

**ADVANCED TECHNICAL APPLICATIONS
ESSENTIAL CURRICULUM
(125 hours)**

Unit 1: Technology & Engineering (25 hours)

Indicator Statement:

Develop an understanding of the core concepts of technology and engineering design

Objectives: Students will be able to:

- Apply logic and creativity in creating and utilizing systems with appropriate compromises in complex real-life problems.
- Explain that systems are the building blocks of technology, are embedded within larger technological, social, and environmental systems.
- Describe how technological systems are influenced by all of the components in the system, especially those in the feedback loop.
- Select resources while understanding the trade-offs between competing values, such as availability, cost, desirability, and waste.
- Create requirements involving the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development.
- Optimize processes or methodologies of designing or making a product dependent on criteria and constraints.
- Utilize new technologies to create new processes.
- Establish design principles to evaluate existing designs, to collect data, and to guide the design process.
- Explain how engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
- Describe that a prototype is a working model used to test a design concept by making actual observations and necessary adjustments.
- Utilize the process of engineering design while taking into account a number of factors.

Unit 2: Information & Communication Technology (25 hours)

Indicator Statement:

Develop an understanding of and ability to select and use information and communication technologies

Objectives: Students will be able to:

- Explain that information and communication technologies include the inputs, processes, and outputs associated with sending and receiving information.
- Assess how information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
- Utilize information and communication systems to inform, persuade, entertain, control, manage, and educate.

- Describe that communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
- Create many ways to communicate information, such as graphic and electronic means.
- Utilize technological knowledge and processes to communicate using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.

Unit 3: Medical Technology (25 hours)

Indicator Statement:

Develop an understanding of and ability to select and use medical technologies

Objectives: Students will be able to:

- Analyze how medical technologies prevent illness and rehabilitate patients.
- Assess how medical technologies, such as vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within protect and maintain health.
- Utilize telemedicine as a convergence of technological advances in a number of fields, including medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology.
- Describe how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures.

UNIT 4: Agricultural & Bio-Related Technologies (25 hours)

Indicator Statement:

Develop an understanding of and ability to select and use agricultural and biotechnologies

Objectives: Students will be able to:

- Explain that agriculture includes a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products.
- Apply biotechnology in areas of agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering.
- Promote conservation as the process of controlling soil erosion, reducing sediment in waterways, conserving water, and improving water quality.
- Utilize engineering design in the management of agricultural systems to meet requirements of artificial ecosystems and to minimize the negative effects of technological development on flora and fauna.

Unit 5: Entertainment Technology (25 hours)

Indicator Statement:

Develop ability to apply the design process

Objectives: Students will be able to:

- Identify a design problem to solve and decide whether or not to address it.
- Identify criteria and constraints and determine how these will affect the design process.
- Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
- Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.
- Develop and produce a product or system using a design process.
- Evaluate final solutions and communicate observation, processes, and solutions.

DRAFT