

# Grades 9, 10, 11, 12

Adopted 2011

**Engineering and technology impacts the world and humankind. ET1**

**1 (9-12). Identify the factors affecting technological advances (e.g. social, economic, political, cultural, and environmental) throughout history. ET1.1 (9-12)**

1 (9-12). Students demonstrate an understanding of the influences of technology by: ET1.1 (9-12)

- 1a. analyzing factors related to the development of technology and its effects on the rate of change on the designed world.
- 1b. assessing the relationship between available resources and the development of technology.
- 1c. analyzing the evolution of factors affecting technological advances in a global environment (e.g. satellites, transportation, media).
- 1aa. forecasting technological advancements based on potential needs and wants. (e.g. eBooks, Kindle)
- 1bb. developing technology to meet a need and identify potential tradeoffs.

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**2 (9-12). Analyze and explain advancements in technological systems and their impact on the world. ET1.2 (9-12)**

2 (9-12). Students demonstrate an understanding of the impacts of technology by: ET1.2 (9-12)

- 2a. revising a current technological system and analyzing the global effects of the innovation (e.g. transition from fossil fuels to use of renewable resources).
  - 2b. modeling the design of a technological system and evaluating its impact on humankind
  - 2aa. designing a technological system to meet a specified need and analyzing its potential impact on the world
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**Effective design through engineering and technology is the outcome of a problem solving process involving the application of content knowledge, acquired skills, and creativity. ET2**

**1 (9-12). Evaluate and refine the design used to solve a real world problem. ET2.1 (9-12)**

**1 (9-12).** Students demonstrate an understanding of the attributes of a design process by: **ET2.1 (9-12)**

- 1a.** identifying in-depth criteria and constraints by developing a concise problem statement.
- 1b.** evaluating and finalizing the most appropriate design solution for a given scenario or task
- 1c.** creating a team and assigning roles to team members for the purpose of achieving an overall desired result.
- 1aa.** reevaluating the process utilized in the development of the design solution with the goal of enhanced efficiency.
- 1bb.** identifying the personnel positions required to complete a task and the essential qualities required of each position

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**2 (9-12). Incorporate technological products, systems and their tools to achieve design solutions. ET2.2 (9-12)**

**2 (9-12).** Students demonstrate an understanding of technological products and systems by: **ET2.2 (9-12)**

- 2a.** selecting independently the proper tools or information resources used in completing a task.
- 2b.** incorporating proper information, material selection and appropriate tools throughout the design process. (e.g. digital micrometers, digital oscilloscopes)
- 2c.** documenting, communicating, and evaluating processes and procedures used to build, operate, and maintain systems.
- 2d.** integrating information to develop possible solutions and evaluate designs.
- 2aa.** designing specific tools (e.g. jigs and fixtures) to expedite the task.
- 2bb.** creating technically written documentation to support a designed product.

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**3 (9-12). Refine the processes of research and development, invention and innovation, experimentation, and troubleshooting for the purpose of achieving an optimal design solution. ET2.3 (9-12)**

- 3 (9-12). Students demonstrate an understanding of what is an optimal design solution by: ET2.3 (9-12)
- 3a. independently develop and utilize a process to solve a real world problem and justifying the selection.
  - 3b. selecting appropriate materials to construct a working prototype and/or simulation.
  - 3c. evaluating and refining a complex design solution for a working prototype
  - 3d. presenting comparative simulations/ prototypes and defending the selected solution.
  - 3aa. revising a process to solve a real world problem given unexpected constraints. (e.g. time, funding, personnel)
  - 3bb. developing an alternative solution to a design problem.
  - 3cc. researching the patent application process.
  - 3dd. presenting solutions to a community problem in a public forum (e.g. senior exhibitions).

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**The designed world community selects and uses appropriate technologies. ET3**

**1 (9-12). Experience and implement the various areas in engineering and technology. ET3.1 (9-12)**

- 1 (9-12). Students demonstrate an understanding of the areas of engineering and technology by ET3.1 (9-12)
- 1a. preparing a career portfolio of a particular area of engineering or technology.
  - 1b. evaluating the connections within the areas of engineering and technology as they apply to a student designed product.
  - 1aa. participating in an internship or job shadowing opportunity in a particular engineering / technological discipline.

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**2 (9-12). Evaluate the effectiveness of tools to measure, design, and implement specific technologies. ET3.2 (9-12)**

- 2 (9-12). Students demonstrate an understanding of selecting appropriate tools by: ET3.2 (9-12)
- 2a. evaluating the effectiveness of various tool(s) used in specific technologies.
  - 2b. developing or improving a tool for a specific technology (e.g. software, jig, fixture).
  - 2aa. Design, manufacture and test a prototype.