



2022-2023
PROGRAM GUIDE FOR:
STEM CLUSTER
AND
STEM MIDDLE SCHOOL



ALABAMA STATE DEPARTMENT OF EDUCATION
CAREER AND TECHNICAL EDUCATION
LISA BRUCE, EDUCATION ADMINISTRATOR
BEN SCHEIERMAN, EDUCATION SPECIALIST
ASHLEY CRUM, ADMINISTRATIVE ASSISTANT
(334) 694-4746

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 highlighted in yellow are shared with other clusters. See "Shared Courses" table on page 6 for additional details.**

Career Pathway Program	CTE Engineering Program (Must teach three courses from this program list within two years.) The CTE STEM curriculum should emphasize the integration of academics. To achieve the solution to a given problem, students must possess an adequate foundation in communication skills for reading, writing, speaking, listening, viewing, and presenting; knowledge and skills in mathematics, science, and social studies; and knowledge of current and emerging technologies.		
Course Number	Career Pathway Program Courses	Career Readiness Indicator (CRI)	Workforce Careers
21005G1000	Foundations of Engineering and Technology	<ul style="list-style-type: none"> • Autodesk Inventor Certified User • Autodesk-AutoCAD Certified User • Autodesk-Revit Certified User • Autodesk-Fusion 360 Certified User • FANUC CERT-Handling Tool Operations and Programming • Microsoft Office- Excel Expert 2019/O365 • Microsoft Office- Access Expert 2019/O365 • 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 • Oracle Certified Associate (OCA) - Java Programmer • SolidEdge Certified Associate • SolidWorks Associate 	<ul style="list-style-type: none"> • Engineer/Technician • Aerospace Engineer/Tech • Aesthetics Specialist • Architectural Engineer/Tech • Civil Engineer/Tech • Control Systems Engineer/Tech • Electrical Engineer/Tech • Ergonomics Specialist • Industrial Design • Manufacturing Engineer/Tech • Mechanical Engineer/Tech • Robotics Engineer/Tech
21002G1000	Applications of Engineering and Technology		
21047G1000	Capstone of Engineering and Technology		
21015G1001	Computer Engineering and Technology		
21014G1000	Environmental Engineering		
21009G1000	Robotics Systems		
21015G1000	Basic Programming for Engineers		
21047G1001	Career Pathway Project in STEM		
21997G1000	CTE Lab in STEM		

*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)	Workforce Careers
21026G1000	Engineering Essentials – PLTW	<ul style="list-style-type: none"> • Autodesk Inventor Certified User • Autodesk-AutoCAD Certified User • Autodesk-Revit Certified User • Autodesk-Fusion 360 Certified User • FANUC CERT-Handling Tool Operations and Programming • Microsoft Office- Excel Expert 2019/O365 • Microsoft Office- Access Expert 2019/O365 • 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 • Oracle Certified Associate (OCA) - Java Programmer • SolidEdge Certified Associate • SolidWorks Associate 	<ul style="list-style-type: none"> • All Disciplines Engineer/Technician • Aerospace Engineer/Tech • Aesthetics Specialist • Architectural Engineer/Tech • Civil Engineer/Tech • Control Systems Engineer/Tech • Electrical Engineer/Tech • Ergonomics Specialist • Industrial Design • Manufacturing Engineer/Tech • Mechanical Engineer/Tech • Robotics Engineer/Tech
21017G1000	Introduction to Engineering Design – PLTW		
21018G1000	Principles of Engineering – PLTW		
21019G1000	Aerospace Engineering – PLTW		
21021G1000	Civil Engineering and Architecture – PLTW		
21022G1000	Computer Integrated Manufacturing – PLTW		
10013G1000	Computer Science Essentials – PLTW		
21023G1000	Digital Electronics – PLTW		
21025G1000	Engineering Design and Development – PLTW		
21024G1000	Environmental Sustainability – PLTW		
10019E1000	AP Computer Science Principles		
21047G1001	Career Pathway Project in STEM		
21997G1000	CTE Lab in STEM		

***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	<p align="center">*SREB AC Aerospace Engineering Program (Must teach three courses from this program list within two years.)</p> <p>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.</p>				
Course Number	Career Pathway Program Courses	Career Readiness Indicator (CRI)	Workforce Careers		
21013G1012	Fundamentals of Aerospace Technology-SREB AC	<ul style="list-style-type: none"> • Autodesk Inventor Certified User • Autodesk-AutoCAD Certified User • Autodesk-Revit Certified User • Autodesk-Fusion 360 Certified User • FANUC CERT-Handling Tool Operations and Programming • Microsoft Office- Excel Expert 2019/O365 • Microsoft Office- Access Expert 2019/O365 • 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 • Oracle Certified Associate (OCA) - Java Programmer • SolidEdge Certified Associate • SolidWorks Associate 	<ul style="list-style-type: none"> • All Disciplines Engineer/Technician • Aerospace Engineer/Tech • Aesthetics Specialist • Architectural Engineer/Tech • Civil Engineer/Tech • Control Systems Engineer/Tech • Electrical Engineer/Tech • Ergonomics Specialist • Industrial Design • Manufacturing Engineer/Tech • Mechanical Engineer/Tech • Robotics Engineer/Tech 		
21013G1022	Advanced Aerospace Technology-SREB AC				
21013G1001	Aeronautics Engineering Applications-SREB AC				
21013G1002	Astronautics Engineering Applications-SREB AC				
21047G1001	Career Pathway Project in STEM				
21997G1000	CTE Lab in STEM				

***NOTE:** LEAs must contact [SREB](#) for additional information prior to utilizing any of the course codes listed above with a SREB suffix, as it does require commitment to the conditions in a MOU and participation in mandatory training provided by the provider.

*SREB AC Innovations in Science and Technology Program (Must teach three courses from this program list within two years.)			
Career Pathway Program	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)	Workforce Careers
21990G1001	The Nature of Science and Technology-SREB AC	<ul style="list-style-type: none"> • Autodesk Inventor Certified User • Autodesk-AutoCAD Certified User • Autodesk-Revit Certified User • Autodesk-Fusion 360 Certified User • FANUC CERT-Handling Tool Operations and Programming • Microsoft Office- Excel Expert 2019/O365 • Microsoft Office- Access Expert 2019/O365 • 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 • Oracle Certified Associate (OCA) - Java Programmer • SolidEdge Certified Associate • SolidWorks Associate 	<ul style="list-style-type: none"> • All Disciplines Engineer/Technician • Aerospace Engineer/Tech • Aesthetics Specialist • Architectural Engineer/Tech • Civil Engineer/Tech • Control Systems Engineer/Tech • Electrical Engineer/Tech • Ergonomics Specialist • Industrial Design • Manufacturing Engineer/Tech • Mechanical Engineer/Tech • Robotics Engineer/Tech
21990G1002	Core Applications of Science and Technology-SREB AC		
21990G1003	Impacts of Science and Technology-SREB AC		
21990G1004	Creativity and Innovations-SREB AC		
21997G1000	CTE Lab in STEM		
21047G1001	Career Pathway Project in STEM		
<p>*NOTE: LEAs must contact SREB for additional information prior to utilizing any of the course codes listed above with a SREB suffix, as it does require commitment to the conditions in a MOU and participation in mandatory training provided by the provider.</p>			

Middle School STEM Technologies Program			
Career Pathway 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)	Workforce Careers
21052G0608	STEM Technologies I	N/A	<ul style="list-style-type: none"> • All Disciplines Engineer/Technician • Aerospace Engineer/Tech • Aesthetics Specialist • Architectural Engineer/Tech • Civil Engineer/Tech • Control Systems Engineer/Tech • Electrical Engineer/Tech • Ergonomics Specialist • Industrial Design • Manufacturing Engineer/Tech • Mechanical Engineer/Tech • Robotics Engineer/Tech
21052G0708	STEM Technologies II		
21052G0808	STEM Technologies III		

*PLTW Middle School (PLTW Gateway) Program			
Career Pathway 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)	Workforce Careers
10099G6800	App Creators-PLTW	N/A	<ul style="list-style-type: none"> • All Disciplines Engineer/Technician • Aerospace Engineer/Tech • Aesthetics Specialist • Architectural Engineer/Tech • Civil Engineer/Tech • Control Systems Engineer/Tech • Electrical Engineer/Tech • Ergonomics Specialist • Industrial Design • Manufacturing Engineer/Tech • Mechanical Engineer/Tech • Robotics Engineer/Tech
21009G0708	Automation and Robotics – PLTW		
10099G6801	Computer Science for Innovators and Makers – PLTW		
21007G0708	Design and Modeling – PLTW		
21024G0708	Energy and the Environment – PLTW		
21019G0708	Flight and Space – PLTW		
21024G0608	Green Architecture – PLTW		
21023G0708	Magic of Electrons – PLTW		
14001G0608	Medical Detectives – PLTW		
21051G0708	Science and Technology – PLTW		
<p>*NOTE: This is a purchased curriculum. LEAs must contact for PLTW 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.</p>			

Greenpower Program			
Career Pathway Program	The Greenpower challenge – to design and build an electric car to race at Greenpower events. Students build age appropriate kit cars according to regulations and then race them at motorsport venues around the state/country. The Greenpower challenge harnesses the excitement of motorsport to inspire more than 10,000 participants a year to excel in STEM.		
Course Number	Career Pathway Program Courses	Career Readiness Indicator (CRI)	Workforce Careers
21105G0708	Introduction to Greenpower	<ul style="list-style-type: none"> • Autodesk Inventor Certified User • Autodesk-AutoCAD Certified User • Autodesk-Revit Certified User • Autodesk-Fusion 360 Certified User • FANUC CERT-Handling Tool Operations and Programming • Microsoft Office- Excel Expert 2019/O365 • Microsoft Office- Access Expert 2019/O365 • 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 • Oracle Certified Associate (OCA) - Java Programmer • SolidEdge Certified Associate • SolidWorks Associate 	<ul style="list-style-type: none"> • All Disciplines Engineer/Technician • Aerospace Engineer/Tech • Aesthetics Specialist • Architectural Engineer/Tech • Civil Engineer/Tech • Control Systems Engineer/Tech • Electrical Engineer/Tech • Ergonomics Specialist • Industrial Design • Manufacturing Engineer/Tech • Mechanical Engineer/Tech • Robotics Engineer/Tech
21105G1001	Greenpower F24 Eng Design & Race Ch I		
21105G1002	Greenpower F24 Eng Design & Race Ch II		

2022 – 2023 Subject and Personnel Codes
STEM Engineering Cluster and Middle School Program

Course Number	Course Name
21013G1022	Advanced Aerospace Technology-SREB AC
21013G1001	Aeronautics Engineering Applications-SREB AC
21019G1000	Aerospace Engineering-PLTW
21002G1000	Applications of Engineering and Technology
21013G1002	Astronautics Engineering Applications-SREB AC
21015G1000	Basic Programming for Engineers
21047G1000	Capstone of Engineering and Technology
21047G1001	Career Pathway Project in STEM
21021G1000	Civil Engineering and Architecture-PLTW
21015G1001	Computer Engineering and Technology
21022G1000	Computer Integrated Manufacturing-PLTW
21990G1002	Core Applications of Science and Technology-SREB AC
21990G1004	Creativity and Innovations-SREB AC
21997G1000	CTE Lab in STEM
21023G1000	Digital Electronics-PLTW
21025G1000	Engineering Design and Development-PLTW
21026G1000	Engineering Essentials-PLTW
21014G1000	Environmental Engineering
21024G1000	Environmental Sustainability-PLTW
21005G1000	Foundations of Engineering and Technology
21013G1012	Fundamentals of Aerospace Technology-SREB AC
21105G1001	Greenpower F24 Eng Design & Race Ch I
21105G1002	Greenpower F24 Eng Design & Race Ch II
21990G1003	Impacts of Science and Technology-SREB AC
21017G1000	Introduction to Engineering Design-PLTW
21018G1000	Principles of Engineering-PLTW
21009G1000	Robotics Systems
21990G1001	The Nature of Science and Technology-SREB AC
Middle School Courses	
10099G1001	App Creators – PLTW
21009G0708	Automation and Robotics – PLTW
10012G0608	Computer Science Discoveries
10099G6801	Computer Science for Innovators and Makers – PLTW
21007G0708	Design and Modeling – PLTW
21024G0708	Energy and the Environment – PLTW
21019G0708	Flight and Space – PLTW
21024G0608	Green Architecture – PLTW
21105G0708	Introduction to Greenpower
21023G0708	Magic of Electrons – PLTW
14001G0608	Medical Detectives – PLTW
21051G0708	Science and Technology – PLTW
21052G0608	STEM Technologies I
21052G0708	STEM Technologies II
21052G0808	STEM Technologies III

Shared Courses			
Course Number	Course Name	Cluster(s)	Required Year to Implement COS
10099G6806	App Creators – PLTW	Information Technology	N/A
10012G0608	Computer Science Discoveries	Business Middle School Information Technology	N/A
10099G6801	Computer Science for Innovators and Makers – PLTW	Information Technology	N/A
21009G1000	Robotics Systems	Information Technology	2021-2022

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