

**STEM PATHWAYS MODEL**

**Science Foundation Arizona - The Arizona STEM Network**

★ **INTRODUCTION:** STEM Pathways offer students multiple opportunities to explore, prepare for and pursue STEM degrees and careers, expanding the notion that the only pathway to success is through a four-year university ★ Pathway programs are led and driven by community colleges that function as conduits between high schools, universities and jobs ★ These community college-led programs include 1) outreach to K-12 students, 2) technology---driven academic curriculum that lead students to industry-recognized credentials, 3) and early college options for high school students who earn transferable college credits toward these certifications and degrees ★ All programs are integrated with industry who keep the programs current, offer students real world experiences through outreach programs and internships, and give hiring preferences to students with nationally-recognized credentials ★ The STEM Pathways program at Science Foundation Arizona (SFAz) is built upon the Engineering Pathway model developed at Cochise College with funding from SFAz and the National Science Foundation (NSF) and includes an online STEM Pathways Guide ★ This Guide is a strategic framework that provides adopters with an easy to use roadmap for researching, planning and implementing STEM Pathway programs ★ SFAz is collaborating with rural Arizona community colleges and Hispanic Serving Community Colleges across the county to adopt components of the Pathway into their communities ★

<b>PATHWAY COMPONENTS</b>	<b>A. STEM EDUCATION OUTREACH AND CAREER EXPLORATION (Recruitment)</b>	<b>B. FOUNDATIONAL KNOWLEDGE AND SKILLS (Retention)</b>	<b>C. TRANSFERABLE CERTIFICATIONS AND DEGREES (Workforce)</b>
<b>DEFINITIONS</b>	<i>Community college-led activities and events that generate enthusiasm and engage student interest in STEM-related career fields.</i>	<i>Education programs and strategies that improve college students' foundational STEM knowledge and skills.</i>	<i>Job and research experiences and competency-based programs with industry that align to industry-recognized credentials.</i>
<b>1. STUDENT SUPPORT STRATEGIES</b>	<i>A1. Student-success strategies are incorporated in outreach activities and events that promote STEM career exploration.</i>	<i>B1. Student-support strategies lead students to achieving foundational STEM knowledge and skills.</i>	<i>C1. Student-support strategies help students optimize course selection and credits earned toward a stackable credential or degree.</i>
<b>ATTRIBUTES Resources, processes and strategies that encourage student success.</b>	<p><b>A1. Community Colleges:</b></p> <p><b>A1a:</b> offer events and activities that promote career exploration and ties to the workforce.</p> <p><b>A1b:</b> provide content-specific events/opportunities for both teachers and students to engage in Mathematics/Science content and/or pedagogy.</p> <p><b>A1c:</b> provide summer learning opportunities for students in the form of STEM camps, STEM clubs or STEM focused learning modules.</p> <p><b>A1d:</b> offer programs that promote the field of engineering, which can include Engineering nights with local professionals, engineering contests and competitions, or STEM career exploration events.</p>	<p><b>B1: Community Colleges:</b></p> <p><b>B1a:</b> provide a tutoring center or other areas of individualized student assistance for resources and support.</p> <p><b>B1b:</b> provide an individual or support group whose responsibilities include giving guidance and encouragement to support student success.</p> <p><b>B1c:</b> offer programs or seminars that provide students with strategies for being a successful student (i.e. time management, study skills, goal setting).</p> <p><b>B1d:</b> track the impact of student interventions to see if the colleges programs are applicable and effective.</p>	<p><b>C1: Community Colleges:</b></p> <p><b>C1a:</b> provide specific information through Transfer Guides for Engineering students (and other STEM areas) regarding the transfer of community college courses into in-state universities or other partner universities.</p> <p><b>C1b:</b> provide advising (counseling services) to local high school students with information and strategies for registering and taking college level courses.</p>



		<b>B1e:</b> offer STEM specific Professional Development programs aimed at local educators that are building a STEM pipeline program into the Community College.	
<b>EXAMPLES</b>	<b>A1: Example Programs-</b> <ul style="list-style-type: none"> <li>• Math/Science Day for K-12 on College Campus</li> <li>• STEM Career Exploration Events</li> <li>• STEM Summer Camps</li> <li>• Engineering Night</li> </ul>	<b>B1: Example Programs-</b> <ul style="list-style-type: none"> <li>• Math Improvement Seminar</li> <li>• Tutoring Hall / Learning Commons</li> <li>• Student Support Specialist for High School</li> <li>• Students in Early College Programs</li> <li>• Academic Excellence Seminar / Counseling and</li> <li>• Personal Development</li> <li>• Professional development for College Instructors</li> </ul>	<b>C1: Example Programs-</b> <ul style="list-style-type: none"> <li>• Online Transfer Guide</li> <li>• College Advisors &amp; Recruiters</li> </ul>
<b>2. INDUSTRY ENGAGEMENT</b>	<b>A2. Industry plays a supporting role in outreach activities, tours and events, capturing student interest in real-world STEM opportunities.</b>	<b>B2. Industry contributes to program development and mentors students in real-world experiences.</b>	<b>C2. Industry offers internships, apprenticeships, and job-shadowing experiences that guide students to earning industry-recognized certifications and degrees.</b>
<b>ATTRIBUTES</b> <i>Vital to keeping schools current, providing teachers with resources, and capturing student interest in STEM careers</i>	<b>A2. Community Colleges:</b> <b>A2a:</b> have a designated staff person to coordinate industry relationships. <b>A2b:</b> offer outreach events with local company employees. <b>A2c:</b> engage local professionals into the classrooms as guest speakers. <b>A2d:</b> engage local professionals as coaches for Robotics teams or other STEM Competitions. <b>A2e:</b> engage local professionals in mentor and/or coaching roles for out of the classroom projects and events.	<b>B2: Community Colleges:</b> <b>B2a:</b> collaborate with an established outside industry advisory board with which to connect and garner advice from local businesses/industry. <b>B2b:</b> offer Industry assistance with developing ideas for classroom projects. <b>B2c:</b> promote and support Industry knowledge of college programs that relate to STEM careers. <b>B2d:</b> engage Industry representatives to serve as advisors/mentors to faculty.	<b>C2: Community Colleges:</b> <b>C2a:</b> collaborate with local industry to help students successfully prepare for their future. <b>C2b:</b> engage local professionals with students in on-site field trips for both career exploration and job shadowing opportunities. <b>C2c:</b> partner with industry to provide student apprenticeships, internships, and job shadowing experiences.
<b>EXAMPLES</b>	<b>A2: Example Programs-</b> <ul style="list-style-type: none"> <li>• Industry Representation at Outreach Events and Activities</li> <li>• Classroom and STEM Club Industry Guest Speakers</li> </ul>	<b>B2: Example Programs-</b> <ul style="list-style-type: none"> <li>• Assistance with developing ideas for Classroom Projects throughout Early College Academy</li> <li>• Industry Advisory Board Participation</li> </ul>	<b>C2. Example Programs-</b> <ul style="list-style-type: none"> <li>• Industry Internship Program</li> </ul>

	<ul style="list-style-type: none"> <li>Coaches for Robotics and other STEM Team Competitions</li> <li>Group Tours and Field Trips</li> </ul>	<ul style="list-style-type: none"> <li>Input to keep Course Curriculum Current</li> </ul>	
<b>3. TECHNOLOGY INTEGRATION</b>	<b>A3. College outreach activities have access to technology labs and technical equipment that generate student interest and awareness of STEM careers.</b>	<b>B3. Technology programs offer students hands-on learning experiences; technology is utilized to access instruction and student learning opportunities between institutions.</b>	<b>C3. Technical equipment is available at industry for students to gain the appropriate experience and prepare for competency-based testing and certifications.</b>
<b>ATTRIBUTES</b> <i>Integrated across the Pathway to provide better access to education resources, virtual tours, internships and mentorship.</i>	<b>A3 Community Colleges:</b> <b>A3a:</b> offer resources for students to explore careers online. <b>A3b:</b> use technology to expand the use of social media awareness campaigns. <b>A3c:</b> collect data (i.e. demographics, # of participants, program evaluations, and teacher participation in events along a pathway) via technology for various outreach programs.	<b>B3 Community Colleges:</b> <b>B3a:</b> offer Classes via Interactive Television. <b>B3b:</b> provide Homework on Electronic Notebooks. <b>B3c:</b> offer students use of technological devices, e.g. tablets with math and/or gaming software to improve their math and other STEM content skills.	<b>C3 Community Colleges:</b> <b>C3a:</b> offer college students on-campus field trips of other industry programs, including equipment and technology. <b>C3b:</b> offer Virtual Field Trips of companies to students who cannot travel to off campus sites.
<b>EXAMPLES</b>	<b>A3: Example Programs-</b> <ul style="list-style-type: none"> <li>On-campus College Field Trips for K-12 Students</li> <li>Online Projects and Career Explorations</li> <li>Social Media Awareness Campaigns</li> </ul>	<b>B3: Example Programs-</b> <ul style="list-style-type: none"> <li>Classes via Interactive Television (ITV)</li> <li>Homework on Electronic Notebooks</li> </ul>	<b>C3: Example Programs-</b> <ul style="list-style-type: none"> <li></li> </ul>
<b>4. CURRICULAR ALIGNMENT</b>	<b>A4. College outreach activities and events inform parents and students about curricular alignment to STEM career programs.</b>	<b>B4. Dual enrollment or early college STEM academies, including intrusive advisement that lead to student success.</b>	<b>C4. Colleges and industry align curriculum with industry-recognized certifications and include credits that transfer toward stackable degree programs.</b>
<b>ATTRIBUTES</b> <i>Ensures all course credits count toward a credential.</i>	<b>A4 Community Colleges:</b> <b>A4a:</b> establish MOA/MOU's with local High Schools for a continuous STEM Pipeline. <b>A4b:</b> embed outreach activities with local High Schools. <b>A4c:</b> include representation of local high schools	<b>B4 Community Colleges:</b> <b>B4a:</b> utilize self-paced math modules to strengthen students' math skills. <b>B4b:</b> audit the type and success rate (# of passing students) in STEM classes that lead to a certificated program.	<b>C4 Community Colleges:</b> <b>C4a:</b> offer STEM programs of study that lead to industry-recognized certifications. <b>C4b:</b> offer A.S. or A.A.S. degrees in STEM areas. <b>C4c:</b> track data on the number of students

	<p>on your Advisory Board or in your Professional Learning Council (PLC).</p> <p><b>A4d:</b> keep up to date on current state and national K-12 standards to ensure a smooth transition of content from HS to the Community College.</p>	<p><b>B4c:</b> offer early college academies and/or options for dual enrollment STEM pathways programs for high school students.</p>	<p>that successfully transfer to a four-year University STEM degree program.</p> <p><b>C4d:</b> track data on the number of students that successfully enter the STEM workforce upon completion of a two---year program.</p>
<b>EXAMPLES</b>	<p><b>A4: Example Programs-</b></p> <ul style="list-style-type: none"> <li>Community College Outreach Experience Linked to K12 Curriculum and Content.</li> </ul>	<p><b>B4: Example Programs-</b></p> <ul style="list-style-type: none"> <li>Early College Academies for High School</li> <li>Students</li> <li>Embedded Math and Science in CTE programs</li> <li>Dual enrollment or Dual credit offerings</li> </ul>	<p><b>C4: Example Programs-</b></p> <ul style="list-style-type: none"> <li>Programs of Study leading to Industry</li> <li>Recognized Certifications</li> <li>Associates Degrees</li> <li>Jobs</li> <li>Transfer to University</li> </ul>