

# Engineering & Technology Education (2023-24): Exploration of Aerospace Technology and Career Planning (8600052)

Demonstrate an understanding of the characteristics and scope of technology.--  
The student will be able to: **1**

- 1 Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative. 1.01**
- 2 Explain how technology is closely linked with creativity, which has resulted in innovation. 1.02**
- 3 Demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it. 1.03**
- 4 Describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative. 1.04**

Demonstrate an understanding of the core concepts of technology.--The student will be able to: **2**

- 1 Describe technological systems including input, processes, output, and, at times, feedback. 2.01**
- 2 Apply systems thinking, involving considering how every part relates to others. 2.02**
- 3 Identify control systems having no feedback path and requiring human intervention, and control systems using feedback. 2.03**
- 4 Explain how technological systems can be connected to one another. 2.04**
- 5 Repair malfunctions of any part of a system that may affect the function and quality of the system. 2.05**
- 6 Compare and contrast requirements or parameters placed on the development of a product or system. 2.06**
- 7 Compare and contrast trade-offs as a decision process recognizing the need for careful compromises among competing factors. 2.07**

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**8 Describe different technologies that involve different sets of processes. 2.08**

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**9 Perform basic maintenance as the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability. 2.09**

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**10 Utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change. 2.1**

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**Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.--The student will be able to: 3.0**

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**1 Modify the way technological systems interact with one another. 3.01**

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**2 Apply a product, system, or environment developed for one setting in another setting. 3.02**

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**3 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems. 3.03**

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**Demonstrate an understanding of the cultural, social, economic, and political effects of technology.--The student will be able to: 4**

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**1 Identify the ways that use of technology affects humans, including their safety, comfort, choices, and attitudes about technology's development and use. 4.01**

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**2 Explain that technology, by itself, is neither good nor bad; but decisions about the use of products and systems can result in desirable or undesirable consequences. 4.02**

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**3 Identify ethical issues associated with the development and use of technology. 4.03**

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**4 Identify the economic, political, and cultural issues that are influenced by the development and use of technology. 4.04**

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**Demonstrate an understanding of the effects of technology on the environment.--The student will be able to: 5**

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**1 Describe the management of waste produced by technological systems as an important societal issue. 5.01**

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**2 Describe how technologies can be used to repair damage and to break down waste from the use of various products and systems. 5.02**

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**3 Make decisions about the development and use of technologies that put environmental and economic concerns in direct competition with one another. 5.03**

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**Demonstrate an understanding of the role of society in the development and use of technology.--The**

**1 Describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies. 6.01**

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**2 Describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations. 6.02**

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student will be able to: .6.0

- 3 Understand social and cultural priorities and values that are reflected in technological devices. 6.03
- 4 Explain how meeting societal expectations is the driving force behind the acceptance and use of products and systems. 6.04

Demonstrate an understanding of the influence of technology on history.--The student will be able to: 7

- 1 Identify inventions and innovations that have evolved by using slow and methodical processes of tests and refinements. 7.01
- 2 Explain how the specialization of function has been at the heart of many technological improvements. 7.02
- 3 Identify the design and construction of structures for service or convenience evolving from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships. 7.03
- 4 Investigate how, that in the past, an invention or innovation was not usually developed with the knowledge of science. 7.04

Demonstrate an understanding of the attributes of design.--The student will be able to: 8

- 1 Use design as a creative planning process that leads to useful products and systems. 8.01
- 2 Explain why there is no perfect design. 8.02
- 3 Evaluate criteria and constraints that are requirements for a design. 8.03

Demonstrate an understanding of engineering design.--The student will be able to: 9

- 1 Utilize the design process involving a set of steps, which can be performed in different sequences and repeated as needed. 9.01
- 2 Employ brainstorming as a group problem-solving design process in which each person in the group presents his or her ideas in an open forum. 9.02
- 3 Model, test, evaluate and modify designs to transform ideas into practical solutions. 9.03

Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.--The student will be able to: 10

- 1 10.01 Use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system. 10.01
- 2 10.02 Describe invention as a process of turning ideas and imagination into devices and systems and innovation as the process of modifying an existing product or system to improve it. 10.02
- 3 10.03 Identify technological problems that are best solved through experimentation. 10.03

**Demonstrate the abilities to apply the design process.--The student will be able to:** 11

- 1 Apply a design process to solve problems in and beyond the laboratory-classroom.** 11.01
- 2 Specify criteria and constraints for the design.** 11.02
- 3 Make two-dimensional and three-dimensional representations of the designed solution.** 11.03
- 4 Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.** 11.04
- 5 Make a product or system and document the solution.** 11.05

**Demonstrate the abilities to use and maintain technological products and systems.--The student will be able to:** 12

- 1 Use information provided in manuals, protocols, or by experienced people to see and understand how things work.** 12.01
- 2 Use tools, materials, and machines safely to diagnose, adjust, and repair systems.** 12.02
- 3 Use computers and calculators in various applications.** 12.03
- 4 Operate and maintain systems in order to achieve a given purpose.** 12.04

**Demonstrate the abilities to assess the impact of products and systems.--The student will be able to:** 13

- 1 Design and use instruments to gather data.** 13.01
- 2 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.** 13.02
- 3 Identify trends and monitor potential consequences of technological development.** 13.03
- 4 Interpret and evaluate the accuracy of the information obtained and determine if it is useful.** 13.04

**Demonstrate an understanding of and be able to select and use information and communication technologies.--The student will be able to:** 17

- 1 Describe communication systems made up of a source, encoder, transmitter, receiver, decoder, and destination (e.g. phonetic alphabet).** 17.01
- 2 Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas (e.g. airport symbols and signs).** 17.02

**Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.-**

- 1 Follow classroom/laboratory safety rules and procedures.** 21.01
- 2 Demonstrate good housekeeping at workstations within a classroom/laboratory.** 21.02

**-The student will be able to: 21**

**3 Conduct classroom/laboratory activities and equipment operations in a safe manner. 21.03**

**4 Exercise care and respect for all tools, equipment, and materials. 21.04**

**5 Select appropriate tools, machines, and equipment to accomplish a given task. 21.05**

**6 Identify color-coding safety standards. 21.06**

**7 Safely use hand tools and power equipment. 21.07**

**8 Explain fire prevention and safety precautions and practices for extinguishing fires. 21.08**

**9 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment. 21.09**

**Exhibit positive human relations and leadership skills.--The student will be able to: 22**

**1 Perform roles in a student personnel system or in a career and technical student organization (CTSO). 22.01**

**2 Work cooperatively with others. 22.02**

**Describe the influences that societal, economic, and technological changes have on employment trends and future training. 24.0**

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**Develop skills to locate, evaluate, and interpret career information. 25.0**

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**Identify and demonstrate processes for making short and long term goals. 26.0**

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**Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship. 27.0**

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Understand the relationship between educational achievement and career choices/postsecondary options. 28.0

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Identify a career cluster and related pathways through an interest assessment that match career and education goals. 29.0

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Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals. 30.0

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30 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals. 30.0

Demonstrate knowledge of technology and its application in career fields/clusters. 31.0

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Discuss educational and training requirements as they relate to various aerospace careers.--The student will be able to: 39

1 Research and identify various aerospace career choices. 39.01

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2 Discuss individual interests related to a career. 39.02

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3 List occupations, job requirements, and job opportunities in aerospace technology. 39.03

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4 List occupational training programs and academic programs at the secondary/postsecondary levels in aerospace technology. 39.04

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Demonstrate an understanding of and be able to select and use aerospace technologies.--The student will be able to: 40.0

1 Describe subsystems of aerospace vehicles, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively. 40.01

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2 Employ processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions that are necessary for the entire transportation system to operate efficiently. 40.02

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Demonstrate knowledge of the basic principles of

1 Define terminology associated with aerostatics and aerodynamics. 41.01

**aerostatics and aerodynamics.--The student will be able to:** 41.0

- 2 Explain how buoyancy principles affect an object in a fluid. 41.02
- 3 Explain how Bernoulli's Principle applies to an object in flight. 41.03
- 4 Identify and describe basic forces acting on an object in flight. 41.04
- 5 Build an aerostatic vehicle. 41.05
- 6 Build an aerodynamic vehicle. 41.06

**Identify and demonstrate knowledge of both liquid and solid propellant rocket propulsion systems.-- The student will be able to:** 42

- 1 Define technical terminology associated with propulsion systems. 42.01
- 2 Identify parts of a solid-propellant rocket engine. 42.02
- 3 Identify parts of a liquid-propellant rocket engine. 42.03
- 4 Discuss the principles of rocket propulsion. 42.04
- 5 Construct a solid- or liquid- propellant model rocket. 42.05

**Define and describe the stages and forms of interference in basic satellite systems.--The student will be able to:** 43

- 1 Describe the basic functions and advantages of a communications satellite. 44.01
- 2 Describe the basic functions and advantages of a weather satellite. 44.02
- 3 Describe the basic functions and advantages of a navigation satellite. 44.03

**Become familiar with the basic information provided by a sectional chart.--The student will be able to:** 44

- 1 Extract and utilize information from an aeronautical chart legend. 44.01
- 2 Identify locations on an aeronautical chart using latitude and longitude 44.02
- 3 Differentiate between statute and nautical miles. 44.03
- 4 Determine a course and distance between two points on an aeronautical chart using a navigational plotter. 44.04

**Describe and define different categories of aviation.--The student will be able to:** 45

- 1 Describe military aviation and be able to identify military aircraft types and missions. 45.01
- 2 Define general aviation (including business and executive) and be able identify general aviation aircraft types. 45.02
- 3 Define air carrier and be able identify air carrier aircraft types. 45.03