2023-2024

PROGRAM GUIDE FOR:

STEM CLUSTER

AND

STEM MIDDLE SCHOOL
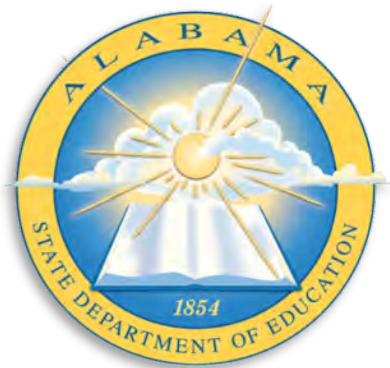
STEM Cluster Program Guide

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 8 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)**	**In Demand Occupations**
21002G1000	Applications of Engineering and Technology	• Autodesk – AutoCAD Certified User • Autodesk – Fusion 360 Certified User • Autodesk – Inventor Certified User • Autodesk – Revit Certified User • Certiport Information Technology Specialist (ITS) – Databases • Certiport Information Technology Specialist (ITS) – HTML & CSS • Certiport Information Technology Specialist (ITS) – HTML5 Application Development • Certiport Information Technology Specialist (ITS) – Java • Certiport Information Technology Specialist (ITS) – JavaScript • Certiport Information Technology Specialist (ITS) – Python • Certiport Information Technology Specialist (ITS) – Software Development • FAA Part 107 • FANUC CERT – Handling Tool Operations and Programming • Microsoft Office – Access Expert 2019/O365 • Microsoft Office – Excel Expert 2019/O365 • Oracle Certified Associate (OCA) – Java Programmer • SolidEdge Certified Associate • SolidWorks 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/Mgr. • Petroleum Engineer/Tech • Robotics Engineer/Tech
21015G1000	Basic Programming for Engineers		
21047G1000	Capstone of Engineering and Technology		
21047G1001	Career Pathway Project in STEM		
21015G1001	Computer Engineering and Technology		
21997G1000	CTE Lab in STEM		
21014G1000	Environmental Engineering		
21005G1000	Foundations of Engineering and Technology		
21009G1000	Robotics Systems		

Career Pathway Program	Greenpower 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)**	**In Demand Occupations**
21047G1001 21997G1000 21105G1001 21105G1002 21105G1003 21105G0708	Career Pathway Project in STEM CTE Lab in STEM Greenpower F24 Eng Design & Race Ch I Greenpower F24 Eng Design & Race Ch II Introduction to Greenpower (HS) Introduction to Greenpower (MS)	• Autodesk – AutoCAD Certified User • Autodesk – Fusion 360 Certified User • Autodesk – Inventor Certified User • Autodesk – Revit Certified User • Certiport Information Technology Specialist (ITS) – Databases • Certiport Information Technology Specialist (ITS) – HTML & CSS • Certiport Information Technology Specialist (ITS) – HTML5 Application Development • Certiport Information Technology Specialist (ITS) – Java • Certiport Information Technology Specialist (ITS) – JavaScript • Certiport Information Technology Specialist (ITS) – Python • Certiport Information Technology Specialist (ITS) – Software Development • FAA Part 107 • FANUC CERT – Handling Tool Operations and Programming • Microsoft Office – Access Expert 2019/O365 • Microsoft Office – Excel Expert 2019/O365 • Oracle Certified Associate (OCA) – Java Programmer • SolidEdge Certified Associate • SolidWorks 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/Mgr. • Petroleum Engineer/Tech • Robotics Engineer/Tech

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	Aerospace Engineering – PLTW	• Autodesk – AutoCAD Certified User	• Aerospace Engineer/Tech
21047G1001	Career Pathway Project in STEM	• Autodesk – Fusion 360 Certified User	• Aesthetics Specialist
21021G1000	Civil Engineering and Architecture – PLTW	• Autodesk – Inventor Certified User	• Architectural Engineer/Tech
21022G1000	Computer Integrated Manufacturing – PLTW	• Autodesk – Revit Certified User	• Civil Engineer/Tech
10013G1000	Computer Science Essentials – PLTW	• Certiport Information Technology Specialist (ITS) – Databases	• Control Systems Engineer/Tech
21997G1000	CTE Lab in STEM	• Certiport Information Technology Specialist (ITS) – HTML & CSS	• Electrical Engineer/Tech
21023G1000	Digital Electronics – PLTW	• Certiport Information Technology Specialist (ITS) – HTML5 Application Development	• Engineer/Technician all Disciplines
21025G1000	Engineering Design and Development – PLTW	• Certiport Information Technology Specialist (ITS) – Java	• Environmental Scientist/Specialist
21026G1000	Engineering Essentials – PLTW	• Certiport Information Technology Specialist (ITS) – JavaScript	• Ergonomics Specialist
21024G1000	Environmental Sustainability – PLTW	• Certiport Information Technology Specialist (ITS) – Python	• Industrial Engineer/Tech
21017G1000	Introduction to Engineering Design – PLTW	• Certiport Information Technology Specialist (ITS) – Software Development	• Manufacturing Engineer/Tech
21018G1000	Principles of Engineering – PLTW	• FAA Part 107	• Materials Engineer/Tech
		• FANUC CERT – Handling Tool Operations and Programming	• Mechanical Engineer/Tech/Mgr.
		• Microsoft Office – Access Expert 2019/O365	• Petroleum Engineer/Tech
		• Microsoft Office – Excel Expert 2019/O365	• Robotics Engineer/Tech
		• Oracle Certified Associate (OCA) – Java Programmer	
		• SolidEdge Certified Associate	
		• SolidWorks Associate	

*NOTE: This is a purchased curriculum. <u>LEAs must contact PLTW for additional information prior to utilizing the course codes listed above with a PLTW suffix</u>, 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	*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**
21013G1022	Advanced Aerospace Technology – SREB AC	• Autodesk – AutoCAD Certified User • Autodesk – Fusion 360 Certified User • Autodesk – Inventor Certified User • Autodesk – Revit Certified User • Certiport Information Technology Specialist (ITS) – Databases • Certiport Information Technology Specialist (ITS) – HTML & CSS • Certiport Information Technology Specialist (ITS) – HTML5 Application Development • Certiport Information Technology Specialist (ITS) – Java • Certiport Information Technology Specialist (ITS) – JavaScript • Certiport Information Technology Specialist (ITS) – Python • Certiport Information Technology Specialist (ITS) – Software Development • FAA part 107 • FANUC CERT-Handling Tool Operations and Programming • Microsoft Office – Access Expert 2019/O365 • Microsoft Office – Excel Expert 2019/O365 • Oracle Certified Associate (OCA) – Java Programmer • SolidEdge Certified Associate • SolidWorks 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/Mgr. • Petroleum Engineer/Tech • Robotics Engineer/Tech
21013G1001	Aeronautics Engineering Applications – SREB AC		
21013G1002	Astronautics Engineering Applications – SREB AC		
21047G1001	Career Pathway Project in STEM		
21997G1000	CTE Lab in STEM		
21013G1012	Fundamentals of Aerospace Technology – SREB AC		
*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.			

Career Pathway Program	***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 options after high school.		
Course Number	**Career Pathway Program Courses**	**Career Readiness Indicator (CRI)**	**In Demand Occupations**
21047G1001	Career Pathway Project in STEM	• Autodesk – AutoCAD Certified User • Autodesk – Fusion 360 Certified User • Autodesk – Revit Certified User • Autodesk – Inventor Certified User • Certiport Information Technology Specialist (ITS) – Databases • Certiport Information Technology Specialist (ITS) – HTML & CSS • Certiport Information Technology Specialist (ITS) – HTML5 Application Development • Certiport Information Technology Specialist (ITS) – Java • Certiport Information Technology Specialist (ITS) – JavaScript • Certiport Information Technology Specialist (ITS) – Python • Certiport Information Technology Specialist (ITS) – Software Development • FAA part 107 • FANUC CERT – Handling Tool Operations and Programming • Microsoft Office – Access Expert 2019/O365 • Microsoft Office – Excel Expert 2019/O365 • Oracle Certified Associate (OCA) – Java Programmer • SolidEdge Certified Associate • SolidWorks 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/Mgr. • Petroleum Engineer/Tech • Robotics Engineer/Tech
21990G1002	Core Applications of Science and Technology – SREB AC		
21990G1004	Creativity and Innovations – SREB AC		
21997G1000	CTE Lab in STEM		
21990G1003	Impacts of Science and Technology – SREB AC		
21990G1001	The Nature of Science and Technology – SREB AC		
*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.			

Career Pathway Program	SREB AC Clean Energy 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 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. Clean Energy is for students who want to apply their science and math skills and apply engineering processes as they tackle the world's energy needs within a green point of view.		
Course Number	**Career Pathway Program Courses**	**Career Readiness Indicator (CRI)**	**Workforce Careers**
18506G1014	**SREB AC – Clean Energy Systems – Required Foundation Course**	• Autodesk Inventor Certified User • Autodesk – AutoCAD Certified User • Autodesk – Fusion 360 Certified User • Autodesk – Revit Certified User • Certiport Information Technology Specialist (ITS) – Databases • Certiport Information Technology Specialist (ITS) – HTML & CSS • Certiport Information Technology Specialist (ITS) – HTML5 Application Development • Certiport Information Technology Specialist (ITS) – Java • Certiport Information Technology Specialist (ITS) – JavaScript • Certiport Information Technology Specialist (ITS) – Python • Certiport Information Technology Specialist (ITS) – Software Development • Construction and Skilled Trade Assessment (CAST) • FAA Part 107 • FANUC CERT – Handling Tool Operations and Programming • Microsoft Office – Access Expert 2019/O365 • Microsoft Office – Excel Expert 2019/O365 • NCCER Core (Module 6 is an elective and not required for CRI) • Oracle Certified Associate (OCA) – Java Programmer • SolidEdge Certified Associate • SolidWorks Associate	• Control Systems Engineer/Tech • Electrical Engineer/Tech • Environmental Engineer • Environmental Scientist/Specialist
21047G1001	Career Pathway Project in STEM		
21990G1000	CTE Lab in STEM		
18506G1024	SREB AC – Clean Energy Application		
18506G1044	SREB AC – Clean Energy Innovations		
18506G1034	SREB AC – Clean Energy Strategies		

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 • 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/Mgr. • Petroleum Engineer/Tech • Robotics Engineer/Tech
21052G0708	STEM Technologies II		
21052G0808	STEM Technologies III		

Career Pathway Program	*PLTW Middle School (PLTW Gateway) 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
21007G0708	Design and Modeling – PLTW		• Control Systems Engineer/Tech
21024G0708	Energy and the Environment – PLTW		• Electrical Engineer/Tech
21019G0708	Flight and Space – PLTW		• Engineer/Technician all Disciplines
21024G0608	Green Architecture – PLTW		• Environmental Scientist/Specialist
21023G0708	Magic of Electrons – PLTW		• Ergonomics Specialist
14001G0608	Medical Detectives – PLTW		• Industrial Engineer/Tech
21051G0708	Science and Technology – PLTW		• Manufacturing Engineer/Tech
			• Materials Engineer/Tech
			• Mechanical Engineer/Tech/Mgr.
			• Petroleum Engineer/Tech
			• Robotics Engineer/Tech
*NOTE: This is a purchased curriculum. <u>LEAs must contact PLTW for additional information prior to utilizing the course codes listed above with a PLTW suffix</u>, 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 Readiness Indicator (CRI)**	**In Demand Occupations**
21052G6800	We Build It Better	N/A	• 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/Mgr. • Petroleum Engineer/Tech • Robotics Engineer/Tech
*NOTE: This is a purchased curriculum. <u>LEAs must contact WBIB for additional information prior to utilizing the course codes listed above</u>, as it requires participation in mandatory training and purchase of specific training equipment.			

2023 – 2024 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
21052G6800	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
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

College and Career Readiness Indicator Course Matrix

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

Program Name	SREB AC Clean Energy Program	Greenpower
Foundation Course(s)	SREB AC – Clean Energy Systems	Introduction to Greenpower
Concentrator Course(s)	SREB AC – Clean Energy Application	Greenpower F24 Eng Design & Race Ch I
	SREB AC – Clean Energy Innovations	Greenpower F24 Eng Design & Race Ch II
Capstone Course(s)	Career Pathway Project in STEM	Career Pathway Project in STEM
	CTE Lab in STEM	CTE Lab in STEM
	SREB AC – Clean Energy Strategies	

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 Memorandum **FY22-2065**.

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.