2023-2024

PROGRAM GUIDE FOR:

STEM CLUSTER

AND

STEM MIDDLE SCHOOL



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STEM Cluster Program Guide

The STEM cluster course of study is designed to address the challenges of a changing, technological, diverse, and global society. Students develop their abilities to analyze, communicate, manage, and lead. The rigorous content standards contained in these courses require students to use creative and innovative, critical-thinking skills. Experiences should be project-based and require higher-order thinking, communication, management, and leadership skills.

**Courses highligh	ted in yellow are shared with other clusters. See	"Shared Courses" table on page 6 for additional deta	uils.	
	CTE Engineering Program			
Career	(Must teach three courses from this program list within two years.)			
Pathway	The CTE STEM curriculum should emphasize the integration of academics. To achieve the solution to a given problem, students must			
Program	possess an adequate foundation in communicat	ion skills for reading, writing, speaking, listening, vi	ewing, and presenting; knowledge and	
	skills in mathematics, science, and social studie	s; and knowledge of current and emerging technologies	gies.	
Course	Career Pathway Program Courses	Career Readiness Indicator (CRI)	In Demand Occupations	
Number	Career ratilway riogram Courses	Career Readiness Indicator (CRI)	In Demand Occupations	
21005G1000	Foundations of Engineering and	 Autodesk Inventor Certified User 	 Aerospace Engineer/Tech 	
	Technology – Required Foundation	 Autodesk-AutoCAD Certified User 	 Aesthetics Specialist 	
	Course	Autodesk-Revit Certified User	Architectural Engineer/Tech	
21002G1000	Applications of Engineering and Technology	• Autodesk-Fusion 360 Certified User	• Civil Engineer/Tech	
21015G1000	Basic Programming for Engineers	• Certiport Information Technology Specialist	Control Systems Engineer/Tech	
21047G1000	Capstone of Engineering and Technology	(ITS) - HTML5 Application Development • Certiport Information Technology Specialist	 Electrical Engineer/Tech Engineer/Technician all Disciplines 	
21047G1001	Career Pathway Project in STEM	(ITS) - Python	Environmental Scientist/Specialist	
21015G1001	Computer Engineering and Technology	Certiport Information Technology Specialist	Ergonomics Specialist	
21997G1000	CTE Lab in STEM	(ITS) - JavaScript	Industrial Engineer/Tech	
21014G1000	Environmental Engineering	Certiport Information Technology Specialist	Manufacturing Engineer/Tech	
21009G1000	Robotics Systems	(ITS) - HTML & CSS	 Materials Engineer/Tech 	
		Certiport Information Technology Specialist	 Mechanical Engineer/Tech/Mgr. 	
		(ITS) – Java	Petroleum Engineer/Tech	
		Certiport Information Technology Specialist	Robotics Engineer/Tech	
		(ITS) – DatabasesCertiport Information Technology Specialist		
		(ITS) – Software Development		
		• FANUC CERT-Handling Tool Operations and		
		Programming		
		Microsoft Office- Excel Expert 2019/O365		
		Microsoft Office- Access Expert 2019/O365		
		Oracle Certified Associate (OCA) - Java		
		Programmer		
		SolidEdge Certified Associate		
		SolidWorks Associate		

Revised	3/08/2023
ICC VISCU	5/06/2025

Career Pathway Program	*Project Lead The Way (PLTW) Engineering Program (Must teach three courses from this program list within two years.) From launching space explorations to delivering safe, clean water to communities, engineers find solutions to pressing problems and turn their ideas into reality. PLTW Engineering empowers students to step into the role of an engineer, adopt a problem-solving mindset, and make the leap from dreamers to doers. The program's courses engage students in compelling, real-world challenges that help them become better collaborators and thinkers. Students take from the courses in-demand knowledge and skills they will use in high school and for the rest of their lives, on any career path they take.		
Course Number	Career Pathway Program Courses	Career Readiness Indicator (CRI)	In Demand Occupations
21019G1000 21047G1001 21021G1000 21022G1000 21023G1000 21023G1000 21023G1000 21025G1000 21026G1000 21024G1000 21017G1000 21018G1000	Aerospace Engineering – PLTW Career Pathway Project in STEM Civil Engineering and Architecture – PLTW Computer Integrated Manufacturing – PLTW Computer Science Essentials – PLTW CTE Lab in STEM Digital Electronics – PLTW Engineering Design and Development – PLTW Engineering Essentials – PLTW Introduction to Engineering Design – PLTW Principles of Engineering – PLTW	 Autodesk Inventor Certified User Autodesk-AutoCAD Certified User Autodesk-Revit Certified User Autodesk-Fusion 360 Certified User Certiport Information Technology Specialist (ITS) - HTML5 Application Development Certiport Information Technology Specialist (ITS) - Python Certiport Information Technology Specialist (ITS) - JavaScript Certiport Information Technology Specialist (ITS) - HTML & CSS Certiport Information Technology Specialist (ITS) - Java Certiport Information Technology Specialist (ITS) - Java Certiport Information Technology Specialist (ITS) - Java Certiport Information Technology Specialist (ITS) - Databases Certiport Information Technology Specialist (ITS) - Software Development FANUC CERT-Handling Tool Operations and Programming Microsoft Office- Excel Expert 2019/O365 Microsoft Office- Access Expert 2019/O365 Oracle Certified Associate (OCA) - Java Programmer SolidEdge Certified Associate 	 Aerospace Engineer/Tech Aesthetics Specialist Architectural Engineer/Tech Civil Engineer/Tech Control Systems Engineer/Tech Electrical Engineer/Tech Engineer/Technician all Disciplines Environmental Scientist/Specialist Ergonomics Specialist Industrial Engineer/Tech Manufacturing Engineer/Tech Materials Engineer/Tech Mechanical Engineer/Tech Robotics Engineer/Tech
		SolidWorks Associate TW for additional information prior to utilizing the s and Conditions, participation in mandatory training	

Career Pathway Program	Revised 3/08/20 *SREB AC Aerospace Engineering Program (Must teach three courses from this program list within two years.) Schools are challenged to better prepare students for a wide array of postsecondary options. The workforce of today and tomorrow demands a higher level of skill — people who grasp complex problems, understand technology and troubleshoot problems. Advanced Career (AC) answers both of these needs. By fusing a rigorous academic core with challenging project work and advanced technology in a career pathway program of study, AC courses give students a greater depth of knowledge and skills and prepare them for more options after high school.		
Course Number	Career Pathway Program Courses	Career Readiness Indicator (CRI)	In Demand Occupations
21013G1015 21047G1001 21997G1000 21013G1016 21013G1001 21013G1002	SREB AC - Fundamentals of Aerospace Technology – Required Foundation Course Carcer Pathway Project in STEM CTE Lab in STEM SREB AC - Advanced Aerospace Technology SREB AC - Aeronautics Engineering Applications SREB AC - Astronautics Engineering Applications	 Autodesk Inventor Certified User Autodesk-AutoCAD Certified User Autodesk-Revit Certified User Autodesk-Fusion 360 Certified User Certiport Information Technology Specialist (ITS) - HTML5 Application Development Certiport Information Technology Specialist (ITS) - Python Certiport Information Technology Specialist (ITS) - JavaScript Certiport Information Technology Specialist (ITS) - HTML & CSS Certiport Information Technology Specialist (ITS) - Java Certiport Information Technology Specialist (ITS) - Databases Certiport Information Technology Specialist (ITS) - Software Development FANUC CERT-Handling Tool Operations and Programming Microsoft Office- Excel Expert 2019/O365 Microsoft Office- Access Expert 2019/O365 Oracle Certified Associate (OCA) - Java Programmer SolidEdge Certified Associate 	 Aerospace Engineer/Tech Aesthetics Specialist Architectural Engineer/Tech Civil Engineer/Tech Control Systems Engineer/Tech Electrical Engineer/Tech Engineer/Technician all Disciplines Environmental Scientist/Specialist Industrial Engineer/Tech Manufacturing Engineer/Tech Materials Engineer/Tech Mechanical Engineer/Tech Robotics Engineer/Tech
	must contact SREB for additional information pr he conditions in a MOU and participation in man	SolidWorks Associate ior to utilizing any of the course codes listed above datory training provided by the provider.	e with a SREB suffix, as it does require
Career Pathway Program		SREB AC Clean Energy Program three courses from this program list with ho want to apply their science and math skills and een point of view.	
Course	Career Pathway Program Courses	Career Readiness Indicator (CRI)	In Demand Occupations

Course Number	Career Pathway Program Courses	Career Readiness Indicator (CRI)	In Demand Occupations
18506G1014 21047G1001 21990G1000 17049G1000 18506G1024 18506G1034 18506G1034	SREB AC - Clean Energy Systems – Required Foundation Course Career Pathway Project in STEM CTE Lab in STEM Safety and Health Regulations SREB AC - Clean Energy Application SREB AC - Clean Energy Innovations SREB AC - Clean Energy Strategies	 Autodesk Inventor Certified User Autodesk-AutoCAD Certified User Autodesk-Revit Certified User Autodesk-Fusion 360 Certified User Certiport Information Technology Specialist (ITS) - HTML5 Application Development Certiport Information Technology Specialist (ITS) - Python Certiport Information Technology Specialist (ITS) - JavaScript Certiport Information Technology Specialist (ITS) - JavaScript Certiport Information Technology Specialist (ITS) - Java Certiport Information Technology Specialist (ITS) - Databases Certiport Information Technology Specialist (ITS) - Software Development FANUC CERT-Handling Tool Operations and Programming Microsoft Office- Access Expert 2019/O365 Oracle Certified Associate (OCA) - Java Programmer SolidEdge Certified Associate SolidWorks Associate 	 Control Systems Engineer/Tech Electrical Engineer/Tech Engineer Environmental Scientist/Specialist

Career Pathway Program	Revised 3/08/2023 Revised 3/08/2023 *SREB AC Innovations in Science and Technology Program (Must teach three courses from this program list within two years.) Schools are challenged to better prepare students for a wide array of postsecondary options. The workforce of today and tomorrow demands a higher level of skill — people who grasp complex problems, understand technology and troubleshoot problems. Advanced Career (AC) answers both of these needs. By fusing a rigorous academic core with challenging project work and advanced technology in a career pathway program of study, AC courses give students a greater depth of knowledge and skills and prepare them for more			
Course	options after high school.	Company Descriptions La Provide a (CDD)	L. D	
Number	Career Pathway Program Courses	Career Readiness Indicator (CRI)	In Demand Occupations	
	e conditions in a MOU and participation in mar	Greenpower Program		
Pathway Program Course		ild an electric car to race at Greenpower events. Str t motorsport venues around the state/country. The 0 10,000 participants a year to excel in STEM.		
Number	Career Pathway Program Courses	Career Readiness Indicator (CRI)	In Demand Occupations	
21047G1001	Career Pathway Project in STEM	Autodesk Inventor Certified User	Aerospace Engineer/Tech	
21997G1000	CTE Lab in STEM	Autodesk-AutoCAD Certified User	Aesthetics Specialist	
21105G1001	Greenpower F24 Eng Design & Race Ch I	Autodesk-Revit Certified User	 Architectural Engineer/Tech Civil Engineer/Tech 	
21105G1002	Greenpower F24 Eng Design & Race Ch II	Autodesk-Fusion 360 Certified User	Control Systems Engineer/Tech	
21105G1003 21105G0708	Introduction to Greenpower (HS) Introduction to Greenpower (MS)	Certiport Information Technology Specialist	Electrical Engineer/Tech	
2110540708		 (ITS) - HTML5 Application Development Certiport Information Technology Specialist (ITS) - Python Certiport Information Technology Specialist (ITS) - JavaScript Certiport Information Technology Specialist (ITS) - HTML & CSS Certiport Information Technology Specialist (ITS) - Java Certiport Information Technology Specialist (ITS) - Java Certiport Information Technology Specialist (ITS) - Databases Certiport Information Technology Specialist (ITS) - Software Development FANUC CERT-Handling Tool Operations and Programming Microsoft Office- Excel Expert 2019/O365 Oracle Certified Associate (OCA) - Java Programmer 	 Engineer/Technician all Disciplines Environmental Scientist/Specialist Ergonomics Specialist Industrial Engineer/Tech Manufacturing Engineer/Tech Materials Engineer/Tech Mechanical Engineer/Tech/Mgr. Petroleum Engineer/Tech Robotics Engineer/Tech 	

Career Pathway Program	Middle School STEM Technologies Program STEM Technologies provide students with knowledge and processes needed to begin their attainment of technological literacy and awareness of careers in science, technology, engineering, and mathematics. Students gain knowledge and skills in the application, design, production, and assessment of products, services, and systems in a variety of areas.				
Course Number	Career Pathway Program Courses Career Readiness Indicator (CRI) In Demand Occupations				
21052G0608	STEM Technologies I	N/A	Aerospace Engineer/Tech		
21052G0708	STEM Technologies II		Aesthetics Specialist		
21052G0808	STEM Technologies III		 Architectural Engineer/Tech Civil Engineer/Tech Control Systems Engineer/Tech Electrical Engineer/Tech Engineer/Technician all Disciplines Environmental Scientist/Specialist Ergonomics Specialist Industrial Engineer/Tech Manufacturing Engineer/Tech Materials Engineer/Tech Mechanical Engineer/Tech Rebotics Engineer/Tech Robotics Engineer/Tech 		

Career Pathway Program	*PLTW (Gateway) Middle School Program From launching space explorations to delivering safe, clean water to communities, engineers find solutions to pressing problems and turn their ideas into reality. PLTW Engineering empowers students to step into the role of an engineer, adopt a problem-solving mindset, and make the leap from dreamers to doers. The program's courses engage students in compelling, real-world challenges that help them become better collaborators and thinkers. Students take from the courses in-demand knowledge and skills they will use in high school and for the rest of their lives, on any career path they take.				
Course Number	Career Pathway Program Courses Career Readiness Indicator (CRI) In Demand Occupations				
10099G6800	App Creators-PLTW	N/A	Aerospace Engineer/Tech		
21009G0708	Automation and Robotics - PLTW		Aesthetics Specialist		
10099G6801	Computer Science for Innovators and Makers – PLTW		 Architectural Engineer/Tech Civil Engineer/Tech Control Systems Engineer/Tech 		
21007G0708	Design and Modeling – PLTW		Electrical Engineer/Tech		
21024G0708	Energy and the Environment - PLTW		Engineer/Technician all Disciplines		
21019G0708	Flight and Space – PLTW		Environmental Scientist/Specialist		
21024G0608	Green Architecture – PLTW		Ergonomics Specialist		
21023G0708	Magic of Electrons – PLTW		 Industrial Engineer/Tech Manufacturing Engineer/Tech 		
14001G0608	Medical Detectives – PLTW		Manufacturing Engineer/Tech Materials Engineer/Tech		
21051G0708	Science and Technology – PLTW		 Mechanical Engineer/Tech/Mgr. Petroleum Engineer/Tech Robotics Engineer/Tech 		

*NOTE: This is a purchased curriculum. LEAs must contact PLTW for additional information prior to utilizing the course codes listed above with a PLTW suffix, as it does require submission of a signed copy of the Terms and Conditions, participation in mandatory training and payment of a participation fee to the provider.

Career Pathway Program	*We Build It Better Middle School Program This program, delivered through seven We Build It Better innovation kits, will introduce inventive technologies, expose students to techniques that help build new skill sets, provide hours of curriculum and activities, offer unique resources, and promote career awareness. Aimed at middle school students, the overall objective of the program is to weave 21st century work skills with higher level thinking skills such as measurement, product design, tools, electrical wiring, fiber optics and coding to encourage students to design inventions on their own.					
Course Number	Career Pathway Program Courses	Career Pathway Program Courses Career Readiness Indicator (CRI) In Demand Occupations				
21052G6800	We Build It Better	N/A BIB for additional information prior to utilizing th	 Aerospace Engineer/Tech Architectural Engineer/Tech Civil Engineer/Tech Control Systems Engineer/Tech Electrical Engineer/Tech Engineer/Technician all Disciplines Environmental Scientist/Specialist Ergonomics Specialist Industrial Engineer/Tech Manufacturing Engineer/Tech Materials Engineer/Tech Mechanical Engineer/Tech Robotics Engineer/Tech 			

<u>2023 – 2024 Subject and Personnel Codes</u> STEM Engineering Cluster and Middle School Program

STEM Engineering Cluster Program Courses

Course Number Course Name			
Course Name			
Aerospace Engineering-PLTW			
Applications of Engineering and Technology			
Basic Programming for Engineers			
Capstone of Engineering and Technology			
Career Pathway Project in STEM			
Civil Engineering and Architecture-PLTW			
Computer Engineering and Technology			
Computer Integrated Manufacturing-PLTW			
CTE Lab in STEM			
Digital Electronics-PLTW			
Engineering Design and Development-PLTW			
Engineering Essentials-PLTW			
Environmental Engineering			
Environmental Sustainability-PLTW			
Foundations of Engineering and Technology - Required Foundation Course			
Greenpower F24 Eng Design & Race Ch I			
Greenpower F24 Eng Design & Race Ch II			
Introduction to Engineering Design-PLTW			
Introduction to Greenpower (HS)			
Principles of Engineering-PLTW			
Robotics Systems			
SREB AC - Advanced Aerospace Technology			
SREB AC - Aeronautics Engineering Applications			
SREB AC - Astronautics Engineering Applications			
SREB AC - Clean Energy Application			
SREB AC - Clean Energy Innovations			
SREB AC - Clean Energy Strategies			
SREB AC - Clean Energy Systems - Required Foundation Course			
SREB AC – Core Applications of Science and Technology			
SREB AC – Creativity and Innovations			
SREB AC – Fundamentals of Aerospace Technology – Required Foundation Course			
SREB AC – Impacts of Science and Technology			
SREB AC – The Nature of Science and Technology - Required Foundation Course			
STEM Middle School Courses			
App Creators – PLTW			
Automation and Robotics – PLTW			
Computer Science Discoveries			
Computer Science for Innovators and Makers – PLTW			
Design and Modeling – PLTW			
Energy and the Environment – PLTW			
Flight and Space – PLTW			
Green Architecture – PLTW			
Introduction to Greenpower			
Magic of Electrons – PLTW			
Medical Detectives – PLTW			
Science and Technology – PLTW			
STEM Technologies I			
STEM Technologies II			
STEM Technologies III			
We Build It Better			

Shared Courses				
Course Number Course Name Cluster(s)			Required Year to Implement COS	
10099G6806	App Creators – PLTW	Information Technology	N/A	
10099G6801	Computer Science for Innovators and Makers - PLTW	Information Technology	N/A	
21009G1000	Robotics Systems	Information Technology	2023-2024	

General Note: Course descriptions and content standards for most courses are located on the Alabama Department of Education website at: <u>https://www.alabamaachieves.org/career-and-technical-education/cte-courses-of-study/</u>.

Program Name	CTE Engineering	Project Lead The Way (PLTW) Engineering	SREB AC Aerospace Engineering	SREB AC Clean Energy Program
Foundation Course(s)	Foundations of Engineering and Technology	Engineering Essentials – PLTW	SREB AC - Fundamentals of Aerospace Technology	SREB AC - Clean Energy Systems
Concentrator Course(s)	Applications of Engineering and Technology	Aerospace Engineering – PLTW	SREB AC - Advanced Aerospace Technology	SREB AC - Clean Energy Application
	Basic Programming for Engineers	Civil Engineering and Architecture – PLTW	SREB AC - Aeronautics Engineering Applications	SREB AC - Clean Energy Innovations
	Computer Engineering and Technology	Computer Integrated Manufacturing – PLTW		
	Environmental Engineering Robotics Systems	Computer Science Essentials – PLTW		
		Digital Electronics – PLTW		
		Engineering Design and Development – PLTW		
		Environmental Sustainability – PLTW		
		Introduction to Engineering Design – PLTW		
		Principles of Engineering – PLTW		
Capstone Course(s)	Capstone of Engineering and Technology	Career Pathway Project in STEM	Career Pathway Project in STEM	Career Pathway Project in STEM
	Career Pathway Project in STEM	CTE Lab in STEM	CTE Lab in STEM SREB AC - Astronautics	CTE Lab in STEM SREB AC - Clean Energy
	CTE Lab in STEM		Engineering Applications	Strategies

Program Name	SREB AC Innovations in Science and Technology	Greenpower
Foundation Course(s)	SREB AC - The Nature of Science and Technology	Introduction to Greenpower
Concentrator Course(s)	SREB AC - Core Applications of Science and Technology SREB AC - Impacts of Science and Technology	Greenpower F24 Eng Design & Race Ch I Greenpower F24 Eng Design & Race Ch II
Capstone Course(s)	Career Pathway Project in STEM CTE Lab in STEM SREB AC - Creativity and Innovations	Career Pathway Project in STEM CTE Lab in STEM

To meet the CCR Indicator as a CTE completer, a student must earn three (3.0) credits with the grade of a "C" or higher in CTE courses that are part of an approved CTE program of study. Additional requirements are outlined in <u>Memorandum FY22-2065</u>.

This matrix is intended for general guidance on the CCR completer status and is subject to change. For all CTE programming information, please refer to the CTE Cluster specific Program Guide. It contains a list of approved CTE programs, valid course numbers, required prerequisite courses, approved Career Readiness Indicators (CRIs) and in demand occupations.

*Courses are listed in alphabetical order, not in sequential order.