the Programmer's Model of Interactive Graphics through digitally-created interactive games (e.g. Jeopardy, Kakasa Ka Ba sa Grade 5, Who Wants to Be a Millionaire, Game Ka Na Ba?, Word Craft, and the like) 1.5. Modify raster and vector images using image-editing tools (e.g. gimp, paint, photoshop for raster while illustrator and inkscape for vector images) 1.6. Show creativity and ingenuity in digital imaging and interactive designing	**SSP_TLE-CT7DIID -Ih-j-1.0** **SSP_TLE-CT7DIID -Ih-j-1.1** **SSP_TLE-CT7DIID -Ih-j-1.2** **SSP_TLE-CT7DIID -Ih-j-1.3** **SSP_TLE-CT7DIID -Ih-j-1.4** **SSP_TLE-CT7DIID -Ih-j-1.5**

Grade Level: **GRADE 7** **Quarter**: **SECOND**
Subject Title: **2D MODELING AND PRINTING** **No. of Hours:** **30 hours/quarter**

Subject Description: The subject, ***2D Modeling and Printing***, helps learners understand the processes involved in the concept and technical drawing relationship, multiple part assembly drawings and drawings for documentation and library functions. It will prepare learners to effectively plan and create 2D technical drawings with document labelling for navigation within a project and pipeline concept in hierarchal structure and functional layers.

LESSON 1. CONCEPT AND TECHNICAL DRAWING RELATIONSHIP (CTDR)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Principles of 2D Technical Drawings 1.1 Sketch, profile, constraint and dimension techniques 1.2 orthographic views 1.3 Perspective drawings 1.4 Sectional and material views	The learner demonstrates an understanding of the principles in 2D technical drawings using various illustration methods.	The learner independently draws 2D technical drawings using various illustration methods.	1.1. Identify sources of information and relevant ideas to enrich one's own concept of 2D technical drawings 1.2. Draw preference setup 1.3. Create simple parts by sketching outlines 1.4. Create profile constrain and dimension sketched outlines 1.5. Extrude profiles into parts 1.6. View models from different viewpoints, revolve a profile into a part and sweep a profile into a part 1.7. Draw 2D technical drawings using: • orthographic views • Perspective drawings • Sectional and material views	**SSP_TLE-CT7CTDR -IIa-c-1.1** **SSP_TLE-CT7CTDR -IIa-c-1.2** **SSP_TLE-CT7CTDR -IIa-c-1.3** **SSP_TLE-CT7CTDR -IIa-c-1.4** **SSP_TLE-CT7CTDR -IIa-c-1.5** **SSP_TLE-CT7CTDR -IIa-c-1.6** **SSP_TLE-CT7CTDR -IIa-c-1.7**
LESSON 2. MULTIPLE PART ASSEMBLY DRAWINGS (MPAD)				
1. Understanding Parts and Assembly Drawings 1.1 Cartesian Plane 1.2 Joints	The learner demonstrates an understanding of the underlying principles in making simple 3D parts, and importing it for a 2D technical drawing.	The learners independently modifies and creates simple 3D parts, and import it for a 2D technical drawing using various print out and digital media formats.	1.1. Identify the parts of the object to be assembled 1.2. Discuss the Cartesian plane and joints 1.3. Modify 2D illustrations between two or more-part assembly 1.4. Create simple 3D parts for a 2D technical drawing using a software 1.5. Import 3D parts for a 2D technical drawing using a software 1.6. Produce a blueprint of the 3D object	**SSP_TLE-CT7MPAD-IId-f-1.1** **SSP_TLE-CT7MPAD -IId-f-1.2** **SSP_TLE-CT7MPAD -IId-f-1.3** **SSP_TLE-CT7MPAD -IId-f-1.4** **SSP_TLE-CT7MPAD -IId-f-1.5** **SSP_TLE-CT7MPAD -IId-f-1.6**

LESSON 3. DRAWINGS FOR DOCUMENTATION AND LIBRARY FUNCTIONS (DDLF)				
1. Concept of Pipeline 2. Structure and Functional Layers	The learner demonstrates an understanding of the underlying principles in document labeling for navigation within a project and pipeline concept.	The learner independently plans and arranges 2D technical drawings document labeling for navigation within a project and pipeline concept in hierarchal structure and functional layers.	1.1. Define and discuss the concept pipeline and its production processes 1.2. To modify a prepared 2D illustrations for documentation 2.1. Label the document for navigation within a project and pipeline concept in hierarchal structure and functional layers 2.2. Make a simple flowchart synchronized with a project structure 2.3. Apply the principle of pipeline documentation in a chosen project	**SSP_TLE-CT7DDLF-Iig-j-1.1** **SSP_TLE-CT7DDLF -Iig-j-1.1** **SSP_TLE-CT7DDLF -Iig-j-2.1** **SSP_TLE-CT7DDLF -Iig-j-2.2** **SSP_TLE-CT7DDLF -Iig-j-2.3**

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL (JHS) SPECIAL SCIENCE PROGRAM (SSP) – TLE (CREATIVE TECHNOLOGIES)

Grade Level: GRADE 7 **Quarter: THIRD**
Core Subject Title: 3D MODELING AND PRINTING **No. of Hours: 30 hours/quarter**

Core Subject Description: The subject, ***3D Modeling and Printing***, helps learners understand the processes involved in the conversion of 2D technical drawings to 3D models, objects assembly in the real world and digital world, and reacting objects and mock-up simulations. It will prepare learners to effectively create 3D models from 2D technical drawings, and react in various simulation environments.

LESSON 1. CONVERSION OF 2D TECHNICAL DRAWINGS TO 3D MODELS (CTDM)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Key Concepts, Uses and Principles of 3D Modeling 2. Types 3D Modeling with Software and their Environment 3. Shapes and Model-Based on a Reference 4. 3D Digital Tools 5. Conversion of 2D Technical Drawings to 3D Models	The learner demonstrates an understanding of the concepts and underlying principles in applying quality standards of 3D model creation from 2D technical drawings.	The learner independently performs and produces 3D model from 2D technical drawings.	1.1. Explain and demonstrate the 3D Model Concepts 1.2. Identify 3D model uses and principles 2.1. Introduce and explain different 3D software and its environment 2.2. Discuss and differentiate views of 3d modeling (Wireframe, Surface and Solid) 2.3. Identify and create types of 3D Modeling (Parametric, Polygonal and NURB) 3.1. Set a Model-based on a Reference 3.2. Differentiate shapes and objects 3.3. Create, edit, and render Shapes and Objects 3.4. Add dimensions to object Profile 3.5. Create and set 2D Technical Drawing 4.1. Demonstrate how to produce 3D models using digital tools within a 3D software: • Extrude • Lathes • Lofts • Booleans • Welds • Spline Contours 5.1. Convert and create 2D Technical Drawing to 3D Models	**SSP_TLE-CT7CTDM -IIIa-c-1.1** **SSP_TLE-CT7CTDM -IIIa-c-1.2** **SSP_TLE-CT7CTDM -IIIa-c-2.1** **SSP_TLE-CT7CTDM -IIIa-c-2.2** **SSP_TLE-CT7CTDM -IIIa-c-2.3** **SSP_TLE-CT7CTDM -IIIa-c-3.1** **SSP_TLE-CT7CTDM -IIIa-c-3.2** **SSP_TLE-CT7CTDM -IIIa-c-3.3** **SSP_TLE-CT7CTDM -IIIa-c-3.4** **SSP_TLE-CT7CTDM -IIIa-c-3.5** **SSP_TLE-CT7CTDM -IIIa-c-4.1** **SSP_TLE-CT7CTDM -IIIa-c-5.1**

LESSON 2. OBJECTS ASSEMBLY IN REAL WORLD AND DIGITAL WORLDN (OADW)				
1. Real World Objects Assembly vs. Digital World Objects Assembly 2. Techniques in Adding Dimensions of an Object using 3D Models 3. Methods in 3D Model Objects Assembly	The learner demonstrates an understanding of the underlying principles in applying quality standards of real and Digital 3D model objects assembly.	The learner independently produces and assembles 3D model objects.	1.1. Explain and demonstrate real world and digital world **[This is unclear.]** 2.1. Identify measuring tools in the real world and digital world 2.2. Explain and identify hinges and pivots 2.3. Create hinges and pivots in the real and digital world 3.1. Assemble two or more objects in the real world 3.2. Assemble two or more objects in the digital world	**SSP_TLE-CT7OADW -IIId-f-1.1** **SSP_TLE-CT7OADW -IIId-f-2.1** **SSP_TLE-CT7OADW -IIId-f-2.2** **SSP_TLE-CT7OADW -IIId-f-2.3** **SSP_TLE-CT7OADW -IIId-f-3.1** **SSP_TLE-CT7OADW -IIId-f-3.2**
LESSON 3. REACTING OBJECTS AND MOCK-UP SIMULATIONS (ROMS)				
1. Reacting to Digital Objects and Real World Simulations	The learner demonstrates an understanding of the underlying principles in applying quality standards of real and digital world objects interaction through simulations and observations.	The learner independently demonstrates knowledge and skills in creating 3D models capable of reacting in various simulation environments.	1.1. Simulate and analyze assembled real and digital objects 1.2. Observe and demonstrate behavior of real and digital objects at rest and in action 1.3. Determine the accuracy of hinges 1.4. Prepare 3D objects to react to a real world simulation 1.5. Prepare 3D objects to react to a digital simulation • Validate and finalize dimensions • Convert objects into STL files • Import STL File into CAD/CAM Software	**SSP_TLE-CT7ROMS -IIIg-j-1.1** **SSP_TLE-CT7ROMS -IIIg-j-1.2** **SSP_TLE-CT7ROMS -IIIg-j-1.3** **SSP_TLE-CT7ROMS -IIIg-j-1.4** **SSP_TLE-CT7ROMS -IIIg-j-1.5**

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL (JHS) SPECIAL SCIENCE PROGRAM (SSP) – TLE (CREATIVE TECHNOLOGIES)

Grade Level: GRADE 7 **Quarter: FOURTH**
Core Subject Title: 3D PRINT OUTPUT AND ITS APPLICATION **No. of Hours: 30 hours/quarter**

Core Subject Description: The subject, ***3D Print Output and Its Application***, helps learners understand the processes involved in 3D printing and its components, preparing files for 3D printing, printing methods and printouts, and reacting objects and mock-up simulations. It will prepare learners to effectively print 3D object models using 3D printer applications.

LESSON 1. 3D PRINTER AND ITS COMPONENTS (3DPR)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Introduction to 3D Printer 2. Basic Parts of a 3D Printer 3. Functions of the basic parts of a 3D Printer	The learner demonstrates understanding of the 3D printer and its components.	The learner independently demonstrates knowledge of a 3D printer.	1.1. Describe a 3D Printer 2. 2.1. Identify the basic parts of a 3D printer 3. 3.1. Explain the functions of different parts of a 3D printer	**SSP_TLE-CT73DPR -IVa-c-1.1** **SSP_TLE-CT73DPR -IVa-c-2.1** **SSP_TLE-CT73DPR -IVa-c-3.1**
LESSON 2. PREPARING FILES FOR 3D PRINTING (PF3D)				
1. Converting and Importing 3D Model/Files for printing 2. Types and Properties of Filaments for a 3D Printer • Filament Groups • Filament Properties	The learner demonstrates understanding of importing STL and drawing files.	The learner independently demonstrates knowledge and skills in importing quality STL and drawing files.	1.1. Describe STL files and 3D Objects for 3D Printing 1.2. Convert STL files from a 3D software 1.3. Export STL files to a 3D printer from a 3D software 1.4. Set/modify printer settings according to printing requirements • Nozzle output (Diameter of nozzle) • Temperature configurations 2.1 Explain the function of filaments 2.2 Group filaments according to functions 2.3 Differentiate common filaments from specialized ones 2.4 Differentiate plastic from composite filaments 2.5 Explain the characteristics and uses of specialized filaments	**SSP_TLE-CT7PF3D -IVd-f-1.1** **SSP_TLE-CT7PF3D -IVd-f-1.2** **SSP_TLE-CT7PF3D -IVd-f-1.3** **SSP_TLE-CT7PF3D -IVd-f-1.4** **SSP_TLE-CT7PF3D -IVd-f-2.1** **SSP_TLE-CT7PF3D -IVd-f-2.2** **SSP_TLE-CT7PF3D -IVd-f-2.3** **SSP_TLE-CT7PF3D -IVd-f-2.4** **SSP_TLE-CT7PF3D -IVd-f-2.5**

			2.6 Set appropriately the filament nozzle temperature and sizes according to filament used 2.7 Present possible 3D projects appropriate for each type of filament	**SSP_TLE-CT7PF3D -IVd-f-2.6** **SSP_TLE-CT7PF3D -IVd-f-2.7**
LESSON 3. PRINTING METHODS AND PRINTOUTS (PMP)				
1. Printing Methods using a 3D Printer	The learner demonstrates understanding of the underlying principles in applying quality standards in printing single object and supported objects and applying common 3D printing methods.	The learner demonstrates knowledge and skills in preparing and printing 3D objects.	1.1. Explains the procedures in printing single 3D objects and supported objects 1.2. Discuss the different printing methods for single object and supported objects 1.3. Apply appropriate printing methods for a chosen project 1.4. Evaluate the printout according to the set requirements of a printing project 1.5. Make a report and recommendation on the quality of printout based on project requirements	**SSP_TLE-CT7PMP-IVg-j-1.1** **SSP_TLE-CT7PMP -IVg-j-1.2** **SSP_TLE-CT7PMP -IVg-j-1.3** **SSP_TLE-CT7PMP -IVg-j-1.4** **SSP_TLE-CT7PMP -IVg-j-1.5**

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JUNIOR HIGH SCHOOL (JHS) SPECIAL SCIENCE PROGRAM (SSP) – TLE (CREATIVE TECHNOLOGIES)

Grade Level: **GRADE 8** **Quarter**: **FIRST**
Subject Title: **DIGITAL MULTIMEDIA COMMUNICATION** **No. of Hours:** **30 hours/quarter**

Subject Description: The subject, ***Digital Multimedia Communication***, will help learners understand the processes involved in software for digital multimedia presentations and documents, and apply the elements and principles of art and design through their own work. Students will learn to communicate messages, information and ideas effectively using digital media. They will also learn to use information responsibly. Students will learn that multimedia presentations and documents may incorporate different media elements: text, graphics, sound, animation and video. Students will recognize the importance of storyboarding, and learn and apply the principles of interface design as they engage in creating multimedia documents for presentations and for publishing. Students will also learn how to be productive, solve problems, develop original ideas, organize thoughts, budget time, and be successful. Each student will learn about digital media literacy and become producers of digital media. Students will apply 21st century skills and practices required for using technology and creating digital media.

LESSON 1: MULTIMEDIA BASICS (MB)				
CONTENT	**CONTENT STANDARD**	**PERFORMANCE STANDARD**	**LEARNING COMPETENCIES**	**CODE**
1. Multimedia Elements 2. Principles of Design 3. Multimedia Applications	The learner demonstrates understanding of the nature and importance of multimedia content.	The learner shall be able to apply the principles of design in creating a media using the multimedia elements/applications.	1.1. Identify multimedia elements in various forms (graphics, animation, sound, video, etc.) as encountered and used in daily life (entertainment, education, business, etc.)	**SSP_TLE-CT8MB-Ia-b-1.1**
			1.2 Explain design elements and principles as it applies to various media	**SSP_TLE-CT8MB -Ia-b-2.1**
			1.3 Discuss the relevance and impact of digital multimedia content on the individual and on society	**SSP_TLE-CT8MB -Ia-b-2.2**
			1.4 Evaluate common multimedia applications based on its impact on one's self and society	**SSP_TLE-CT8MB -Ia-b-3.1**
LESSON 2: MULTIMEDIA CONTENT CREATION (MCC)				
1. Storyboard 2. Software and Authoring tools for Multimedia Editing	The learner demonstrates an understanding of the principles of design in creating a multimedia project	The learner independently creates multimedia content, applying the principles of design.	1.1. Use storyboarding as a planning tool to show the sequence or flow of content and layout of the media elements in a project	**SSP_TLE-CT8MCC -Ic-e-1.1**

3. Publishing Platforms	using different authoring tools.		1.2. Apply the principles of design to layout media elements effectively	**SSP_TLE-CT8MCC -Ic-e-1.2**
			2.1. Use software and authoring tools to edit and enhance digital multimedia content	**SSP_TLE-CT8MCC -Ic-e-2.1**
			3.1. Modify the project for various publishing platforms (web, blog, slides, videos, print, screen, etc.)	**SSP_TLE-CT8MCC -Ic-e-3.1**
			3.2. Evaluate the impact of created multimedia content on the audience	**SSP_TLE-CT8MCC -Ic-e-3.2**
LESSON 2: INTERACTIVE MULTIMEDIA CONTENT CREATION (IMCC)				
1. Types of Interactive Content (websites, games, interactive presentations) 2. Planning Interactive Multimedia Content 3. Software and Authoring Tools for Interactive Multimedia Creation 4. Publishing	The learner demonstrates understanding of interactive multimedia and its specific applications.	The learner independently creates interactive multimedia content to deliver a message or idea effectively.	1.1. Describe the nature of interactive multimedia presentations and their applications	**SSP_TLE-CT8IMCC-If-j-1.1**
			2.1. Use storyboarding as a planning tool to show the sequence or flow of content and layout of the media elements in an interactive multimedia project	**SSP_TLE-CT8IMCC -If-j-2.1**
			2.2. Apply the principles of design to layout media elements effectively in an interactive multimedia project	**SSP_TLE-CT8IMCC -If-j-2.2**
			3.1. Use software and authoring tools to create a menu-controlled presentation for a specific purpose	**SSP_TLE-CT8IMCC -If-j-3.1**
			4.1. Publish using the appropriate platform for the interactive multimedia content created	**SSP_TLE-CT8IMCC -If-j-4.1**
			4.2. Evaluate the impact of created interactive multimedia content on the audience	**SSP_TLE-CT8IMCC -If-j-4.2**

Grade Level: **GRADE 8**
Subject Title: **PROGRAMMING**

Quarter: **SECOND TO FOURTH**
No. of Hours: **30 hours/quarter**

Subject Description: The subject, ***Programming***, will help learners understand the processes involved in computational thinking as a problem-solving tool in order to address issues relevant, not just to them, but to the world around them. The learning experiences created from these standards are relevant to the students and promote their perception of themselves as proactive and empowered problem solvers. The activities are designed with a focus on active learning and exploration in a flexible learning space and are taught explicitly during the TLE subject time or embedded in other curricular areas such as social science, language arts, mathematics, and science. This course also covers the appreciation of the ubiquity of computing and the ways in which computer science impacts the lives of people. This course builds upon other generic skills and processes, including: thinking critically, reflecting on one's work and that of others, communicating effectively both orally and in writing, being a responsible user of computers, and contributing actively to society.

LESSON 1: COMPUTATIONAL THINKING (CP)				
CONTENT	**CONTENT STANDARD**	**PERFORMANCE STANDARD**	**LEARNING COMPETENCIES**	**CODE**
1. Computational Thinking 2. Elements of Computational Thinking • Decomposition • Pattern Recognition • Abstraction • Algorithm Design	The learner demonstrates understanding of computational thinking, underlying principles and related concepts.	The learner independently performs computational thinking in solving a real world issues, scenarios, system or situation.	1.1. Describe how computational thinking supports the development of computer applications and problem solving across all disciplines 2.1. Identify the elements of computational thinking 2.2. Decompose a problem to create a sub-solution for each of its parts 2.3. Use common patterns and order to analyze data relevant to the problem 2.4. Draw relevant information to solve a certain problem 2.5. Develop an ordered series of instructions for solving a similar problem or for doing a task	**SSP_TLE-CT8CP-IIa-c-1.1** **SSP_TLE-CT8CP -IIa-c-2.1** **SSP_TLE-CT8CP - IIa-c-2.2** **SSP_TLE-CT8CP -IIa-c-2.3** **SSP_TLE-CT8CP -IIa-c-2.4** **SSP_TLE-CT8CP -IIa-c-2.5**

LESSON 2: ALGORITHMS AND PROGRAMMING (AP)				
1. Algorithm 2. Variables, Constants, Operators and Expressions 3. Control Structure 4. Modular Programming 5. Process of Program development	The learner demonstrates understanding of algorithms and programming.	The learner independently demonstrates knowledge and skills in the fundamentals of algorithms and programming in developing a computer program to achieve a given goal or to address a defined problem or task.	1.1. Describe algorithms through varied examples 1.2. Develop a set of algorithms to solve a problem 1.3. Recognize that alternative algorithm in solving a given problem 2. 2.1. Cite examples of variables in programming 2.2. Describe the effects of changing the variables in a model or program 2.3. Write codes using variable 3.1. Describe how control structure is used in programming 3.2. Write codes using control structures (for ex. loops, event handlers, conditionals) that represents a more complex task/problem and can be reused to solve similar tasks/problems 4.1. Identify how modules are used in developing a program 4.2. Create new procedures by writing codes that generalize behavior which can be reused in new programs 5.1. Make code readable using comments and documentation 5.2. Explains how one's written code works 5.3. Correct the code that causes an error 5.4. Analyze the dimensions of a problem using an iterative approach in development and debugging	**SSP_TLE-CT8AP-IId-m-1.1** **SSP_TLE-CT8AP -IId-m-1.2** **SSP_TLE-CT8AP -IId-m-1.3** **SSP_TLE-CT8AP -IId-m-2.1** **SSP_TLE-CT8AP -IId-m-2.2** **SSP_TLE-CT8AP -IId-m-2.3** **SSP_TLE-CT8AP -IId-m-3.1** **SSP_TLE-CT8AP -IId-m-3.2** **SSP_TLE-CT8AP -IId-m-4.1** **SSP_TLE-CT8AP -IId-m-4.2** **SSP_TLE-CT8AP -IId-m-5.1** **SSP_TLE-CT8AP -IId-m-5.2** **SSP_TLE-CT8AP -IId-m-5.3** **SSP_TLE-CT8AP -IId-m-5.4**
LESSON 3. DATA MANAGEMENT (DM)				
1. Types of Data	The learner demonstrates understanding of data and	The learner is independently able to accurately store and	1.1. Discuss how different data are stored through a program	**SSP_TLE-CT8DM-IIIa-f-1.1**

2. Methods of Collecting Data 3. Analysis of Data	how computer systems can be used to collect, store, and process data.	analyze data using computer systems.	2.1. Design algorithms to automate data collection and presentation 3.1. Create models for data analysis	**SSP_TLE-CT8DM -IIIa-f-2.1** **SSP_TLE-CT8DM -IIIa-f-3.1**
LESSON 4. EMBEDDED SYSTEMS AND MCU PROGRAMMING (ESM)				
1. Embedded Systems 2. MCU Programming	The learner demonstrates understanding of embedded systems and microcontrollers.	The learner independently creates an embedded system to solve a problem.	1.1. Describe embedded systems and their application in solving problems 1.2. Design an embedded system to address an or problem (ex. data gathering) 2.1. Apply coding skills in programming a microcontroller	**SSP_TLE-CT8ESM -IIIg-j-1.1** **SSP_TLE-CT8ESM -IIIg-j-1.2** **SSP_TLE-CT8ESM -IVa-d-2.1**
LESSON 5. INDIVIDUAL, COMMUNITY, GLOBAL, AND ETHICAL IMPACTS (ICGE)				
1. Impact of technology in humans and society 2. Current trends in the computing world 3. Ethical issues related to computing devices and networks	The learner demonstrates understanding of the impact of computing on individuals and the society.		1.1. Provide examples of how computational artifacts and devices impact health and well-being 2.1. Explain how computer science fosters innovation that improves people's lives 2.2. Describe ways in which technology impacts human communication and interaction 3.1. Identify ethical issues related to computing devices and networks (e.g., equity of access, security, hacking, intellectual property, copyright, Creative Commons licensing, and plagiarism)	**SSP_TLE-CT8ICGE -IVe-g-1.1** **SSP_TLE-CT8ICGE -IVe-g-2.1** **SSP_TLE-CT8ICGE -IVe-g-2.2** **SSP_TLE-CT8ICGE -IVe-g-3.1**

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JUNIOR HIGH SCHOOL (JHS) SPECIAL SCIENCE PROGRAM (SSP) – TLE (CREATIVE TECHNOLOGIES)

Grade Level: **GRADE 9** **Quarter**: **FIRST**
Subject Title: **BASIC ELECTRONICS AND POWER SUPPLY** **No. of Hours:** **40 hours/quarter**

Subject Description: The subject, ***Basic Electricity and Electronics***, helps learners understand the processes involved in basic electricity, electronic circuits, specifications of electronic materials and components, instrumentation, electronic components, and power supply.

LESSON 1: BASIC ELECTRONICS (BE)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Basic Electricity • Types • methods of producing • sources • conductors • Insulators 2. Electronic Circuits • Series • Parallel • combination 3. Specification of Electronic Materials and components • Wires • Cables	The learner demonstrates understanding of the underlying concepts of basic electronics.	The learner independently demonstrates knowledge and skills in understanding and applying the basic concepts on electronics.	1.1. Enumerate the different types of electricity 1.2. Explain the different methods of producing electricity and its sources 1.3. Identify the sources of electricity 1.4. Recognize the common electrical conductors and insulators and their uses 2.1. Enumerate the different kinds of circuit 2.2. Differentiate the different kinds of electronic circuit relevant to robotics 2.3. Describe the operation of each kind of circuit as applied to robotics 3.1. Identify the different materials and components used in electronics 3.2. Discuss the importance of material specification	**SSP_TLE-CT9BE-Ia-1.1** **SSP_TLE-CT9BE -Ia-1.2** **SSP_TLE-CT9BE -Ia-1.3** **SSP_TLE-CT9BE -Ia-1.4** **SSP_TLE-CT9BE -Ib-2.1** **SSP_TLE-CT9BE -Ib-2.2** **SSP_TLE-CT9BE -Ib-2.3** **SSP_TLE-CT9BE -Ic-3.1** **SSP_TLE-CT9BE -Ic-3.2**
LESSON 2: PERFORMING MENSURATION AND EVALUATION OF COMPONENTS (PMEC)				
1. Instrumentation • Resistance • Voltage • Current • Frequency • Period 2. Electronic Components	The learner demonstrates knowledge on instrumentation and measurement involving electronics. The learner demonstrates knowledge and understanding	The learner independently demonstrates knowledge and skills in applying the principles and concepts of measurement and instrumentation in electronics. The learner independently demonstrates knowledge and	1.1. Enumerate the different kinds of electronic measuring instruments 1.2. Perform resistance, voltage, current, frequency and period measurement 1.3. Interpret a signal on the oscilloscope screen 2.1. Enumerate the different electronic components.	**SSP_TLE-CT9PMEC -Ic-d-1.1** **SSP_TLE-CT9PMEC -Ic-d-1.2** **SSP_TLE-CT9PMEC -Ic-e-1.3** **SSP_TLE-CT9PMEC -Ie-2.1**

• Resistors • Capacitors • Inductors • Transformers • Integrated circuits • Diodes • Transistor • ICs	of electronic components and their application to robotics.	skills in understanding the components of electronic products and its applications in robotics.	2.2. Explain the use of each type of electronic components as applied to robotics 2.3. Decode resistor, capacitor, inductors color code 2.4. Identify pin terminals (configuration) of electronic components and their application to robotics 2.5. Relate the operation of Light Dependent Resistor (LDR), Thermistor, Photodiode and Phototransistor to robotics/intelligent machines 2.6. Discuss the disadvantage and advantage of optocouplers	**SSP_TLE-CT9PMEC -Ie-2.2** **SSP_TLE-CT9PMEC -If-2.3** **SSP_TLE-CT9PMEC -If-2.4** **SSP_TLE-CT9PMEC -Ig-2.5** **SSP_TLE-CT9PMEC -Ig-2.6**
LESSON 3: POWER SUPPLY FOR ROBOTS (PSR)				
1. Power supply basics • Transformers • Rectifiers • Filters • Voltage regulators	The learner demonstrates knowledge and understanding of concepts of power supply and voltage regulation and their applications to robotics.	The learner independently demonstrates knowledge and skills in understanding the principles of a power supply and voltage regulation as applied in robotics.	1.1. Describe the principles of transformers used in basic power supplies 1.2. Discuss the operation of each type of rectifier circuit used in power supplies 1.3. Explain the action of a filter capacitor 1.4. Identify the different types of voltage regulators 1.5. Explain the importance of voltage regulation in robotics/intelligent machines 1.6. Design a regulated transformer type power supply circuit for robotics 1.7. Perform circuit application using breadboard	**SSP_TLE-CT9PSR -Ih-1.1** **SSP_TLE-CT9PSR -Ih-1.2** **SSP_TLE-CT9PSR -Ih-1.3** **SSP_TLE-CT9PSR -Ii-1.4** **SSP_TLE-CT9PSR -Ii-j-1.5** **SSP_TLE-CT9PSR -Ii-j-1.6** **SSP_TLE-CT9PSR -Ii-j-1.7**

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JUNIOR HIGH SCHOOL (JHS) SPECIAL SCIENCE PROGRAM (SSP) – TLE (CREATIVE TECHNOLOGIES)

Grade Level: GRADE 9 **Quarter: SECOND**
Subject Title: DIGITAL ELECTRONICS **No. of Hours: 40 hours/quarter**

Subject Description: The subject, ***Basic Electronics and Power Supply***, helps learners understand the processes involved in number systems, digital logic, logic families, combination logic, and sequential logic.

LESSON 1: NUMBER SYSTEM IN ELECTRONICS (NSE)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Numbers Systems • Number system in electronics • Converting number system • Binary Arithmetic • BCD	The learner demonstrates understanding of the concepts and underlying principles in digital electronics and their application to the real world setting.	The learner is independently able to explain the basic principles of digital electronics and their application to robotics.	1.1. Recognize different number systems and their uses 1.2. Convert numerical data between each number system 1.3. Differentiate the relationships between number systems used in digital electronics 1.4. Enumerate the rules used in binary calculations 1.5. Perform binary calculations 1.6. Enumerate limitations in binary arithmetic 1.7. Define Binary Coded Decimal 1.8. Convert Binary to BCD and BCD to Binary	**SSP_TLE-CT9NSE -IIa-1.1** **SSP_TLE-CT9NSE -IIa-1.2** **SSP_TLE-CT9NSE -IIa-1.3** **SSP_TLE-CT9NSE -IIa-1.4** **SSP_TLE-CT9NSE -IIb-1.5** **SSP_TLE-CT9NSE -IIb-1.6** **SSP_TLE-CT9NSE -IIb-1.7** **SSP_TLE-CT9NSE -IIb-1.8**
LESSON2: EVALUATING LOGIC GATES (ELG)				
1. Digital Logic • Logic gates • Truth table • Boolean Algebra • Karnaugh Maps • Simulation software 2. Logic Families • Combination Logic ○ Binary Arithmetic Circuits ○ Data-Select and Multiplexing ○ Comparators			1.1. Discuss the action of each logic gate using Boolean expressions and truth tables 1.2. Explain use of universal gates 1.3. Describe logic circuit using Boolean expression 1.4. Reduce a digital circuit using Karnaugh Maps 1.5. Perform simulation of logic gates using available software (fluidism, circuit wizard)	**SSP_TLE-CT9ELG-IIc-d-1.1** **SSP_TLE-CT9ELG -IIc-d-1.2** **SSP_TLE-CT9ELG -IId-1.3** **SSP_TLE-CT9ELG -IIe-1.4** **SSP_TLE-CT9ELG -IIe-1.5**

○ Encoders and Decoders 3. Sequential Logic • Clock circuit • On delayed timer • Off delayed timer • On & Off delayed timer • SR Flip-flop • D Type Flip-flops • JK Flip-flops • CMOS Flip-flops • Counters • Off counter • Down counter			2.1. Recognize logic families 2.2. Explain the difference between logic families 2.3. Differentiate the operation of binary adder circuits 2.4. Discuss the operation of data select and multiplexer 2.5. Determine the operation of binary encoder and decoder 2.6. Simulate circuit operation using available software 3.1. Explain the need for clock generator 3.2. Recognize clock generator circuits 3.3. Differentiate the kinds of Flip-flops 3.4. Differentiate the operation of asynchronous and synchronous counters 3.5. Use available software to simulate counter operation.	**SSP_TLE-CT9ELG -IIe-2.1** **SSP_TLE-CT9ELG -IIe-2.2** **SSP_TLE-CT9ELG -IIf-2.3** **SSP_TLE-CT9ELG -IIf-2.4** **SSP_TLE-CT9ELG -IIg-2.5** **SSP_TLE-CT9ELG -IIg-2.6** **SSP_TLE-CT9ELG -IIh-3.1** **SSP_TLE-CT9ELG -IIh-i-3.2** **SSP_TLE-CT9ELG -IIi-j-3 .3** **SSP_TLE-CT9ELG -IIi-j-3.4** **SSP_TLE-CT9ELG -IIi-j-3.5**

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JUNIOR HIGH SCHOOL (JHS) SPECIAL SCIENCE PROGRAM (SSP) – TLE (CREATIVE TECHNOLOGIES)

Grade Level: GRADE 9 **Quarter: THIRD**
Subject Title: PCB DESIGN AND FABRICATION **No. of Hours: 40 hours/quarter**

Subject Description: The subject, ***PCB Design and Fabrication***, helps learners understand the processes involved in number systems, digital logic, logic families, combination logic, and sequential logic. **[Description is the same as previous subject?]**

LESSON1: PCB DESIGN AND FABRICATION (PDF)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Electronics Theory on PCB Designing • PCB problems and solutions • PCB Manufacturing Information • PCB characteristics • Design compliance with EMI / EMC • PCB Layout and Artwork ○ Common PCB Layout for Robotics • Proper disposal of chemicals 2. Acceptable methods • Silk screen • Photo transfer • Presentation 3. Fabrication • Etching process	The learner demonstrates understanding of concepts and underlying principles in constructing PCB based on the task requirement and acceptable procedures and standards.	The learner independently demonstrates knowledge and skills in constructing PCB based on the task requirement and acceptable procedures and standards and their relevance to robotics.	1.1. Verify PCB layout for conformity with the schematic diagram in accordance with the layout rules 1.2. Enumerate the characteristics of properly designed PCB 1.3. Design a PCB layout for robotics application based on a given schematic diagram using available software 1.4. Discuss the principles of PCB and designs and their applications to robotics/intelligent machines 2.1. Transfer PCB layout to copper-cladded board following acceptable methods and standards 3.1. Etch a PCB following acceptable methods and standards 3.2. Perform visual inspection 3.3. Drill holes for components 3.4. Clean PCB based on standard procedures 3.5. Test functionality of PCB and perform visual inspection	**SSP_TLE-CT9PDF -IIIa-1.1** **SSP_TLE-CT9PDF -IIIa-1.2** **SSP_TLE-CT9PDF -IIIb-d-1.3** **SSP_TLE-CT9PDF -IIIe-1.4** **SSP_TLE-CT9PDF -IIIf-2.1** **SSP_TLE-CT9PDF -IIIg-3.1** **SSP_TLE-CT9PDF -IIIg-h-3.2** **SSP_TLE-CT9PDF -IIIh-3.3** **SSP_TLE-CT9PDF -IIIi-j-3.4** **SSP_TLE-CT9PDF -IIIi-j-3.5**

• Blanking, Cutting, Punching, Drilling • Laminating Techniques • Surface Finishing and Coatings				

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Grade Level: **GRADE 9**
Subject Title: **ELECTRONIC PRODUCT ASSEMBLY**

Quarter: **FOURTH**
No. of Hours: **40 hours/quarter**

Subject Description: The subject, ***Electronic Product Assembly***, helps learners understand the processes involved in assembling intelligent machine.

LESSON 1: ASSEMBLING INTELLIGENT MACHINE(AIM)				
	CONTENT STANDARDS	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. OH&S policies and procedure • Hazard and risk assessment mechanisms • Use of protective equipment and clothing • Philippine Electronics Code • Materials, tools and equipment uses and specifications • Identification of hand tools • Proper care and use of Hand tools • Preparing the assembly workplace • Task requirements ○ Splicing ○ Jointing 2. Mounting of components • Surface mount components and devices	The learner demonstrates understanding of concepts and underlying principles in assembling electronic products based on the task requirement and acceptable procedure and standards.	The learner independently demonstrates knowledge and skills electronic products assemble based on the task requirements and acceptable procedures and standards in robotics.	1.1. Prepare assembly workplace in accordance with the OH&S policies and procedures 1.2. Follow established risk control measures for work preparation 1.3. Clarify work instructions based on job order or client requirements 1.4. Consult a responsible person for effective and proper work coordination 1.5. Check required materials, tools and equipment in accordance with established procedures 1.6. Obtain parts and components needed to complete the work in accordance with requirements 2.1 Apply knowledge on lead and lead-free soldering characteristics in mounting and soldering process 2.2 Mount, soldering accordance with soldering principles and assemble robotics components 2.3 Apply soldering/desoldering techniques and procedures in accordance with established standards and requirements 2.4 Check soldered products in accordance with international standards and task specification	**SSP_TLE-CT9AIM -IVa-1.1** **SSP_TLE-CT9AIM -IVa-b-1.2** **SSP_TLE-CT9AIM -IVb-1.3** **SSP_TLE-CT9AIM -IVc-1.4** **SSP_TLE-CT9AIM -IVc-d-1.5** **SSP_TLE-CT9AIM -IVc-d-1.6** **SSP_TLE-CT9AIM -IVe-f-2.1** **SSP_TLE-CT9AIM -IVf-g-2.2** **SSP_TLE-CT9AIM -IVh-i-2.3** **SSP_TLE-CT9AIM -IVj-2.4**

• Mounting of components and devices
• Soldering principles
  ○ The four key principles to producing a good joint
• Soldering/de-soldering procedures and techniques
• Hot air soldering procedures
  ○ Hand soldering
  ○ RoHS and lead-free soldering
  ○ Hot air
• Testing
  ○ Aging test
  ○ Substitution test
  ○ Mechanical testing				

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Grade Level: **GRADE 10** **Quarter**: **FIRST**
Subject Title: **POWER SUPPLY AND PRIMARY ELEMENT** **No. of Hours:** **40 hours/quarter**

Subject Description: The subject, ***Power Supply and Primary Element***, helps learners understand the processes involved in robotics technology with sensors.

LESSON 1: POWER SUPPLY AND PRIMARY ELEMENT (PSE)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Basics of Robotics Technology 2. Robots for specific purposes 3. Robotics Sensing	The learner demonstrates an understanding of the underlying principles of Robotics Technology.	The learner is independently able to plan and design basic robotics technology with sensors.	1.1. Discuss concepts of Robotics Technology 2.1. Identify the different types of robots and its uses 2.2. Design robots for specific purpose 3.1. Select appropriate robotics sensors according to requirements of the chosen robotic design • Digital Inputs • Analog inputs • Sensor devices • Mechanical sensor • Inductive Sensors • Capacitive Sensor	**SSP_TLE-CT10PSPE -Ia-b-1.1** **SSP_ TLE-CT10PSPE -Ia-b-2.1** **SSP_ TLE-CT10PSPE -Ic-e-2.2** **SSP_ TLE-CT10PSPE -Id-j-3.1**

Grade Level: **GRADE 10** **Quarter**: **SECOND**
Subject Title: **INTERMEDIATE ELEMENT AND INTERFACING** **No. of Hours:** **40 hours/quarter**

Subject Description: The subject, ***Intermediate Element and Interfacing***, helps learners understand the processes involved in integrated development environment and control device such as relays, timers, counters, programmable logic controller, microcontroller unit and others.

LESSON 1: INTERMEDIATE ELEMENT AND INTERFACING (IEI)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Control Devices 2. Integrated Development Environment (IDE)	The learner demonstrates an understanding of the underlying principles of Control Devices and Integrated Development Environment (IDE).	The learner demonstrates knowledge and skills in applying the principles and concepts of control devices and Integrated Development Environment (IDE) to robotics technology.	1.1. Discuss the importance of the following control devices for robotics application: • Relays, Timers, Counters and etc. • (PLC) Programmable Logic Controller • (MCU) Microcontroller Unit 1.2. Select appropriate control device for a chosen robot for a specific purpose 2.1. Develop specific robotics program using an Integrated Development Environment (IDE) • Interface Familiarization • Create Basic Programs • Uploading/Compiling	**SSP_TLE-CT10IEI-IIa-b-1.1** **SSP_TLE- CT10IEI -IIc-1.2** **SSP_TLE- CT10IEI -IId-j-2.1**

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Grade Level: GRADE 10 **Quarter: THIRD**
Subject Title: FINAL ELEMENT AND INDICATING DEVICES **No. of Hours: 40 hours/quarter**

Subject Description: The subject, ***Final Element and Indicating Devices***, helps learners understand the processes involved in creating functional robots.

LESSON 1: FINAL ELEMENT AND INDICATING DEVICES (FEI)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Final Elements and Control Interface • Status • Indicator Devices • Actuator • Locomotion 2. Functionality, Testing and Troubleshooting	The learner demonstrates an understanding of the underlying principles of robot functions and purpose.	The learner independently demonstrates knowledge and skills in applying the principles and concepts of final elements and control interfaces in creating a functional robot for specific purposes.	1.1. Discuss the principles and concepts of control interface, functions, status indicator devices, actuator and locomotion 1.2. Integrate status indicator to control interface 1.3. Select appropriate control interfaces and actuators for a specific function or purpose 1.4. Present the chosen project 2.1. Apply troubleshooting techniques for the functionality of robotic components 2.2. Creatively present a robotic project	**SSP_TLE-CT10FEI-IIIa-1.1** **SSP_TLE- CT10FEI -IIIb-c-1.1** **SSP_TLE- CT10FEI -IIIc-d-1.3** **SSP_TLE- CT10FEI -IIIe-f-1.4** **SSP_TLE-CT10FEI -IIIg-h-2.1** **SSP_TLE- CT10FEI -IIIi-j-2.2**

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Grade Level: GRADE 10 **Quarter: FOURTH**
Subject Title: PROJECT PROPOSAL AND DOCUMENTATION FOR A PROJECT IN ROBOTICS **No. of Hours: 40 hours/quarter**

Subject Description: The subject, ***Project Proposal and Documentation for a Project in Robotics***, helps learners understand the processes involved in creating and presenting project proposal and documentation.

LESSON 1: PROJECT PROPOSAL AND DOCUMENTATION FOR A PROJECT IN ROBOTICS (PPDR)				
CONTENT	**CONTENT STANDARDS**	**PERFORMANCE STANDARDS**	**LEARNING COMPETENCIES**	**CODE**
1. Project proposal for a project in robotics 2. Documentation for project making in robotics 3. Project Proposal Presentation	Learners demonstrate an in-depth understanding of the critical steps in preparing and presenting a project proposal.	Learners independently demonstrate knowledge and skills in preparing a project proposal and documenting a project in robotics.	1.1. Discuss the parts and steps in writing a project proposal as applied to robotics 2.1. Explain the importance of documentation in project making as applied in robotics 2.2. Discuss the conventions in documentation for a project in robotics 3.1. Prepare a project proposal for a project in robotics (criteria hierarchy, cost of material, project milestones, and the like). 3.2. Creatively present a project proposal for a project in robotics	**SSP_TLE-CT10PPDR -IVa-b-1.1** **SSP_TLE- CT10PPDR -IVc-2.1** **SSP_TLE- CT10PPDR -IVd-e-2.2** **SSP_TLE- CT10PPDR -IVf-h-3.1** **SSP_TLE- CT10PPDR -IVf-i-j-3.1**

K to 12 BASIC EDUCATION CURRICULUM
JUNIOR HIGH SCHOOL (JHS) SPECIAL SCIENCE PROGRAM (SSP) – TLE (CREATIVE TECHNOLOGIES)

Code Book Legend

Sample: SSP_TLE-CT7CTDR-IIa-c-1.7

LEGEND		SAMPLE	
First Entry	Learning Area and Strand/ Subject or Specialization	Special Science Program_Technology and Livelihood Education-Creative Technologies	**SSP_TLE-CT7**
	Grade Level	7	
Uppercase Letter/s	Domain/Content/ Component/ Topic	Concept and Technical Drawing Relationship	**CTDR**
Roman Numeral **Zero if no specific quarter*	Quarter	Second	**II**
Lowercase Letter/s **Put a hyphen (-) in between letters to indicate more than a specific week*	Week	First to Third	**a-c**
Arabic Number	Competency	Draw 2D Technical drawings	**1.7**

DOMAIN/ COMPONENT	CODE

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