

**CAREER CLUSTER™: SCIENCE, TECHNOLOGY, ENGINEERING
AND MATHEMATICS**
**NM Job Council's 13 Economic Sectors Primary Alignment: Emerging
Technologies (non-governmental)**

Pathways and related Programs of Study in this career cluster address 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.

The Pathways for this Career Cluster™ are:

- Engineering and Technology
- Science and Mathematics

Below are the POS's developed by the statewide stakeholders who participated in the development process.

Program Learning Outcomes from the NASDCTE Common Career Technical Core: Note: it is expected that a student completing any Program of Studies in this Career Cluster would transition to post secondary college and career being able to know and do each of these Standards, unless otherwise noted.	
1.	Apply engineering skills in a project that requires project management, process control and quality assurance.
2.	Use technology to acquire, manipulate, analyze and report data.
3.	Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.
4.	Understand the nature and scope of the STEM Career Cluster™ and the role of STEM in society and the economy.
5.	Demonstrate an understanding of the breadth of career opportunities and means to those opportunities in each of the STEM Career Pathways.
6.	Demonstrate technical skills needed in a chosen STEM field.

THE CERTIFICATIONS LISTED BELOW ARISE FROM INTERVIEWS, WEBINARS, AND FOCUS GROUPS WITH SECONDARY AND POST SECONDARY EDUCATORS AS WELL AS INPUT FROM INDUSTRY PARTNERS AND REPRESENTATIVES. THE NEXT STEP FOR VALIDATION IS LABOR MARKET DATA AND THE ECONOMIC NEEDS OF BOTH THE STATE OF NEW MEXICO AND THE REGIONS.

Industry Certifications
Precision Exams Certification: <ul style="list-style-type: none"> • Foundations of Technology
Certiport: <ul style="list-style-type: none"> • Autodesk Inventor

Engineering and Technology: For a future in the Engineering and Technology pathway, students should study and apply principles from advanced mathematics life sciences physical science, earth and space science, and technology. In addition, future engineers and technologists should learn certain processes in mathematics, science and technology. In Grades 9-12, all future engineers and technologists should study mathematics each year, learning important mathematical concepts and processes defined by the National Council of Teachers of Mathematics in Principles and Standards for School Mathematics. With such knowledge and skills, students will be able to demonstrate the following competencies: 1.) Apply mathematics, science and technology concepts to solve problems quantitatively in engineering projects involving design, development or production in various technologies; and 2.) Recognize the core concepts of technology and their relationships with engineering, science and math, and other subjects. All future engineers and technologists should learn important science concepts and processes with an understanding of physics, chemistry and biology as a minimal set. These concepts and processes are defined by the National Research Council in the National Science Education Standards and by the American Association for the Advancement of Science in Benchmarks for Science Literacy. Additionally, learners should become proficient in the areas of technology defined by the Standards for Technological Literacy.

Program Learning Outcomes from the NASDCTE Common Career Technical Core for ENGINEERING AND TECHNOLOGY:

Note: it is expected that a student completing the Program of Studies listed below would transition to post secondary college and career being able to know and do each of these Standards, unless otherwise noted.

1.	Use STEM concepts and processes to solve problems involving design and/or production.
2.	Display and communicate STEM information.
3.	Apply processes and concepts for the use of technological tools in STEM.
4.	Apply elements of the design process.
5.	Apply the knowledge learned in STEM to solve problems.
6.	Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.

Program of Study Course Sequence for ENGINEERING AND TECHNOLOGY CAREER PATHWAY:

Note: it is expected that a student completing the Program of Studies listed below would transition to post secondary college and career being able to know and do each of these Standards, unless otherwise noted.

	9 th Grade	10 th Grade	11 th Grade	12 th Grade
Career and Technical Courses and/or Degree Major Courses as Dual Credit	1626 Emergent Technologies	1783 Scientific Technology	452 Electronics - General	963 Energy and Power
CCRB Approved Career Technical Education (CTE) program of study: <i>Project Lead The Way</i>	1615 Introduction to Engineering Design	1617 Principles of Engineering 1714 Biology Specific Topics	1619 Civil Engineering and Architecture (CEA) 1733 AP Physics I	1620 Engineering Design and Development 1735 AP Physics B
CCRB Approved Career Technical Education (CTE) program of study: <i>SREB</i>	TBA Nature of Science and Technology	TBA Core Applications of Science and Technology	TBA Impacts of Science and Technology	TBA Creativity and Innovations

Program Learning Outcomes Matrix FOR ENGINEERING AND TECHNOLOGY CAREER PATHWAY:

Note: each dot represents the understanding that the student taking that course would have the best opportunity to know and be able to do the CCTC knowledge and skill standards listed above.

Courses in the POS		Program Learning Outcomes					
STARS No.	Course Title	1	2	3	4	5	6
1626	Emergent Technologies						
1783	Scientific Technology						
452	Electronics - General						
963	963 Energy and Power						
1617	Principles of Engineering						
1615	Introduction to Engineering Design						
1620	Engineering Design and Development						
1619	Civil Engineering and Architecture						

STARS No.	Course Descriptions:
452	Electronics - General - Recommended for Students Grades 10 - 12 - Courses offer training in the theory and skills involved in repairing and rebuilding electronic equipment such as radios, television sets, and industrial equipment; they typically include the basic theory of electricity as well. Course topics may include AC, DC, analog, and integrated circuitry, solid state and digital devices, amplifiers, and semiconductors.
963	Energy and Power - Recommended for Students Grades 10 - 12 - Course focuses on one or several aspects of energy and power in transportation and work. Course content may include various sources of energy and their use in society (for example, characteristics, availability, conversion, storage, environmental impact, and socioeconomic aspects of various energy sources); principles involved in various means of energy transfer, such as electricity/electronics, hydraulics, pneumatics, heat transfer, and wind/nuclear/solar energies; and the transmission and control of power through mechanical or electrical devices such as motors and engines.
1626	Emergent Technologies - Recommended for Students Grades 9 - 12 - Course exposes students to the new technologies that affect our technological society. A wide range of technologies may be covered, but examples include video production and editing, lasers, fiber optics, electronics, robotics, technical communications, bio/chemical technologies, and computer technologies (artificial intelligence, computer-aided design and/or machining, and so on). This course is often offered in a modular format.
1783	Scientific Technology - Grades 10-12 - This is a project based course using emergent technologies to give students hands on experience exploring scientific theories and processes. Utilizing microscopy, robotics, supercomputing, and 3D modeling, students will create an independent research project to address real life problems. Students will present their projects at a science fair and compete in robotics and/or supercomputing competitions. <i>NM 9-12 Science Standards. Strand I: Standard I (Benchmarks I, II, III). Strand II: Standard I (Benchmarks II, III), Standard II (Benchmarks I, II). Strand III: Standard I (Benchmark I)</i>

PROGRAM OF STUDY COURSE SEQUENCE FOR ENERGY AND POWER – FUEL CELL ENGINEER

Note: it is expected that a student completing the Program of Studies listed below would transition to post secondary college and career being able to know and do each of these Standards, unless otherwise noted.

	9 th Grade	10 th Grade	11 th Grade	12 th Grade
CCRB Approved Career Technical Education (CTE) program of study	Energy and Power Foundations	Energy Transmission and Distribution	Electronics and Control Systems	Advanced Science and Engineered Systems

Program Learning Outcomes Matrix FOR ENERGY AND POWER – FUEL CELL ENGINEER:

Note: each dot represents the understanding that the student taking that course would have the best opportunity to know and be able to do the CCTC knowledge and skill standards listed above.

Courses in the POS		Program Learning Outcomes					
STARS No.	Course Title	1	2	3	4	5	6
TBA	Energy and Power Foundations						
TBA	Energy Transmission and Distribution						
TBA	Electronics and Control Systems						
TBA	Advanced Science and Engineered Systems						

STARS No.	Course Descriptions:
TBA	Energy and Power Foundations – Through contextual project, students will learn and apply physics, chemistry, fluid mechanics, thermodynamics, algebra, and statistics in learning how these systems interact in the energy and power arena.
TBA	Energy Transmission and Distribution – This course focuses on energy transmission and consumer usage. Students will be introduced to AC and DC power, transformers, and the electrical grid / Smart Grid.
TBA	Electronics and Control Systems – Through projects, students will apply their knowledge to more advanced systems and learn how to program and use National Instrument’s LabVIEW software and the myDAQ data acquisition device to work as engineers in making and analyzing countless scientific measurements.
TBA	Advanced Science and Engineered Systems – Through well-developed projects, Students will assume the roles of building technicians, design engineers, recreational engineers, electrical technicians and CEOs, while learning about real-world energy and power issues.

Science and Mathematics: Those who choose careers in the Science and Mathematics pathway apply essential mathematics and science content and skills in a real world context Science and mathematics occupations include those in physical, environmental and human endeavors. Career possibilities range from teachers of science and mathematics to lab technicians to NASA astronauts. Preparation for such occupations require the following: 1) Understanding the process and applying the skills necessary to engage in discovery; 2) Recognizing the need to obtain a broad education in science and mathematics and share (communicate) this knowledge with the world; and 3) Understanding the role of gathering, creating, processing and sharing data in science and mathematics.

Program Learning Outcomes from the NASDCTE Common Career Technical Core for SCIENCE AND MATHEMATICS:	
<i>Note: it is expected that a student completing the Program of Studies listed below would transition to post secondary college and career being able to know and do each of these Standards, unless otherwise noted.</i>	
1.	Apply science and mathematics to provide results, and algorithms for engineering and technological activities
2.	Apply science and mathematics concepts to the development of plans, processes and projects that address real-world problems.
3.	Analyze the impact that science and mathematics has on society.
4.	Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.

Program of Study Course Sequence for SCIENCE AND MATHEMATICS CAREER PATHWAY:				
<i>Note: it is expected that a student completing the Program of Studies listed below would transition to post secondary college and career being able to know and do each of these Standards, unless otherwise noted.</i>				
	9 th Grade	10 th Grade	11 th Grade	12 th Grade
Career and Technical Courses and/or Degree Major Courses as Dual Credit	1626 Emergent Technologies	1783 Scientific Technology	<i>Has to be developed by a post secondary institution: Physics Laboratory</i>	<i>Has to be developed by a post secondary institution: Scientific Research</i>
Suggestions for Enrichment to POS	0873 Math Engineering Science Achievement (MESA)	0873 Math Engineering Science Achievement (MESA) II	0873 Math Engineering Science Achievement (MESA) III	0873 Math Engineering Science Achievement (MESA) IV

Program Learning Outcomes Matrix FOR SCIENCE AND MATHEMATICS CAREER PATHWAY:

Courses in the POS		Program Learning Outcomes			
STARS No.	Course Title	1	2	3	4
1626	Emergent Technologies				
873	Math Engineering Science Achievement (MESA)				
1783	Scientific Technology				

STARS No.	Course Descriptions:
1626	Emergent Technologies - Recommended for Students Grades 9 - 12 - Course exposes students to the new technologies that affect our technological society. A wide range of technologies may be covered, but examples include video production and editing, lasers, fiber optics, electronics, robotics, technical communications, bio/chemical technologies, and computer technologies (artificial intelligence, computer-aided design and/or machining, and so on). This course is often offered in a modular format.
1783	Scientific Technology - This is a project based course using emergent technologies to give students hands on experience exploring scientific theories and processes. Utilizing microscopy, robotics, supercomputing, and 3D modeling, students will create an independent research project to address real life problems. Students will present their projects at a science fair and compete in robotics and/or supercomputing competitions
873	Math Engineering Science Achievement (MESA) - Course incorporates hands on, real-world math activities into a variety of practical scientific situations by using experimental skills and processes to reach solutions. Students are challenged to discover hidden principles of math, science, engineering, and technology and apply these principles through the use of critical thinking, problem solving, and decision making by using theoretical frameworks, and by developing prototypes and working models.