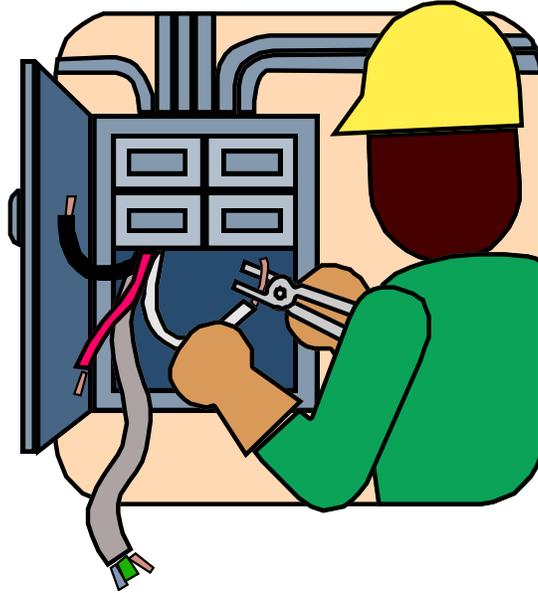


**SCIENCE, TECHNOLOGY, ENGINEERING &  
MATHEMATICS (STEM)**  
**Career Pathway System**



*‘Making the Transition from Education to Employment’*

**GUIDE**

**American Samoa Department of  
Education**

**Developed August 2010**

# SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS (STEM) Career Pathway

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## **What is a Career Pathway?**

Career Pathways are used to cluster a number of careers and occupations that occur within a broadly defined area which helps to focus the curriculum and career-related learning experiences of the Career Pathways within each pathway. Pathways adopted in American Samoa are:

1. Science, Technology, Engineering and Mathematics (STEM)
2. Agriculture, Food & Natural Resources
3. Business, Management & Technology
4. Health Science
5. Human Services
6. Arts, Audio/Video Technology and Communication
7. Education and Training
8. Transportation, Distribution & Logistics

## **What is the Career and Technology Education (CTE) Plan**

- It is a plan to motivate students to participate in activities that will lead to graduation with a high school diploma; an industry recognized credential and/or prepared to enter post-secondary education in a related degree program.
- It is a career-oriented system of programs with the direct involvement of local employers to provide students with a major step towards the skills employers need.
- It prepares students academically and vocationally for either entrance to college or careers in a selected field or both.
- It is a partnership among the high school, community college, local employers, and the American Samoa Department of Education.

## **The Plan ....**

- Involves a close working partnership between the high school and local businesses.
- Focuses on the concept that all students select a Career Pathway upon which to focus their studies while in high school
- All students are enrolled in classes with integrated curriculum from 1<sup>st</sup> through 12<sup>th</sup>
- Elementary teachers have resources and lessons to begin career awareness and career development through the career guidance and counseling programs.
- Orients students towards graduation and receiving a fully credited diploma.
- Develops workplace skills used and needed by local employers.
- Includes a mentor program, with each student matched to a volunteer from the local community who is committed to spending two to four hours a month with the student.
- Places students in summer jobs with local employers following the 11<sup>th</sup> grade, provided that summer school is not required to meet graduation requirements
- Includes workplace learning during the last half of the 12<sup>th</sup> grade.

- Provides additional motivational activities with local community and business involvement.

## Examples of Career Contents in Pathways

Within each of the career pathways there may be 2 or more career areas that relate the student's learning to the knowledge and skills required to become successful in that field and to prepare them to continue their education in community college, college or university, or at the work-site. The following are examples of possible career contents within a pathway:

- Agriculture, Food & Natural Resources
  - Pathways and Career Contents
    - Food Products and Processing Systems
    - Plant Systems
    - Animal Systems
    - Power, Structural & Technical Systems
    - Natural Resources Systems
    - Environmental Service Systems
    - Agribusiness Systems
- Architecture & Construction
  - Pathways and Career Contents
    - Design/Pre-Construction
    - Construction
    - Maintenance/Operations
- Arts, Audio/Video Technology & Communications
  - Pathways and Career Contents
    - Audio/Video Technology & Film
    - Printing Technology
    - Visual Arts
    - Performing Arts
    - Journalism/Broadcasting
    - Telecommunications
- Business Management & Administration
  - Pathways and Career Contents
    - General Management
    - Business Information Mgement
    - Human Resources Management
    - Operations Management
    - Administrative Support
- Education and Training
  - Pathways and Career Contents
    - Administration and Administrative Support
    - Professional Support Services
    - Teaching & Training
- Finance
  - Pathways and Career Contents
    - Banking and Related Services
    - Business Financial Management
    - Financial and Investment Planning
    - Insurance Services

- Government & Public Administration
  - Pathways and Career Contents
    - Governance
    - National Security
    - Foreign Service Planning
    - Revenue & Taxation Regulation
    - Public Mgm/Adm.
- Health Science
  - Pathways and Career Contents
    - Therapeutic Services
    - Diagnostic Services
    - Health Informatics
    - Support Services
    - Biotechnology Research/Development
- Hospitality & Tourism
  - Pathways and Career Contents
    - Restaurants and Food/Beverage Services
    - Lodging
    - Travel & Tourism
    - Recreation, Amusements & Attractions
- Human Services
  - Pathways and Career Contents
    - Early Childhood Development & Services
    - Counseling & Mental Health Services
    - Family & Community Services
    - Personal Care Services
    - Consumer Services
- Information Technology
  - Pathways and Career Contents
    - Network Systems
    - Inf. Support & Services
    - Web & Digital Communication
    - Programming/Software Dev.
- Law, Public Safety, Corrections & Security
  - Pathways and Career Contents
    - Correction Services
    - Emergency/Fire Mgmt. Services
    - Security & Protective Services
    - Law Enforcement Service
    - Legal Services
- Manufacturing
  - Pathways and Career Contents
    - Production
    - Manufacturing Prod. Process Dev.
    - Maintenance, Installation & Repair
    - Quality Assurance
    - Logistics & Inventory Control
    - Health, Safety/Environmental Assurance
- Marketing, Sales and Service
  - Pathways and Career Contents
    - Marketing Management
    - Professional Sales
    - Merchandising
    - Mkt. Communications
    - Marketing Research

- Science, Technology, Engineering and Mathematics (STEM)
  - Pathways and Career Contents
    - Engineering and Technology
    - Science and Math
  
- Transportation, Distribution & Logistics
  - Pathways and Career Contents
    - Transportation Operations
    - Logistics Planning/Mgmt. Services
    - Warehousing/Dist. Ctr. Operations
    - Facility/Mobile Equipt. Maintenance
    - Transportation Systems/ Infrastructure Plng., Mgmt.
    - Health, Safety/ Env. Mgmt.
    - Sales/Service

Within each Pathway required courses and electives are identified that must be completed prior to graduation from high school with specific skills that must be demonstrated for certification in that pathway. Career related learning experiences occur within each pathway that connects the student’s learning to the real world. By the senior year in high school, work experiences in the community related to the student’s career choice may take as much as one-half of the school day depending upon the student’s individual career goal plans. Preparation for entry into the next level of education or directly into the workplace is met within the framework of the career pathway and individualized for each student depending upon his or her aspirations and goals.

## **Science, Technology, Engineering & Mathematics Career Pathway**

The Pathway System for American Samoa will consist of 7 broad clusters of careers under a unifying title. Within each pathway there will be one to five contents that relate to the overall system which may have some courses and experiences that are similar allowing students to cross over and gain a broader perspective of the career field they are pursuing.

The Science, Technology, Engineering & Mathematics (STEM) Career Pathway includes entry-level, technical and professional careers within Industrial Engineering industries of American Samoa.

For example, within the STEM Pathway the following are some of the many occupations that may be pursued.

### **Science, Technology, Engineering and Mathematics**

Occupations that include planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services.

	<b>Code</b>	<b>Occupation</b>
Engineering and Technology	17-2011.00	Aerospace Engineers (Green)
Engineering and Technology	17-2021.00	Agricultural Engineers
Engineering and Technology	17-3011.00	Architectural and Civil Drafters
Engineering and Technology	17-3011.01	Architectural Drafters (Green)
Engineering and Technology	17-3027.01	Automotive Engineering Technicians (Bright Outlook) (Green)
Engineering and Technology	17-2141.02	Automotive Engineers (Bright Outlook) (Green)
Engineering and Technology	17-2199.01	Biochemical Engineers (Bright Outlook) (Green)
Engineering and Technology	17-2041.00	Chemical Engineers (Green)
Engineering and Technology	17-3011.02	Civil Drafters
Engineering and Technology	17-2061.00	Computer Hardware Engineers
Engineering and Technology	17-3023.00	Electrical and Electronic Engineering Technicians
Engineering and Technology	17-3012.00	Electrical and Electronics Drafters
Engineering and Technology	17-3012.02	Electrical Drafters
Engineering and Technology	17-3023.03	Electrical Engineering Technicians (Green)
Engineering and Technology	17-3029.02	Electrical Engineering Technologists (Bright Outlook) (Green)
Engineering and Technology	17-2071.00	Electrical Engineers (Green)
Engineering and Technology	17-3024.00	Electro-Mechanical Technicians (Green)
Engineering and Technology	17-3029.03	Electromechanical Engineering Technologists (Bright Outlook) (Green)
Engineering and Technology	17-3012.01	Electronic Drafters
Engineering and Technology	17-3023.01	Electronics Engineering Technicians (Green)
Engineering and Technology	17-3029.04	Electronics Engineering Technologists (Bright Outlook) (Green)
Engineering and Technology	17-2072.00	Electronics Engineers, Except Computer (Green)
Engineering and Technology	17-2199.03	Energy Engineers (Bright Outlook) (Green)
Engineering and Technology	11-9041.00	Engineering Managers (Green)
Engineering and Technology	17-3029.00	Engineering Technicians, Except Drafters, All Other
Engineering and Technology	17-2199.00	Engineers, All Other
Engineering and Technology	17-2111.02	Fire-Prevention and Protection Engineers
Engineering and Technology	17-2141.01	Fuel Cell Engineers (Bright Outlook) (Green)
Engineering and Technology	17-3029.10	Fuel Cell Technicians (Bright Outlook) ((Green)
Engineering and Technology	17-2111.00	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors
Engineering and Technology	17-2112.01	Human Factors Engineers and Ergonomists (Bright Outlook)
Engineering and Technology	17-3029.05	Industrial Engineering Technologists (Bright Outlook) (Green)
Engineering and Technology	17-2112.00	Industrial Engineers (Green)
Engineering and Technology	13-1081.01	Logistics Engineers (Bright Outlook) (Green)
Engineering and Technology	17-3029.06	Manufacturing Engineering Technologists (Bright Outlook) (Green)
Engineering and Technology	17-2199.04	Manufacturing Engineers (Bright Outlook) (Green)
Engineering and Technology	17-3031.02	Mapping Technicians (Bright Outlook)
Engineering and Technology	17-2121.02	Marine Architects
Engineering and Technology	17-2121.01	Marine Engineers
Engineering and Technology	17-2121.00	Marine Engineers and Naval Architects
Engineering and Technology	17-2131.00	Materials Engineers
Engineering and Technology	17-3029.07	Mechanical Engineering Technologists (Bright Outlook) (Green)
Engineering and Technology	17-2141.00	Mechanical Engineers (Green)
Engineering and Technology	17-2199.05	Mechatronics Engineers (Bright Outlook) (Green)

	<b>Code</b>	<b>Occupation</b>
Engineering and Technology	17-2199.06	Microsystems Engineers (Bright Outlook) (Green)
Engineering and Technology	17-2151.00	Mining and Geological Engineers, Including Mining Safety Engineers
Engineering and Technology	17-2199.09	Nanosystems Engineers (Bright Outlook) (Green)
Engineering and Technology	17-3029.12	Nanotechnology Engineering Technicians (Bright Outlook) (Green)
Engineering and Technology	17-3029.11	Nanotechnology Engineering Technologists (Bright Outlook) (Green)
Engineering and Technology	17-2161.00	Nuclear Engineers (Green)
Engineering and Technology	17-2171.00	Petroleum Engineers
Engineering and Technology	17-2199.07	Photonics Engineers (Bright Outlook) (Green)
Engineering and Technology	17-2111.03	Product Safety Engineers
Engineering and Technology	11-3051.01	Quality Control Systems Managers (Bright Outlook)
Engineering and Technology	17-2199.08	Robotics Engineers (Bright Outlook) (Green)
Engineering and Technology	17-2199.11	Solar Energy Systems Engineers (Bright Outlook) (Green)
Engineering and Technology	17-3031.00	Surveying and Mapping Technicians (Bright Outlook)
Engineering and Technology	17-3031.01	Surveying Technicians (Bright Outlook)
Engineering and Technology	27-3042.00	Technical Writers
Engineering and Technology	17-2051.01	Transportation Engineers (Bright Outlook) (Green)
Engineering and Technology	17-2199.02	Validation Engineers (Bright Outlook) (Green)
Engineering and Technology	17-2051.02	Water/Wastewater Engineers (Bright Outlook) (Green)
Engineering and Technology	17-2199.10	Wind Energy Engineers (Bright Outlook) (Green)
Science and Math	19-4011.00	Agricultural and Food Science Technicians
Science and Math	19-4011.01	Agricultural Technicians (Green)
Science and Math	19-3091.01	Anthropologists (Bright Outlook)
Science and Math	19-3091.00	Anthropologists and Archeologists (Bright Outlook)
Science and Math	19-3091.02	Archeologists (Bright Outlook)
Science and Math	19-2011.00	Astronomers
Science and Math	19-2021.00	Atmospheric and Space Scientists (Green)
Science and Math	19-1021.00	Biochemists and Biophysicists (Bright Outlook)
Science and Math	11-9041.01	Biofuels/Biodiesel Technology and Product Development Managers (Bright Outlook) (Green)
Science and Math	19-1029.01	Bioinformatics Scientists (Bright Outlook)
Science and Math	43-9111.01	Bioinformatics Technicians (Bright Outlook)
Science and Math	19-1029.00	Biological Scientists, All Other
Science and Math	19-4021.00	Biological Technicians
Science and Math	15-2041.01	Biostatisticians (Bright Outlook)
Science and Math	19-4031.00	Chemical Technicians (Green)
Science and Math	19-2031.00	Chemists (Green)
Science and Math	15-1011.00	Computer and Information Scientists, Research (Bright Outlook)
Science and Math	19-1031.00	Conservation Scientists
Science and Math	19-3011.01	Environmental Economists (Bright Outlook) (Green)
Science and Math	19-2041.02	Environmental Restoration Planners (Bright Outlook) (Green)
Science and Math	19-2041.00	Environmental Scientists and Specialists, Including Health (Bright Outlook) (Green)
Science and Math	19-4011.02	Food Science Technicians
Science and Math	19-1029.03	Geneticists (Bright Outlook)
Science and Math	17-1022.01	Geodetic Surveyors (Bright Outlook)
Science and Math	19-3092.00	Geographers (Bright Outlook)
Science and Math	15-1099.07	Geographic Information Systems Technicians (Bright Outlook) (Green)
Science and Math	19-2042.00	Geoscientists, Except Hydrologists and Geographers

	Code	Occupation
Science and Math	15-1099.06	(Green) Geospatial Information Scientists and Technologists (Bright Outlook) (Green)
Science and Math	19-3093.00	Historians
Science and Math	19-2043.00	Hydrologists (Green)
Science and Math	19-2041.03	Industrial Ecologists (Bright Outlook) (Green)
Science and Math	19-1099.00	Life Scientists, All Other
Science and Math	19-4099.00	Life, Physical, and Social Science Technicians, All Other
Science and Math	19-2032.00	Materials Scientists (Green)
Science and Math	15-2021.00	Mathematicians (Bright Outlook)
Science and Math	19-1022.00	Microbiologists
Science and Math	19-1029.02	Molecular and Cellular Biologists (Bright Outlook)
Science and Math	17-3029.01	Non-Destructive Testing Specialists (Bright Outlook)
Science and Math	19-4051.01	Nuclear Equipment Operation Technicians (Green)
Science and Math	19-4051.02	Nuclear Monitoring Technicians
Science and Math	19-4051.00	Nuclear Technicians
Science and Math	19-1031.03	Park Naturalists
Science and Math	19-2012.00	Physicists
Science and Math	19-3094.00	Political Scientists
Science and Math	19-4099.01	Quality Control Analysts (Bright Outlook)
Science and Math	17-2072.01	Radio Frequency Identification Device (Bright Outlook)
Science and Math	19-2099.01	Remote Sensing Scientists and Technologists (Bright Outlook) (Green)
Science and Math	19-4099.03	Remote Sensing Technicians (Bright Outlook) (Green)
Science and Math	19-4061.00	Social Science Research Assistants
Science and Math	15-2041.00	Statisticians
Science and Math	19-3022.00	Survey Researchers (Bright Outlook)
Science and Math	25-1194.00	Vocational Education Teachers, Postsecondary
Science and Math	11-9121.02	Water Resource Specialists

### **GOING GREEN.....**

**Green** occupations will likely change as a result of the green economy. Green economy activities and technologies are increasing the demand for occupations, shaping the work and worker requirements needed for occupational performance, or generating new and emerging occupations. It is important to note that some areas cross over to related clusters.

## **COMPONENTS OF THE SCIENCE, TECHNOLOGY, ENGINEERING & MATHAMATICS CAREER CONTENTS**

The STEM Pathways are competency-based vocational programs that prepare the individual to enter into employment in an entry-level industrial position. Educating students in the industrial engineering program in American Samoa has primarily taken place through a traditional program delivery approach. However, education in American Samoa is experiencing rapid change. The emerging occupations and the technological advances dictate the need for change from this traditional program delivery approach to

one that is more flexible and adaptable to the needs of the industry and students. Therefore, any school reform effort must encourage quality, excellence and accountability.

The needs of business, industry, students and education will best be served by programs that provide meaningful experiences at the secondary level and that provide the foundation for a broad range of employment or further education and training opportunities.

The STEM Pathways programs provide a broad foundation of applied and transferable basic skills plus occupationally specific technical skills required for functioning in an increasingly complex and highly technological society and workplace.

The new program direction will require the following modifications to the current curriculum:

- A new vision of science, math, engineering and technology education as an integrated and interrelated part of the overall education program for students in American Samoa,
- A balanced program that develops broad, transferable skills as well as job-specific skills,
- A flexible delivery system that is in a competency-based format with measurable outcomes,
- A career guidance system that provides an individualized training plan for students that is based upon an analysis of individual strengths and interests,
- A comprehensive certification system centered around job titles that is developed in order to ensure that minimum program standards are met, and
- Equipment, facilities and supplies used in industrial programs that are representative of the current technology and application of the industrial/engineering communities.

The following are the necessary components that comprise a Career Pathway. The Guide describes each component in detail to assist the STEM Career Pathway Committee in developing the Pathways structures. The components are:

- I. Vision, Mission and Goals of the Career Pathway
- II. Core Academic Courses & Competencies
- III. Integrated Core Curriculum Development
- IV. Standards, Tests and Certification
- V. Work-Based Learning Options
- VI. Guidance and Counseling
- VII. Career Pathway Advisory Committee

- VIII. Business and Industry Involvement
- IX. Articulation & Tech Prep
- X. Community College Connections

## I. VISION, MISSION AND GOALS

Career Pathways thrive when the educators have a clear vision and focus on helping students reach their goals. The vision and goals should be developed with input from all educators, students, parents, and business partners.

### VISION

The vision is to create a school atmosphere and program for diverse learners with interests in science, technology, engineering and mathematics with academic and career pathways for success in the work place, informed citizenship, and the global society.

### MISSION

The mission of STEM is to prepare students for academic success in their future education, and prepares them to become responsible and productive citizens.

Students are immersed in a learning environment that encourages them to identify, create and solve problems while meeting the rigorous academic demands of such disciplines as science, technology, engineering and mathematics. The programs are rigorous and emphasize college preparatory education.

### *The Science, Technology, Engineering & Mathematics Career Pathways' Goals*

The Pathways programs are designed to provide students with skills, technical knowledge, and work habits necessary for employment.

#### **The Program Goals are:**

- Connect learning with earning—students who understand the relationship between learning and career skills are more likely to make a successful transition from school to career.
- Develop a common vision for all partners—both educators and business partners work together to provide the workforce needed for the future.
- Demand high expectations for all students—standards and the criteria to meet those standards are established for all students.

#### **The Student Goals are:**

- Make well-informed career choices.
- Understand and apply a career planning process
- Complete a logical sequence of core academic and appropriate vocational courses
- Perform relevant work-based learning experiences.
- Apply leadership and workplace readiness skills.
- Exit the Career Pathway System prepared for further education and employment

## **II. CORE ACADEMIC COURSES AND COMPETENCIES**

A logical sequence of relevant courses, both academic and vocational, is designed for the Science, Technology, Engineering and Mathematics Career Pathways. High school, community college and other higher education course offerings are being considered as each Career Pathway continues to develop.

Courses are developed or expanded to include nontraditional settings such as: distance learning opportunities, internet experiences, work-site settings such as engineering and/or construction companies and high school students working with community college students on projects.

Academic courses recommended in the STEM Career Pathways and content areas meet high school and/or community college entrance requirements. In developing this logical sequence all courses contained in the high school, community college and other higher education course offerings should be considered.

**SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS:** This plan of study can serve as a guide, along with other career planning materials, as learners work to achieve their career goals. Courses listed within this plan are options for recommended coursework. The learner's plan should be individualized to meet his/her educational and career goals. This plan should be customized with the educational institution's specific course titles and meet college ready/work ready requirements. Educational levels to be considered (check all that apply): \_\_\_ On-the-job training \_\_\_ Apprenticeship \_\_\_ Military Training \_\_\_ Certificate/License \_\_\_ Associate Degree \_\_\_ Bachelor Degree \_\_\_ Professional Degree

Science, Technology, Engineering and Mathematics								SAMPLE OCCUPATIONS	
NOTE: Interest Inventory Administered and Interpreted. Tentative Plan of Study Initiated for all learners.								<ul style="list-style-type: none"> <li>■ Aerospace Engineer</li> <li>■ Agricultural Engineer</li> <li>■ Analytical Chemist</li> <li>■ Anthropologist</li> <li>■ Architectural Engineer</li> <li>■ Astrophysicist</li> <li>■ Biomedical Engineer</li> <li>■ CAD Technician</li> <li>■ Civil Engineer</li> <li>■ Computer Programmer</li> <li>■ Ecologist</li> <li>■ Geologist</li> <li>■ Geothermal Engineer</li> <li>■ Math Teacher</li> <li>■ Mathematician</li> <li>■ Metallurgist</li> <li>■ Statistician</li> <li>■ Survey Technician</li> <li>■ Zoologist</li> </ul>	
	Grade Level	English/ Language Arts	Math	Science	Social Studies/ Sciences	Career and Technology Education (CTE) Pathways <i>*Italicized pathways to career majors</i>	Other Elective and Required Courses		
<b>HIGH SCHOOL / TECHNOLOGY CENTER</b>									
Academic/Career Advisement Provided	S E C O N D A R Y	9 ↓ 10 ↓ 11 ↓ 12	English/LA I English/LA II English/LA III English/LA IV	Algebra I Geometry Algebra II Trigonometry or other upper level math courses: Pre-Calculus Calculus Statistics	Biology I Chemistry Physics (Upper division lab sciences)	Samoan History American History U.S. Government Economics Geography World History	<i>*Engineering and Technology *Science and Mathematics</i>		Computer Technology or Foreign Language Fine Arts or Speech Financial Literacy Additional courses to support career goal: Technology Education Intro to Agriculture Power & Tech CAD Drafting and Design Intro to Horticulture Intro to Plant and Soil Science Intro to Environ Sci & Natural Resources Biotechnology Computer Programming Microbiology/Genetics/Zoology Pre-Engineering Additional math and science, including AP classes
	<b>COLLEGE/ UNIVERSITY</b>								
	P O S T S E C O N D A R Y	13	-English Comp I -English Comp II	-College Algebra -Trigonometry -Calculus I and II	-Chemistry -Physics	-Psychology -Global Issues	Take courses pertinent to the pathway selected.		<b>TECHNOLOGY CENTER</b> NOTE: Attainment of a CTE major at a technology center may be completed as a high school student or an adult. Career Major courses may count for college credit.
		14	-Speech/Oral Communications -Technical Writing	-Introduction to Differential Equations -Calculus III	Dependent on chosen pathway	-American History -Sociology -Ethics and Legal Issues	Continue courses pertinent to the pathway selected.		
15		Continue courses in area of specialization. Use institution's degree plan.					NOTE: Use the postsecondary institution's degree plan to help customize the learner's plan with regard to degrees, licenses, certification, etc.		
16		Complete courses for Career Major. Use institution's degree plan.							
Opportunities for experience/training for high school or postsecondary learner: ___ Career and Technology Education student organization ___ Internship/work study ___ Job shadowing ___ Mentorship ___ Part-time employment ___ Volunteer work in charitable/community organizations ___ Work based/work-site learning (Sample plan adapted from the States' Career Cluster Initiatives Pathway Plans of Study)									

(Learner Signature)

(Parent/Guardian Signature)

(School Official Signature)

Dates: Freshman review \_\_\_\_\_

Sophomore review \_\_\_\_\_

Junior Review \_\_\_\_\_

Senior Review \_\_\_\_\_

Grade 13 review \_\_\_\_\_

Grade 14 review \_\_\_\_\_

**SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS PATHWAY: SCIENCE AND MATHEMATICS** This plan of study can serve as a guide, along with other career planning materials, as learners work to achieve their career goals. Courses listed within this plan are options for recommended coursework. The learner's plan should be individualized to meet his/her educational and career goals. This plan should also be customized with the educational institution's specific course titles and meet college ready/work ready requirements. Educational levels to be considered (check all that apply):  On-the-job training  Apprenticeship  Military Training  Certificate/License  Associate Degree  Bachelor Degree  Professional Degree

Science, Technology, Engineering and Mathematics – Science and Mathematics Pathway							SAMPLE OCCUPATIONS		
NOTE: Interest Inventory Administered and Interpreted. Tentative Plan of Study Initiated for all learners.							<ul style="list-style-type: none"> <li>■ Analytical Chemist</li> <li>■ Anthropologist</li> <li>■ Applied Mathematician</li> <li>■ Archeologist</li> <li>■ Astronomer</li> <li>■ Astrophysicist</li> <li>■ Atmospheric Scientist</li> <li>■ Biologist</li> <li>■ Botanist</li> <li>■ Chemist</li> <li>■ Ecologist</li> <li>■ Economist</li> <li>■ Environmental Scientist</li> <li>■ Geneticist</li> <li>■ Geologist</li> <li>■ Geophysicist</li> <li>■ Marine Scientist</li> <li>■ Math Teacher</li> <li>■ Mathematician</li> <li>■ Meteorologist</li> <li>■ Nanobiologist</li> <li>■ Nuclear Chemist/Technician</li> <li>■ Physicist</li> <li>■ Programmer</li> <li>■ Quality-Control Scientist</li> <li>■ Research Technician</li> <li>■ Science Teacher</li> <li>■ Scientist</li> <li>■ Statistician</li> <li>■ Zoologist</li> </ul>		
Grade Level	English/ Language Arts	Math	Science	Social Studies/ Sciences	Career and Technology Education (CTE) Majors <i>*Italicized majors to additional course information</i>	Other Elective and Required Courses			
<b>HIGH SCHOOL / TECHNOLOGY CENTER</b>									
Academic/Career Advisement Provided	SECONDARY	9 ↓ 10 ↓ 11 ↓ 12	English/LA I English/LA II English/LA III English/LA IV	Algebra I Geometry Algebra II Trigonometry or other upper level math courses: Pre-Calculus Calculus Statistics	Biology I Chemistry Physics (Upper division lab sciences)	Samoan History American History U.S. Government Economics Geography World History		<ul style="list-style-type: none"> <li><i>*Biotech Medical</i> <i>*Biotech Ag</i></li> <li><i>*Biotech Pharmaceutical</i></li> <li><i>*Biotech Environmental</i></li> <li><i>*Biomedical Science and Engineering</i></li> <li><i>*Biomedical Science and Medicine</i></li> <li><i>*Medical Safety &amp; Analysis Lab. Science Technician</i> <i>*Laboratory Science Technician</i> <i>*Laboratory Science Assistant</i></li> <li><i>*Environmental Safety &amp; Analysis Laboratory Science Technician</i></li> <li><i>*Industrial Safety &amp; Analysis Laboratory Science Technician</i></li> </ul> NOTE: Cooperative Alliance courses may be listed here.	Computer Technology or Foreign Language Fine Arts or Speech Financial Literacy Additional courses to support career goal: Intro to Horticulture Intro to Plant and Soil Science Intro to Environmental Science and Natural Resources Microbiology Genetics Zoology Additional math and science, including AP classes
	<b>COLLEGE/ UNIVERSITY</b>								
	POSTSECONDARY	13	-English Comp I -English Comp II	-College Algebra or Trigonometry -Calculus I & II	-Chemistry -Physics	-Psychology -Global Issues		-Science and Mathematics in the Real World -Advanced Applications of Science and Mathematics	TECHNOLOGY CENTER NOTE: Attainment of a CTE major at a technology center may be completed as a high school student or an adult. Career Major courses may count for college credit.  NOTE: Use the postsecondary institution's degree plan to help customize with regard to degrees, licenses, certification, etc.
			-Speech/Oral Communications -Professional and Technical Writing	-Intro to Differential Equations -Calculus III -Statistics	-Organic chemistry -Microbiology	-American History - Sociology -Ethics and Legal Issues		-Using Science and Mathematics to Solve Problems -Technical Aspects of Science and Mathematics	
15		Continue courses in your area of specialization							
16		Complete Science and Mathematics Major (4-year degree program)							
Opportunities for experience/training for high school or postsecondary learner: <input type="checkbox"/> Career and Technology Education student organization <input type="checkbox"/> Internship/work study <input type="checkbox"/> Job shadowing <input type="checkbox"/> Mentorship <input type="checkbox"/> Part-time employment <input type="checkbox"/> Volunteer work in charitable/community organizations <input type="checkbox"/> Work based/work site learning (Sample plan adapted from States' Career Clusters Initiatives Pathway Plans of Study)									

(Learner Signature)

(Parent/Guardian Signature)

(School Official Signature)

Dates: Freshman review \_\_\_\_\_

Sophomore review \_\_\_\_\_

Junior Review \_\_\_\_\_

Senior Review \_\_\_\_\_

Grade 13 review \_\_\_\_\_

Grade 14 review \_\_\_\_\_

**SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS PATHWAY: ENGINEERING AND TECHNOLOGY** This plan of study can serve as a guide, along with other career planning materials, as learners work to achieve their career goals. Courses listed within this plan are options for recommended coursework. The learner's plan should be individualized to meet his/her educational and career goals. This plan should also be customized with the educational institution's specific course titles and meet college ready/work ready requirements. Educational levels to be considered (check all that apply): \_\_\_ On-the-job training \_\_\_ Apprenticeship \_\_\_ Military Training \_\_\_ Certificate/License \_\_\_ Associate Degree \_\_\_ Bachelor Degree \_\_\_ Professional Degree

Science, Technology, Engineering and Mathematics –Engineering and Technology Pathway							SAMPLE OCCUPATIONS		
NOTE: Interest Inventory Administered and Interpreted. Tentative Plan of Study Initiated for all learners.							<ul style="list-style-type: none"> <li>■ Aeronautical Engineer</li> <li>■ Aerospace Engineer</li> <li>■ Agricultural Engineer</li> <li>■ Agricultural Technician</li> <li>■ Application Engineer</li> <li>■ Architectural Engineer</li> <li>■ Automotive Engineer</li> <li>■ Biomedical Engineer</li> <li>■ Biotechnology Engineer</li> <li>■ CAD Technician</li> <li>■ Chemical Engineer</li> <li>■ Civil Engineer</li> <li>■ Communications Engineer</li> <li>■ Computer Engineer</li> <li>■ Computer Programmer</li> <li>■ Construction Engineer</li> <li>■ Electrical Engineer</li> <li>■ Electronics Technician</li> <li>■ Geothermal Engineer</li> <li>■ Industrial Engineer</li> <li>■ Manufacturing Engineer</li> <li>■ Manufacturing Technician</li> <li>■ Marine Engineer</li> <li>■ Mechanical Engineer</li> <li>■ Metallurgist</li> <li>■ Mining Engineer</li> <li>■ Nuclear Engineer</li> <li>■ Petroleum Engineer</li> <li>■ Product/Process Engineer</li> <li>■ Survey Technician</li> <li>■ Systems Engineer</li> </ul>		
Academic/Career Advisement Provided	Grade Level	English/ Language Arts	Math	Science	Social Studies/ Sciences	Career and Technology Education (CTE) Majors <i>*Italicized majors to additional course information</i>		Other Elective and Required Courses	
	<b>HIGH SCHOOL / TECHNOLOGY CENTER</b>								
	S E C O N D A R Y	9	English/LA I	Algebra I	Biology I	Samoan History		<i>*Pre-Engineering Mechanical</i>	Computer Technology or Foreign Language Fine Arts or Speech Financial Literacy Additional courses to support career goal: Technology Education Biotechnology Intro to Ag Power & Technology CAD Drafting and Design Computer Programming Pre-Engineering Additional math and science, including AP classes
		↓	English/LA II	Geometry	Chemistry	American History		<i>*Pre-Engineering Civil and Architecture</i>	
		10	English/LA III	Algebra II	Physics	U.S. Government		<i>*Pre-Engineering Biotech</i>	
		↓	English/LA IV	Trigonometry or other upper level math courses: Pre-Calculus Calculus Statistics	(Upper division lab sciences)	Economics Geography World History		<i>*Pre-Engineering Aerospace *Electronics Technician</i>	
	11								
	↓								
	12								
	<b>COLLEGE/ UNIVERSITY</b>								
P O S T S E C O N D A R Y	13	-English Comp I -English Comp II	-College Algebra -Trigonometry -Calculus I & II	-Chemistry -Physics I	-Psychology -Global Issues	-Engineering Analysis -Engineering Design	TECHNOLOGY CENTER NOTE: Attainment of a CTE major at a technology center may be completed as a high school student or an adult. Career Major courses may count for college credit.		
	14	-Speech/Oral Communications -Professional & Technical Writing	-Introduction to Differential quations -Calculus III -Statistics	-Physics II	-American History -Sociology -Ethics and Legal Issues	-Engineering Processes			
	15	Continue courses in your area of specialization					NOTE: Use the postsecondary institution's degree plan to help customize with regard to degrees, licenses, certification, etc.		
	16	Complete Engineering and Technology Major (4-year degree program)							
Opportunities for experience/training for high school or postsecondary learner: ___ Career and Technology Education student organization ___ Internship/work study ___ Job shadowing ___ Mentorship ___ Part-time employment ___ Volunteer work in charitable/community organizations ___ Work based/work site learning (Sample plan adapted from States' Career Clusters Initiatives Pathway Plans of Study)									

(Learner Signature)

(Parent/Guardian Signature)

(School Official Signature)

Dates: Freshman review \_\_\_\_\_

Sophomore review \_\_\_\_\_

Junior Review \_\_\_\_\_

Senior Review \_\_\_\_\_

Grade 13 review \_\_\_\_\_

Grade 14 review \_\_\_\_\_

**ARCHITECTURE AND CONSTRUCTION PATHWAY: CONSTRUCTION** This plan of study can serve as a guide, along with other career planning materials, as learners work to achieve their career goals. Courses listed within this plan are options for recommended coursework. The learner's plan should be individualized to meet his/her educational and career goals. This plan should be customized with the educational institution's specific course titles and meet college ready/work ready requirements. Educational levels to be considered (check all that apply): \_\_\_ On-the-job training \_\_\_ Apprenticeship \_\_\_ Military Training \_\_\_ Certificate/License \_\_\_ Associate Degree \_\_\_ Bachelor Degree \_\_\_ Professional Degree

Architecture and Construction – Construction Pathway								SAMPLE OCCUPATIONS
NOTE: Interest Inventory Administered and Interpreted. Tentative Plan of Study Initiated for all learners.								<ul style="list-style-type: none"> <li>■ Carpenter</li> <li>■ Code Official</li> <li>■ Concrete Finisher</li> <li>■ Construction Engineer</li> <li>■ Construction Foreman/Manager</li> <li>■ Construction Inspector</li> <li>■ Contractor</li> <li>■ Design Builder</li> <li>■ Drywall Installer</li> <li>■ Electrician</li> <li>■ Electronic Systems Tech</li> <li>■ Equipment and Material Manager</li> <li>■ Forklift Operator</li> <li>■ General Contractor/Builder</li> <li>■ Heating, Ventilation, Air Conditioning and Refrigeration</li> <li>■ Landscaper/Groundskeeper</li> <li>■ Brick Mason</li> <li>■ Painter</li> <li>■ Paperhanger</li> <li>■ Plumber</li> <li>■ Project Estimator</li> <li>■ Project Inspector</li> <li>■ Project Manager</li> <li>■ Roofer</li> <li>■ Safety Director</li> <li>■ Security and Fire Alarm Systems Installer</li> <li>■ Sheet Metal Worker</li> <li>■ Specialty Contractor</li> <li>■ Superintendent</li> <li>■ Tile and Marble Setter</li> </ul>
Grade Level	English/ Language Arts	Math	Science	Social Studies/ Sciences	Career and Technology Education (CTE) Majors <small>*Italicized majors additional course information</small>	Other Elective and Required Courses		
<b>HIGH SCHOOL / TECHNOLOGY CENTER</b>								
Academic/Career Advisement Provided	S E C O N D A R Y	9 ↓ 10 ↓ 11 ↓ 12	English/LA I English/LA II English/LA III English/LA IV	Algebra I Geometry Algebra II or other upper level math courses: Trigonometry Pre-calculus Calculus Statistics	Biology I Chemistry Physics (Upper division lab sciences)	Samoan History American History U.S. Gov't Economics Geography World History	<i>*Residential Construction Technician</i> <i>*Structural Carpenter</i> <i>*Construction and Architectural Design Academy</i> <i>*Residential HVAC Installer</i> <i>*Plumbing Installer</i> <i>*Residential Electricians Assistant</i> <i>*Air Distribution Fabricator/Installer</i> <i>*Cabinetmaker</i> <i>*Brick Mason</i> <i>*Advanced Frame Carpenter</i> <i>*Frame Carpenter</i> <i>*Concrete Mason</i> <i>*Commercial HVAC Installer</i> <i>*Commercial Electricians Assistant</i> <i>*Industrial Electricians Assistant</i> <i>*Construction Welder</i> <i>*Form Carpenter</i> <i>*Construction Workforce Transition</i> <i>*Lead Carpenter</i> <i>*Interior Surfaces Technician</i> <i>*Stone Mason</i> <i>*Advanced Brick Mason</i> <i>*Finish Carpenter</i> NOTE: Cooperative Alliance courses may be listed here.	Computer Technology or Foreign Language Fine Arts or Speech Financial Literacy  Additional courses to support career goal: Technology Education CAD Drafting and Design Additional math
	P O S T S E C O N D A R Y	13	<b>Technology Center Adult Only Career Majors:</b> <i>*Heavy Equipment Operator</i> <i>*Home Technology Integrator (Construction Emphasis)</i> <i>*Security and Alarm System Technician</i>					<b>COLLEGE/ UNIVERSITY</b>
		-English Comp I -English Comp II	-College Algebra -Trigonometry	Environmental Science	-American Government or History -Psychology	-Advanced Plan Reading -Construction Ethics and Legal Issues	<i>TECHNOLOGY CENTER</i> NOTE: Attainment of a CTE major at a technology center may be completed as a high school student or an adult. Career Major courses may count for college credit.	
	14	-Speech/Oral Communication -Technical Writing	- Business Accounting -Pre-Calculus or Calculus	-Physics	-Business Law -Sociology	-Technical Applications in the Construction Industry -Construction Internship		
	15	Continue courses in area of specialization					NOTE: Use the postsecondary institution's degree plan to help customize the learner's plan with regard to degrees, licenses, certification, etc.	
	16	Complete Construction Major (4-Year Degree Program)						
		Opportunities for experience/training for high school or postsecondary learner: ___ Career and Technology student organization ___ Internship/work study ___ Job shadowing ___ Mentorship ___ Part-time employment ___ Volunteer work in community organizations ___ Work based/work site learning						

(Learner Signature) \_\_\_\_\_ (Parent/Guardian Signature) \_\_\_\_\_ (School Official Signature) \_\_\_\_\_  
 Dates: Freshman review \_\_\_\_\_ Sophomore review \_\_\_\_\_ Junior Review \_\_\_\_\_ Senior Review \_\_\_\_\_ Grade 13 review \_\_\_\_\_ Grade 14 review \_\_\_\_\_  
 Sample plan adapted from the States' Career Cluster Initiative pathway plans of study

The academic courses also support industries need for skills and competencies. The Core of all American Samoa’s High School Career content areas is comprised of Foundation Skills and Competencies taken from SCANS (*Secretary’s Commission on Achieving Necessary Skills*) which identified the necessary skills all workers need to possess regardless of their career choice. These skills and competencies are:

### **FOUNDATION SKILLS**

1. **Basic Skills** – reading, writing, performing arithmetic and mathematical operations, listening and speaking
2. **Thinking Skills** – thinking creatively, making decisions, solving problems, visualizing, knowing how to learn, reasoning; and
3. **Personal Qualities** – displaying responsibility, self-esteem, sociability, self-management, integrity and honesty.

In addition to the Foundation Skills listed above, the SCANS Core Competencies will be incorporated into the Pathway courses guides. There are five SCANS competencies that comprise the core competencies all students within the American Samoa Instructional content must acquire during their progress through the high schools’ Career Pathways curriculum. They are as follows:

### **CORE COMPETENCIES**

- **Planning Skills** - Allocating financial, temporal, spatial, and human resources; preparing a budget, schedule, space layout, and staffing plan.
- **Information Skills** - Acquiring, evaluating, organizing, and communicating information.
- **Technology Skills** - Using, choosing, and maintaining equipment.
- **Interpersonal Skills** - Working with others, negotiating, teaching, working with diversity.
- **System Skills** - Understanding, monitoring, improving, and designing systems of all kinds. This most complex and important of the competencies is the most difficult to define. Most basically, workers need to work with processes that operate over time. The process can be farming, health care, constructing or installing. One can understand systems built by others or by nature. Systems will be biological, physical, social, or economic in nature. At a higher level, one can design or build a system and find a larger system to improve it as experience is gained and reflected upon.

The STEM Pathway and Career Content Areas must integrate these core competencies within the curriculum. Each student will experience these skills within the two-year Career Pathway curriculum. All students completing the Pathway will be required to meet the Core Foundation Skill Standards and the Core Competencies. Those students wishing to be certified must also pass the Certification tests for entry level employment.

## **III. INTEGRATED CORE CURRICULUM DEVELOPMENT**

“Learning to Know with Learning to Do” means preparing students to apply what they are learning by putting school and work experiences together, academic and vocational standards together, and teaching the SCANS skills with the academics.

In the process of developing the Pathway System course curriculum, committees of teachers both academic and vocational will need to work cooperatively to identify a range of occupations in each Pathway.

They will also collaboratively identify the knowledge and skills (academic and skill standards) that apply to the occupations in each course and meet with business and industry to verify or change the identified knowledge and skills.

They must then develop an effective course syllabus for each vocational course containing the following components:

- course title
- description
- prerequisite courses
- amount of credit for the course
- the performance objectives
- course outline
- materials and equipment
- texts and references
- methods of instruction
- methods of evaluation
- student skills profile
- student task list

The next step is to in-service the instructors on the new course guides and methods to implement these new requirements. This is critical in order to be able to successfully teach the knowledge and skills related to several occupational contexts. It may be necessary to restructure the environment, reschedule classes, and learn to teach in new ways that integrate academics and vocational skills in a setting that makes the subject meaningful.

**Certification Area: Electrical**

<b>A.</b>		<b>GENERAL TRADE INFORMATION</b>	<b>No. of Test Items</b>
	1	Identify NEC regulations and related professional organizations	36
	2	Identify OSHA regulations related to electrical safety	6
<b>B.</b>		<b>BASIC PRINCIPLES OF ELECTRICITY</b>	<b>No. of Test Items</b>
	3	Define electrical terms, abbreviations and acronyms	3
	4	Explain how electricity is made	3
	5	List components of a circuit	4
	6	Explain relationship of current, resistance and voltage	9
	7	Determine current draw	8
	8	Series and parallel DC circuits and concepts	6
	9	Series and parallel AC circuits and concepts	16
	10	Electrical computations	2
	11	Operating electrical test equipment	3
<b>C.</b>		<b>READING DIAGRAMS AND CALCULATIONS</b>	<b>No. of Test Items</b>
	12	Identify common electrical symbols and drawing conventions and use specifications and prints	14
	13	Interpret and evaluate circuit diagrams	3
<b>D.</b>		<b>MOTORS AND GENERATORS</b>	<b>No. of Test Items</b>
	14	Identify specific types of motors (universal, single-phase, etc.)	6
	15	Identify motor components	1
	16	Identify specific types of motor controls (two-wire, three-wire, etc.)	2
	17	Contrast types of switches and their functions	0
	18	Compare resistance of starting winding to running winding	0
	19	Connect a capacitor with a start winding	2

	20	Install relays, starters and switches	4
	21	Reverse polarity	0
	22	Reverse motor rotation	1
	23	Troubleshoot a motor problem	0
	24	Determine number of alternator poles	0
<b>E.</b>		<b>TRANSFORMERS</b>	<b>No. of Test Items</b>
	25	Contrast transformer primary and secondary windings	3
	26	Calculate current and voltage for primary and secondary windings	6
	27	Determine polarity	0
	28	Contrast rectifier circuits (half-wave, full-wave, etc.)	0
	29	Explain and calculate transformer efficiency	1
	30	Connect transformer bank	0
	31	Transformer wiring (delta; wye, etc.)	2
<b>F.</b>		<b>WIRING-CONTROLS</b>	<b>No. of Test Items</b>
	32	Select wiring system appropriate for installation	6
	33	Install and support cable	1
	34	Install ground wire	3
	35	Demonstrate wire-pulling techniques for different wiring methods	4
	36	Install boxes, devices and trim	2
	37	Troubleshoot circuits	3
	38	Rough in wiring	1
	39	Install conduit	3
<b>G.</b>		<b>LIGHTING</b>	<b>No. of Test Items</b>
	40	Describe characteristics of incandescent lamps	1
	41	Discuss characteristics of mercury vapor lamps	1
	42	Describe characteristics of fluorescent lighting	4
	43	Diagnose lighting problems	1

### ***Performance Test***

This certification test contains the following hands-on skills demonstrations in the form of jobs. The following is a brief description of the job along with an estimation of the amount of time it will take for a student to complete that job. The administration of the performance test will require students to complete the job while an evaluator observes and measures the student's performance against a set of standards. This job may be taken before or after the written part of the test.

#### **Job 1—Residential Installation (2 hrs. 20 minutes)**

The participant will be required to make installations on a 4' x 8' wall section based on an electrical plan and in accordance with national and local standards.

### ***Certification Area: Air Conditioning and Refrigeration***

<b>A</b>		<b>ELECTRICITY</b>	<b>No. of Items</b>
	1	Demonstrate knowledge of basic AC/DC theory	2
	2	Interpret symbols on an electrical diagram	2
	3	Interpret and construct electrical diagrams	2
	4	Use ohmmeters, voltmeters, and ammeters	2
	5	Identify different electrical components (motors, starter, relay, etc.)	3
	6	Identify types of fans	1
	7	Identify and classify types of electrical motors	5
	8	Perform troubleshooting	1
	9	Apply and manipulate Ohm's Law	5
	10	Test motors (and identify motor protection)	5
	11	Test transformers	2
	12	Test capacitors and calculate multiple capacitors	1

	13	Test fuses and calculate sizes	1
<b>B.</b>		<b>SOLDERING, BRAZING AND WELDING</b>	<b>No. of Items</b>
	14	Identify types of solder and alloys	2
	15	Choose proper flux for each alloy	2
	16	Indicate melting temperatures	1
	17	Set up and use torch and equipment	1
	18	Demonstrate techniques in soldering and brazing	1
	19	Check for leaks	1
	20	Weld with an Arc, MIG, and TIG welder	1
	21	Solder sheet metal	1
<b>C</b>		<b>PIPEFITTING</b>	<b>No. of Items</b>
	22	Interpret drawings on blueprints	1
	23	Measure and cut tubing or pipe	1
	24	Ream or deburr tubing or pipe	2
	25	Flare tubing	2
	26	Thread pipe	1
	27	Identify valves and fittings	2
	28	Measure and bend tubing or pipe	1
<b>D</b>		<b>REFRIGERATION</b>	<b>No. of Items</b>
	29	Differentiate between types of refrigeration systems	2
	30	Identify refrigeration components	1
	31	Identify and differentiate between system components	1
	32	Identify compound gauge	2
	33	Demonstrate personal and industrial safety techniques	1
	34	Evacuate and charge a refrigeration system	1
	35	Measure superheat	2
	36	Test for leaks	1
	37	Explain compressor operation	3
	38	Service refrigeration systems	2
	39	Identify refrigeration types	1
	40	Pump down compressors	1
<b>E.</b>		<b>CONTROLS</b>	<b>No. of Items</b>
	41	Identify low and high pressure controls	2
	42	Differentiate between a range and a differential adjustment	2
	43	Explain pressures required to operate an oil safety switch	1
	44	Differentiate between types of metering valves	2
	45	Explain the function of a distributor	1
	46	Explain application, function and operation of refrigerant controls	1
	47	Test and set fan and limit controls	1
	48	Test and calibrate thermostats	3
	49	Test cad cells	2
	50	Test aquastats	1
	51	Test motor starting relays	2
<b>F</b>		<b>INSTALLATION AND SERVICE</b>	<b>No. of Items</b>
	52	Identify and use appropriate hand and power tools	2
	53	Test, analyze, troubleshoot and repair system	1
	54	Service motor components (V-belts, mounts, pulleys, etc.)	4
	55	Install refrigeration system	2
<b>G</b>		<b>SHEET METAL AND DUCTWORK</b>	<b>No. of Items</b>
	56	Demonstrate use of sheet metal table and hand tools	2
	57	Use measurements from blueprint	1
	58	Layout duct fittings and components	2
	59	Identify sheet metals (copper, aluminum, galvanized, etc.)	1
	60	Measure sheet thickness	1
	61	Build fiberglass ducts	1
	62	Identify fiberglass duct building tools	1
<b>H</b>		<b>GENERAL SAFETY</b>	<b>No. of Items</b>

	63	Demonstrate ladder safety	1
	64	Demonstrate safe tool use	2
	65	Demonstrate electrical safety	3
	66	Demonstrate reporting accidents	2
	67	Demonstrate welding safety	1
	68	Demonstrate safe equipment repair practices	1
<b>I</b>		<b>RELATED MATH AND SCIENCE</b>	<b>No. of Items</b>
	68	Demonstrate knowledge of British Thermal Units	3
	70	Explain how compression ratio applies to system efficiency	1
	71	Measure in fractions	1
	72	Calculate circumference and diameter	1
	73	Calculate materials cost	1
	74	Demonstrate employability skills	1
	75	Demonstrate oral presentations	1
	76	Demonstrate knowledge of personal hygiene	1
	77	Apply record keeping skills	1
	78	Demonstrate computer literacy	2

### ***Performance Test: HVACR***

This certification test contains the following hands-on skills demonstrations in the form of jobs. The following is a brief description of each job along with an estimation of the amount of time it will take for a student to complete that job. The administration of the performance test will require students to complete the job while an evaluator observes and measures the student's performance against a set of standards. These jobs may be taken before or after the written part of the test.

#### Job 1 – Troubleshoot and Repair a Refrigeration System (30 minutes)

The participant will observe the operation of the refrigeration system, take all measurements on the performance test, compare the measurements to specifications given and determine the problem. The participant will then select the proper replacement part and use the proper tools and procedures to repair the system. Final measurements will then be taken and compared to specifications given to be sure the system is operating properly.

#### Job 2 – Refrigeration (1 hr. 30 minutes)

The participant is to service and troubleshoot a refrigeration system with a 1/2 H.P., 115 V, single-phase, air-cooled low temperature.

Together, the curriculum standards and certification exams constitute a critical piece of accountability for the Pathway and the business partners. Students completing the curriculum and the certification tests will offer evidence of the attainment of skills that meet industry standards. Business and industry must partner to assure that these students are recognized through the hiring process as adding value to the business hiring them.

## **V. WORKBASED LEARNING OPTIONS**

One of the most critical components of a Career Pathway, making it a unique approach to relevant, integrated education, is work-based learning. This is applied learning taken outside the classroom walls. For many students, this is the crucial element of the Career Pathway experience. Here is the application of all they have learned and is actually a component of their educational experience.

## ***Connection of School with Community and the World of Work***

To prepare students for the workplace and future careers, activities must occur at the school site and the work site that complement each other and extend the learning environment outside of the school building. Employers, community members, and parents must become partners with teachers in this effort.

In the Industrial Engineering Pathway, students beginning as early as 9<sup>th</sup> grade should have the opportunity for summer work experience and job shadowing in the 10<sup>th</sup> grade. To make this possible there must be a close working relationship between the school and the community with employers, parents and teachers planning and working together. It is also helpful to have volunteer or paid coordinators at the high schools to organize and schedule meaningful workplace experiences that allow students to connect what they learn in the classroom with the world of work.

As students progress through the 11<sup>th</sup> and 12<sup>th</sup> grade, the amount of time and the level of interaction and skills increases in workplace experiences with some students spending several hours a day learning and working in the community. Mentoring in the 11<sup>th</sup> grade, internships in the 12<sup>th</sup> grade as well as volunteering/community service opportunities and some school-based enterprises are being developed to continue to cultivate students' career plans and to provide increasingly more complex work-based experiences for students.

Projects that require students to work in the community and with employers to solve problems and extend learning should be developed jointly with the school and credit given when students meet the expectations of both the academic and work-based requirements. Panels of employers, other community members, and educators may judge the products produced and the performance of the student in relation to a set of standards.

On the following page is an example of how some high schools are structuring their curriculum to allow for both school and work-based experiences to occur simultaneously with each supportive of the other. There are different way to structure the school day and the delivery of instruction to connect 'learning to know with learning to do'. Each high school and community needs to work together to find a system that fits the interests and needs of the students, assuring that ALL students are given the opportunity to participate not just those in vocational programs.

### **School to Work Learning Component for the Pathways**

#### ***An Example***

***(The following is an example of how work-based learning is being accomplished on one Pacific island)***

Career exploration and experiences in work-based learning begin in 9<sup>th</sup> grade in Career Development I. Students are introduced to career interests and explore each Career Pathway area. Students rotate approximately every 7 weeks through the four Career Pathway orientations (Business Information, Health and Human Resources, Industrial/Engineering and Natural Resources).

9<sup>th</sup> grade students are also provided instruction in completing job applications, how to conduct oneself during a job interview, letters of application and developing resumes. Students also are introduced to proper processes for securing and changing employment. During the course of Career Development I class, students are given instruction on labor laws, termination processes

and entrepreneurial skills. Opportunities in non-traditional jobs are explored and discussed along with the relationship of work, family, society and leisure. Guest speakers from the Chamber of Commerce and other businesses are utilized to assist in teaching these skills and concepts.

In addition, students in the course develop a career pathway plan, set goals, and develop a career portfolio for use during high school. Students are provided instruction in the workplace through guest speakers, field trips to businesses, teacher lectures and hands-on activities specific to each Career Pathway during the rotations.

Students also are provided an opportunity to use the ERISS computerized career information delivery system to identify sources of employment within each Career Pathway.

In the Career Development II course, students explore different career clusters. In this course particular attention is given to human relation skills in the context of career development. Each student develops a career plan to assist them in making career choices.

A technology component is included to provide students the opportunity for hands-on integrated technology applications useful in the workplace. Students will be expected to apply these technology skills to the various career Pathways.

In the Career Development II course, all 10<sup>th</sup> grade students are expected to participate in a job shadowing experience in the area of their career interest. The job shadowing activity must take place outside of normal school hours. The students are expected to identify the career area, the business and make contact with the appropriate person within the business to arrange the date for the job shadowing experience. It is recommended that the Career Pathway students experience more than one day of job shadowing.

In many schools with a block schedule, a course called Career Practicum has been implemented. In this structure, the students are in a classroom with the teacher two days per week and on a work-site observing three days per week. The class continues for one semester. The students are given a structure set of assignments that can only be completed by working with a sponsor or mentor at the work site. The students journal their experiences each day and must identify other issues in the workplace such as safety, continued education, salary and benefits, impact of the economy on the business, inventory, accounting and other components that may be unique to the industry. The days in the classroom are spent in investigating the career cluster and occupations within the cluster as well as making presentations and reports concerning their work experience. This option provides the student with a more complex experience to offer more information as students are making decisions about entering a selected Career Pathway. In the Career Practicum students are encouraged to engage in diverse experiences so that a compare and contrast method of data analysis can take place as part of the decision-making process to enter a Career Pathway or select an occupational focus.

At the end of the year in Career Development II, students will rotate through each of the Career Pathway areas and visit vocational departments at the community college. Students are expected to make a Career Pathway choice by the end of their sophomore year.

## VI. GUIDANCE AND COUNSELING

(The following overview and components of a comprehensive Guidance and Counseling program is entered here for possible consideration by the Department of Education in American Samoa)

The Guidance and Counseling program is a comprehensive K-12 program that is based on twelve competencies. These competencies for Grades 9-12 are:

### AREA I--Career Planning and Exploration

Category A—Planning and Developing Careers

Category C—Understanding How Being Male or Female Relates to Jobs and Careers

Category D—Making Decisions About College

Category L—Planning high school Classes

Category N—Learning How to Use Leisure Time

### AREA II—Knowledge of Self and Others

Category B—Understanding and Accepting Self

Category F—Making Decisions

Category H—Understanding and Getting Along With Others

Category K—Knowing How Alcohol and Other Drugs Affect Me and My Friends

Category P—Learning About Marriage and Family Responsibilities

Category Q—Understanding and Appreciation for Cultural Values and Traditions

### AREA III—Educational and Occupational Exploration

Category J—Improving Basic Skills and Study Learning Skills

Category M—Learning From Friends and Others Who Have Graduated

Category D—Vocational Selection and Training

Category E—Preparation for Finding Jobs

Category I—Finding Jobs

Category F—Making Decisions

The competencies are taught through increasingly more complex activities throughout the K-12 learning process. The comprehensive guidance and counseling program provides a very important foundation upon which the Career Pathways are built. Students with experiences in identifying interests, investigating occupations and understanding themselves are much more ready to select a career focus within the Career Pathway structure. The active involvement of the counselors as advisors and resource people for the Career Development classes is an important role. This relationship between the counselors and Career Development teachers will assure that all the career-development related activities in the school are connected and are focused on helping students select a Career Pathway and successfully acquire the academic and technical skills needed to be successful in work or further education.

In 9<sup>th</sup> grade, students are provided activities that teach the guidance competencies through the Career Development I(or Investigation) course. The Career Development I course provides opportunities for students to work on the Individual Career Planner and develop the Career Portfolio.

The students have taken the self-assessments such as interests, aptitudes, etc. Counselors should take the lead in working cooperatively with the Career Development teachers in assuring that

each student has taken the appropriate career assessments and participated in a session to interpret the assessments. The results of the assessments should be shared in an individual career advisement session with the family. Counselors can help the teachers communicate the importance of these activities to the students and their families.

In the 9<sup>th</sup> grade, students will utilize the results of the assessments taken in 8<sup>th</sup> grade to develop the Career Portfolio. Counselors should work cooperatively with the Career Development teacher to assure the student is developing a Career Portfolio and including all relevant information not only acquired within the Career Development class but also through activities in the workplace and in the counseling office. The Career Portfolio will continue to be developed during the student's high school education.

As students develop their Individual Career Plan to meet their own individual career goals, a conversation among parents, counselors, and teachers should be taking place to assure students have access to many sources of advice and information. It is within the Career Development I course that students are first able to rotate through a 7-week introduction to each of the Career Pathways for exploration. It is during these rotations that the students will need help in relating their rotation through the Pathways with the assessments on interests and experiences. It is during this time they should begin to tentatively identify the Career Pathway that they will select in 10<sup>th</sup> grade.

The Individual Career Plan should be periodically reviewed and revised to make the needed adjustments to accommodate student's goals as they change and grow. Student advisement is considered the job of everyone in the school setting not just counselors or career development teachers. Parental involvement is very important - they hold the most powerful position to convince students of the importance of education.

## **VII. CAREER PATHWAY ADVISORY COMMITTEE**

Each Career Pathway needs an Advisory Committee in place. The Advisory Committee's role is to provide input into the structure of the Career Pathway, the curriculum and business connections.

The Steering/Advisory Committee is an adjunct, voluntary group of community members who are qualified in a specific area or areas. The committee is formed annually. The committee is strictly advisory in capacity and had no administrative or legislative authority.

This committee also consists of individuals involved in Career Pathway System's operations including Department and school administrators, coordinating/lead teachers, and counselors. The committee reviews policies and procedures and makes recommendations to ensure the Career Pathway program meets both educational and career goals. Business and Industry representatives should be individuals who are able to obtain the needed support (e.g. job shadowing, summer work experience jobs, mentors, equipment) to make the program a success. The committee should be large enough that a different task force can be formed to work on particular issues or solve specific problems without overburdening individuals (e.g. task force for curriculum development, job development, and recruitment of mentors and other volunteers, student support services, public relations).

## **VIII. BUSINESS AND INDUSTRY INVOLVEMENT**

In developing the Transportation Career Pathways, the business partners should be representative of the related business presence in the community. They are partners in all aspects of the Career Pathway development and progress, especially the relevancy of the curriculum and in developing the certification examinations. They may in the future provide equipment and materials. They are hosts for field trips and for providing a work site for job shadowing. Business partners are valuable resource people for teachers and may mentor students as well as provide summer and after-school work experiences for students.

Business/industry and education partners have worked toward consensus in developing and affirming the standards and certification test items within the Transportation Career Pathways and will assist with the Pilot testing and review of future curriculum for the Pathways System.

## **IX. ARTICULATION AND TECH PREP**

The purpose of the articulation component of Tech Prep is to provide linkages among the American Samoa High School and American Samoa Community College which assist all students in making a smooth transition from one level to another.

Articulation focuses on creating a smooth transition from the secondary school to a post-secondary setting or the work force. It also facilitates lateral transfer of students between high schools. This component involves identification of articulation linkage points, establishment of teams to link secondary and post-secondary component of the Tech Prep program, and the creation of sequential courses of study for all students.

The development of the Vocational Course Guides is the first step in articulating high school and community college curriculum. A Memorandum of Understanding (MOU) needs to be signed signifying the intent to articulate vocational high school courses with correlating technical community college courses. It is the intent for high school vocational students mastering the competencies and standards equal to those in certain courses at the community college through testing, portfolios or competency certificates to be awarded credit upon successful admission and performance at the community college. In this way, the standards for high school vocational programs will be improved, students will be rewarded for their work and students will have an improved method for transitioning from high school, to community college, to work. The outcome will be:

- coordination of Industrial Engineering & Technology content between secondary and postsecondary courses and among high school courses
- sequential courses of high school study which better prepare student for postsecondary programs or employment after high school
- dual enrollment in vocational/technical and academic courses

## **X. COMMUNITY COLLEGE CONNECTIONS**

American Samoa Community College (ASCC) was founded in 1970 to provide post-secondary education opportunities in the liberal arts, teacher training, vocational-technical education and general education to the residents of American Samoa. As a Land Grant Institution, the

American Samoa Community College provides two-year transferable programs in general education, vocational-technical training as well as programs in Samoan and Pacific Studies, Adult Education and literacy.

ASCC is granted full accreditation by the Western Association of Schools and Colleges and the Accrediting Commission of Community and Junior Colleges.

Connections will be built from American Samoa High schools to ASCC through vertical integration of the academic courses. The Computer and Business Management Career Pathways align with the College of Arts and Sciences through the Associate of Science Degree in Business Management, the Associate of Science Degree in Office Administration and Technology, and the Associate of Science Degree in Public Administration. Certificates of Proficiency in Accounting and Office Administration and Technology offered by the community college also connect with the high schools' career content areas in Computer and Business Management.

### ***Entrance Requirements***

Admission is open to all that can profit from instruction at ASCC provided they meet the following conditions:

- The student is a legal resident of American Samoa.
- The student is a high school graduate, General Education Diploma recipient, bears an U.S. Military Form 214 or is at least 18 years of age.
- The student is admitted under the special admission policy for high school seniors.

### ***Degrees and Certificates***

ASCC offers the Associate of Science Degree (AS) and the Associate of Arts Degree (AA) and Certificates of Proficiency.

- **The Associate of Science (AS) degree** is awarded to students successfully completing a program of occupational, technical, professional and general education courses. The purpose of the Associate of Science degree program is to prepare students for employment and/or to continue education in their prospective field of interest. Students graduating with an Associate of Science degree must meet the following requirements:
  1. Complete general graduation requirements.
  2. Complete general education requirements.
  3. Complete program requirements.
  4. Meet the residency requirements of 15 credits toward program be completed at ASCC.

**The Associate of Arts (AA) degree and the Associate of Science (AS) degree** is awarded to students successfully completing a program of occupational, technical, professional and general education courses. The purpose of the Associate of Science and Associate of Arts degree programs is to prepare students for employment and/or to continue education in their prospective field of interest. Students graduating with Associate degrees must meet the following requirements:

1. Satisfactory completion of the General Education Core.
2. Satisfactory completion of the required number of credits and courses for the selected associate degree program.
3. Cumulative grade point average of 2.0(C average) or better, as well as for the last semester.
4. Satisfactory completion of the prescribed series of courses for the selected major.

5. Meet the residency requirements of 18 credits toward program are completed at Campus with the exception of the associate degree programs in Education, which can be earned on the American Samoa campus.
6. Transfer credits from other institutions are limited to the extent that at least 30 credits of the major are earned at ASCC.

The **Certificate of Achievement** is offered by a number of programs of study and is intended for the student seeking immediate employment or students currently working and are seeking a career upgrade. This program also intends to reduce the reliance on foreign skilled work force and help the citizens of American Samoa to be productive members of the society and be able to contribute to the general welfare and economic development of American Samoa. High school graduates or those who have a GED are eligible for admissions into the program. The specific course requirements are specified by individual Certificate programs.

A minimum of 30 semester credit hours and a minimum cumulative grade point average of 2.0 are required for a Certificate of Achievement.

## Connections to High School Pathways

The following degrees and corresponding coursework are listed here as a possible continuation of the high school Pathway curriculum that should align with this ‘Next Step’ in a student’s career plan. Connections will be built from American Samoa High School to American Samoa Community College through vertical integration of the academic courses. The Transportation Career Contents may align through the Certificates of Achievement in Construction Electricity, Refrigeration and Air conditioning, and Electronic Engineering Technology.

To be granted a *Certificate of Achievement in Electricity*, the following must be fulfilled:

- 3 credits\_\_ Technical English
- 3 credits\_\_ Technical Math I
- 3 credits\_\_ Technical Math II
- 3 credits\_\_ Small Business Management
- 3 credits—Basic Computer Applications
- 3 credits\_\_ Industrial Safety
- 3 credits\_\_ Blueprint Sketching and Interpretation
- 3 credits\_\_ Construction Procedures
- 3 credits\_\_ Basic Electricity I
- 3 credits\_\_ Basic Electricity II
- 3 credits\_\_ Electrical Wiring
- 3 credits\_\_ National Electrical Code

Total Credits – 36

To be granted a *Certificate of Achievement in Refrigeration and Air Conditioning*, the following must be fulfilled:

- 3 credits\_\_ Technical English
- 3 credits\_\_ Technical Math I
- 3 credits\_\_ Technical Math II
- 3 credits\_\_ Small Business Management

- 3 credits—Basic Computer Applications
- 3 credits—Introduction to Electronic Engineering
- 3 credits\_\_Refrigeration I
- 3 credits—Refrigeration II
- 3 credits—Refrigeration III
- 3 credits\_\_Basic Electricity I
- 3 credits\_\_Basic Electricity II
- 3 credits\_\_Electrical Wiring
- 3 credits\_\_ Fundamentals of Oxyacetylene Welding

Total Credits - 39

To be granted a *Certificate of Achievement in Electronic Engineering Technology*, the following must be fulfilled:

- 3 credits\_\_Technical English
- 3 credits\_\_Technical Math I
- 3 credits\_\_Technical Math II
- 3 credits\_\_Small Business Management
- 3 credits—Basic Computer Applications
- 3 credits—DC Circuits I
- 3 credits\_\_DC Circuits II
- 3 credits—AC Circuits I
- 3 credits—AC Circuits II
- 3 credits\_\_Semiconductor Devices
- 3 credits\_\_Electronic Circuits
- 4 credits\_\_Digital Technology

Total Credits - 37

## **EMPLOYMENT OUTLOOK**

Employment of electrical and engineering workers is obviously of great demand today. These activities will increase in the next five years in response to demand for new housings, commercial and industrial buildings, hotels, and many other projects that are being planned. The need for people with formal training is apt to rise because of the introduction of new and improved tools, equipment, techniques and materials.

Job opportunities in Transportation Technology are expected to be plentiful for those who have training in formal programs. Use of new technology for car, bus and boat engines will contribute to the demand of highly trained technicians. Increasing numbers of people own a car which clearly indicates the need for more technicians.

## **SUMMARY**

The Career Pathways System combines high-level academics and career skills with a real-life context for learning that maximizes students' present and future academic and career success.

***Career Pathway instruction strengthens—***

- Vocational and academic integration and teamwork among teachers and students
- Partnerships between education, the family, community and business and industry
- Acquisition of career goals and skills for both additional education and the workplace

***Everyone benefits—***

- Students are more motivated, learn more, are able to apply what they learn and feel connected to the world around them
- Parents become part of the process as a contributing member of the team that helps their students make good career choices based on academic and field experiences
- Teachers learn new teaching strategies and work collaboratively developing curriculum and projects with employers, parents and other colleagues
- Employers become contributors to the curriculum, provide meaningful work experiences related to that curriculum, and will be able to reap the benefits of an improved work force of the future.

## STEM PATHWAY ACKNOWLEDGMENTS

The following persons contributed to the information presented in this Guide and are gratefully acknowledged for their expertise:

Director of the State Department of Education

American Samoa State Department of Education staff

Dr. Jessie Teddlie, CETA Consultant

Dr. Belinda McCharen, Assoc. Supt, DOE. Oklahoma

Dr. Katherine Manley, NOCTI Consultant

Pacific educators, business and industry volunteers who developed the curriculum standards and certification tests with Dr. Manley:

### Teachers

- Brinton Peter, Construction
- Renato Calma, Construction
- John Sigrah, Electronics
- Qulick Ahiksa, Auto Mechanics
- Herton Mongkeya, Auto Mechanics

### Construction

- Bob Jerry, Public Works
- Rollence Weilbacher, Public Works (Air Conditioning and Refrigeration)
- Solomon Talley, Public Works (Plumbing)

### Marine Mechanics

- Robert Taulung—Marine Resources
- Tony W. Abraham—Marine Resources
- Maxwell H. Salik—Marine Resources
- Anderson L. Tilfas—Marine Resources
- Semeon A. Luke—Marine Resources

### Transportation

- Thansley Kinere, Public Works (automotive and Heavy Equipment)

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