ARCHITECTURAL ENGINEERING DESIGN 2
ESSENTIAL CURRICULUM
TE.AED2

STANDARDS

➔Students will develop an understanding of the nature of technology.
➔Students will develop abilities to assess the impacts of technology.
➔Students will demonstrate knowledge of and apply the engineering design and development process.
➔Students will demonstrate knowledge of and skills related to the core technologies, the building blocks of the designed world.
➔Students will demonstrate knowledge of the major enterprises that produce the goods and services of the designed world.

INDICATORS

TE.AED2.01 - **Explain that the nature of development of technological knowledge and processes are functions of the setting.**

OBJECTIVES

TE.AED2.01.01 - Identify and demonstrate how the nature and development of technological knowledge and processes are functions of the architectural design.

TE.AED2.01.02 - Explain how different cultures develop their own Architectural requirements to satisfy their individual and shared needs, wants, and values.

TE.AED2.02 - **Explain that inventions and innovations are the result of specific, goal-oriented research.**

OBJECTIVES

TE.AED2.02.01 - Identify and describe how inventions and innovations that have impacted architectural design are the results of specific, goal-oriented research.

TE.AED2.02.02 - Describe how architectural design methods are market driven.

TE.AED2.02.03 – Research, explain and demonstrate how a number of different architectural elements contribute to shaping the design and demand of various technologies.

TE.AED2.03 - **Explain that optimization is an ongoing process or methodology of designing or making a product and is dependent on criteria and constraints.**

OBJECTIVES

TE.AED2.03.01 - Demonstrate how systems-thinking applies logic and creativity with appropriate compromises in current architectural design.

TE.AED2.03.02 - Explain and demonstrate how requirements involve the identification of the architectural criteria and constraints of a product or system and the determination of how they affect the final design and development.

TE.AED2.03.03 - Explain how current architectural building codes are a planned process to ensure that a product, service, or system meets established criteria.

TE.AED2.04 - **Describe how changes caused by the use of technology can range from gradual to rapid and from subtle to obvious.**

OBJECTIVES

TE.AED2.04.01 - Demonstrate and explain how complex systems within architectural design have many layers of controls and feedback loops to provide information.

TE.AED2.04.02 - Explain that technological ideas are sometimes protected through the process of patenting.

TE.AED2.05 - **Make informed decisions about the use of technology, weighing the trade-offs between positive and negative effects.**

OBJECTIVES

TE.AED2.05.01 - Identify and demonstrate how technology transfer occurs when an existing innovation developed for one purpose is utilized in the architectural element.

TE.AED2.05.02 - Demonstrate and explain that technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.

TE.AED2.05.03 - Explain that making decisions about the use of technology involves weighing the trade-offs between the positive and negative effects.

TE.AED2.06 - **Apply the design process (STL-11)**

OBJECTIVES

TE.AED2.06.01 - Demonstrate and describe that the design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.

TE.AED2.06.02 - Demonstrate and explain that design problems are seldom presented in a clearly defined form.

TE.AED2.06.03 - Explain how architectural designs need to be checked, critiqued, redefined and improved.

TE.AED2.06.04 - Identify and describe that requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.

TE.AED2.06.05 - Identify the design problem to solve and decide whether or not to address it.

TE.AED2.06.06 - Identify criteria and constraints and determine how these will

affect the design process.

TE.AED2.06.07 - Refine an architectural design by using modeling to ensure quality, efficiency, and productivity of the final product.

TE.AED2.06.08 - 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.

TE.AED2.06.09 - Develop and produce a model within the architectural design process.

TE.AED2.06.10 - Evaluate final solutions and communicate observation, processes, and results of the entire architectural design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.

TE.AED2.07 - **Use and maintain technological products and systems (STL-12)**

OBJECTIVES

TE.AED2.07.01 - Demonstrate and explain how established architectural design principles are used to evaluate existing designs, to collect data, and to guide the design process.

TE.AED2.07.02 - Demonstrate and describe how engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

TE.AED2.07.03 - Demonstrate that a prototype is a working model used to test a design concept by making actual observations and necessary adjustments.

TE.AED2.07.04 - Identify and explain how the process of engineering design takes into account a number of factors.

TE.AED2.07.05 - Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.

TE.AED2.08 - **Select and use manufacturing technologies (STL-19)**

OBJECTIVES

TE.AED2.08.01 - Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.

TE.AED2.08.02 - Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.

TE.AED2.08.03 - Operate systems so that they function in the way they were designed.

TE.AED2.08.04 - Demonstrate and describe that materials have different qualities and may be classified as natural, synthetic, or mixed.

TE.AED2.08.05 - Demonstrate and explain that the interchangeability of parts increases the effectiveness of manufacturing processes.

TE.AED2.09 - **Conduct a structured research and development (R&D) process as part of a design problem.**

OBJECTIVES

TE.AED2.09.01 - Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.

TE.AED2.09.02 - Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate

TE.AED2.09.03 - Collect information and evaluate its quality.

TE.AED2.10 - **Analyze the functioning of the core technologies (mechanical, structural, electrical, fluid, thermal, optical, materials, and bio technologies) in terms of common components, basic system design, safety, simple controls, and system performance evaluation.**

OBJECTIVES

TE.AED2.10.01 - Describe that the engineering design and management of agricultural systems require knowledge of artificial ecosystems and the effects of technological development on flora and fauna.

TE.AED2.10.02 - Demonstrate and describe how the design of structures includes a number of requirements. Structures require maintenance, alteration, or renovation periodically to improve them or to alter their intended use.

TE.AED2.11 - **Use knowledge of the core technologies in the engineering design process.**

OBJECTIVES

TE.AED2.11.01 - Identify and demonstrate how energy resources can be renewable or nonrenewable.

TE.AED2.11.02 - Identify and demonstrate how power systems must have a source of energy, a process, and loads

TE.AED2.12 - **Describe how the engineering design process is applied in medical technologies, agricultural and biotechnologies, energy and power technologies, information and communication technologies, transportation technologies, manufacturing technologies, and construction technologies.**

OBJECTIVES

TE.AED2.12.01 - Demonstrate and describe that technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.