Science, Technology, Engineering and Mathematics Career Cluster
Cluster Knowledge and Skill Statements

The following Cluster (Foundation) Knowledge and Skill Chart provides statements that apply to all careers in the Science, Technology, Engineering and Mathematics Cluster. Persons preparing for careers in the Science, Technology, Engineering and Mathematics Cluster should be able to demonstrate these skills in addition to those found on the Essential Knowledge and Skills Chart. The Pathway Knowledge and Skill Charts are available in separate documents.

Cluster Topic SCC01	**ACADEMIC FOUNDATIONS:** *Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.*
	No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic SCC02	**COMMUNICATIONS:** *Use oral and written communication skills in creating, expressing and interpreting information and ideas including technical terminology and information.*

SCC02.01   **Prepare STEM material in oral, written, or visual formats that provide information to an intended audience to fulfill specific communication need of an audience.**

SCC02.01.01   Use effective methods to communicate concepts of STEM to a broadly represented audience.

Sample Indicators
- Report subjective and objective information.
- Report information with the intent of being persuasive.
- Report information with the intent of being informational.
- Report information with the intent of being instructional.
- Analyze the audience and presentation environment.
- Explain technical concepts to non-technical audiences.
- Use professional terminology.
- Identify, select, use appropriate multimedia resources.
- Discern between various communication techniques and their ability to convey various types of information.
- Explain various methods of obtaining information.

SCC02.01.02   Effectively communicate STEM information to a select audience.

Sample Indicators
- Explain the various methods of presenting information.
- Use oral presentation skills to present scientific, technological, engineering, or mathematical reports.
- Use written presentation skills to present scientific, technological, engineering, or mathematical reports.
- Use visual presentation skills to present scientific, technological, engineering, or mathematical reports.
- Use multimedia presentation skills to present scientific, technological, engineering, or mathematical reports.

SCC02.01.03   Apply the ability to read, interpret, and analyze STEM materials discerning the information and concepts.

Sample Indicators
- Use appropriate note-taking methods.
- Write a report on technical literature; use graphical tools as appropriate.
- Present a report on technical literature; use graphical tools as appropriate.

Discriminate between fact and opinion.

SCC02.02 **Apply active listening skills to obtain or clarify information pertaining to plans, processes, projects, or designs.**

SCC02.02.01 Interpret messages or information provided that clarifies issues, ideas, plans, projects, or processes.

Sample Indicators Indicate familiarity of topic being presented.

Respond accordingly using appropriate verbal and nonverbal language.

Answer questions correctly and be able to provide feedback in own words.

SCC02.02.02 Respond and/or restate information that will clarify STEM techniques to be used and/or information to be applied to projects, plans, or processes.

Sample Indicators Ask questions to seek or confirm understanding.

Paraphrase and/or repeat information.

Record notes and summarize information from written notes.

Cluster Topic SCC03	**PROBLEM-SOLVING AND CRITICAL THINKING:** *Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.*

SCC03.01 **Effectively develop and apply the skills inherent in systems engineering where requirements, configuration, integration, project management, quality assurance, and process applications are necessary.**

SCC03.01.01 Apply the skills and abilities in requirements analysis and configuration control while working plans, processes, and projects as assigned.

SCC03.01.02 Use the skills required in project management to track and assess the progress of a plan, process, or project as assigned.

SCC03.01.03 Apply the skills in quality assurance as well as those in process management and development for appropriate applications of systems integration techniques to an assigned project.

Cluster Topic SCC04	**INFORMATION TECHNOLOGY APPLICATIONS:** *Use information technology tools specific to the career cluster to access, manage, integrate, and create information.*

SCC04.01 **Effectively use information technology to gather, store, and communicate data in appropriate formats.**

SCC04.01.01 Use IT in support of gathering, storage, and transfer of data or results in appropriate formats to support assigned projects.

Sample Indicators Apply different techniques for gathering storing and transferring data.

SCC04.01.02 Select and use assorted forms of IT to meet the requirements of a plan, process, project, report, issue, or problem.

Write a report based on Internet research, using calculations, graphs, and/or spreadsheets.

Sample Indicators

Create, organize, manage, and distribute information in electronic format.

SCC04.02 **Evaluate and use skills relating to the differing technological tools used to manipulate, report, or operate with data acquisition.**

SCC04.02.01 Use IT tools to manipulate data creating reports, plans, processes, or projects from data provided.

Sample Indicators
- Use statistical tools to analyze data.
- Query and extract information from data.
- Create knowledge from data.

SCC04.02.02 Use modeling, simulation, or visual reproduction to effectively analyze, create, and/or communicate to others regarding plans, projects, problems, issues or processes.

Sample Indicators
- Apply techniques for modeling systems or problems.
- Apply techniques for scientific visualization and animation of complex physical systems or problems.
- Test different scenarios to multiple variables.

SCC04.02.03 Apply a currently applicable computer programming language to a process, project, plan, or issue as assigned.

Sample Indicators
- Write a computer program, e.g., Java, C++.
- Execute a computer program, e.g., Java, C++.

SCC04.02.04 Apply statistical tools that verify the reliability or validity of the data used or collected in the plan, project, process, or problem.

Sample Indicators
- Using a selected statistical tool, compute data reliability.
- Select and use the tools to analyze and synthesize data.
- Describe the meaning of probability and how it applies to a set of data.

SCC04.02.05 Apply a technological, scientific, or mathematical concept (use of algorithms) when communicating with others on issues, plans. processes, problems, or concepts.

Sample Indicators
- Select the proper visualization tools.
- Use simulation, modeling, prototype techniques to solve problems.
- Communicate data visually.

Cluster Topic SCC05	**SYSTEMS:** *Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. Identify how key organizational systems affect organizational performance and the quality of products and services. Understand global context of industries and careers.*
	No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic SCC06	**SAFETY, HEALTH AND ENVIRONMENTAL:** *Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.*

SCC06.01   **Apply safety practices in the environment where science, technology, engineering, and/or mathematical principles are appropriate to ensure a safe workplace.**

SCC06.01.01   Apply appropriate safety and health practices when developing plans, projects, processes, or solving complex problems.

Sample Indicators   Exercise good safety practices.

Follow various regulatory codes, such as EPA, FEMA, UL, OSHA, CSA.

Reference and use material safety data sheets (MSDS).

Encourage others to employ safe practices.

SCC06.01.02   Use appropriate safety techniques, equipment, and processes in planning and /or project applications.

Sample Indicators   Demonstrate safe use of tools and equipment.

Develop and implement emergency plans.

Develop and implement workplace lab safety plan.

Follow workplace regulations and record-keeping requirements.

Demonstrate the use of safety equipment in the workplace.

Demonstrate the use of eyewash and safety showers

Accurately interpret safety signs, symbols, and labels.

Demonstrate basic first aid techniques.

SCC06.02   **Develop an awareness of safety, health, and environmental hazards inherent in the STEM arenas when solving problems, developing plans, processes, or completing projects to be proactive in promoting safety.**

SCC06.02.01   Identify existing or potential hazards to existing or assigned plans, projects, or processes where safety, health, or environment might be in play.

Sample Indicators   Describe potential safety, health and environmental hazards in various situations.

Identify physical, chemical, toxicological, biological, and radioactive hazards.

Analyze environmental impacts.

Conduct a safety audit.

Cluster Topic SCC07	**LEADERSHIP AND TEAMWORK:** *Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.*
	No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic SCC08	**ETHICS AND LEGAL RESPONSIBILITIES:** *Know and understand the importance of professional ethics and legal responsibilities.*

SCC08.01   **Develop the knowledge and abilities to comprehend ethical and legal standards as they apply to STEM where plans, processes, and projects will be dependent upon them.**

SCC08.01.01 Demonstrate the skill of application to ethical and legal standards as they apply to the plans, processes, and projects as assigned in simulated environments.

Sample Indicators

Evaluate the pros and cons of current ethical questions and scenarios, for example, environmental stewardship, genetic research, and living subjects in research.

Comply with ethical standards and professional code of ethics.

Follow legal requirements for the treatment of people in the workplace (ADA, EEO).

Follow requirements of regulatory agencies in the scientific, and mathematics, engineering, or technology field (e.g., NFPA. OSHA, EPA, ADA, EOE, FCC).

Develop personal ethics for real-life situations and experiences.

Evaluate personal, professional, and organizational ethics.

Explain fundamentals of patents, trademarks, copyrights, and proprietary information.

Recognize and refute misleading information.

Evaluate methods for protecting and conserving resources.

Cluster Topic SCC09	**EMPLOYABILITY AND CAREER DEVELOPMENT:** *Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.*

SCC09.01 **Develop the skills and abilities to research career pathways in STEM.**

SCC09.01.01 Engage experiences in STEM where an individual can identify personal interests and expectations for career and personal development.

Sample Indicators

List resources for researching funding sources for scientific projects and technology.

List careers that you have investigated, internships that you could apply for, and job shadowing opportunities that you have identified.

Construct and maintain a portfolio of experiences and accomplishments.

Cluster Topic SCC10	**TECHNICAL SKILLS:** *Use the technical knowledge and skills required to pursue the targeted careers for all pathways in the career cluster, including knowledge of design, operation, and maintenance of technological systems critical to the career cluster.*

No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.