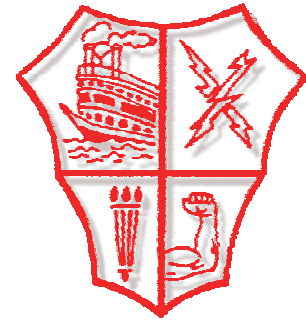


OHIO ACADEMIC CONTENT STANDARDS TECHNOLOGY STANDARDS

Adopted from the Ohio Department of Education



Grade 12

New Richmond Exempted Village School District

Grade 12

Academic Correlation

Standard 1 ~ Nature of Technology

Benchmark A: Synthesize information, evaluate and make decisions about technologies.

1. Demonstrate how the development of technological knowledge and processes are functions of the setting.
2. Predict the impact of the exponential development and diffusion of technology.
3. Invent a product using goal-directed research.
4. Plan/construct technological products considering profit incentive and market economy.

Benchmark B: Apply technological knowledge in decision-making.

1. Design/construct a model to demonstrate how all components contribute to the stability of a technological system.
2. Make, support and defend decisions that involve trade-offs between competing values.
3. Evaluate the sustainability of a system based on social, economic, political, technological, cultural, historical, moral, aesthetic, biological and physical dimensions.

Benchmark C: Examine the synergy between and among technologies and other fields of study when solving technological problems.

1. Debate the positive and negative outcomes of technology transfer.
2. Demonstrate how technological innovation can result when ideas, knowledge or skills are shared within or among technologies or across other fields.
3. Predict changes in society as a result of continued technological progress, and defend the rationale.

Standard 2 ~ Technology and Society Interaction

Benchmark A: Interpret and practice responsible citizenship relative to technology.

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| 1. Make informed choices among technology systems, resources and services. | |
| 2. Articulate how different factors, such as individual curiosity, advertising, strength of the economy, the goals of a company and current trends, contribute to shaping the design of and demand for various technologies. | |
| 3. Debate the advantages and disadvantages of widespread use and reliance on technology in the workplace and in society as a whole. | |
| 4. Evaluate national and international policies that have been proposed as ways of dealing with social changes resulting from new technologies (e.g., censorship of the media, intellectual property rights, or organ donations). | |

Benchmark B: Demonstrate the relationship among people, technology and the environment.

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| 1. Forecast intended and unintended consequences of technology deployment. | |
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Benchmark C: Interpret and evaluate the influence of technology throughout history, and predict its impact on the future.

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| 1. Debate the position that technology has been a powerful force in reshaping the social, cultural, political and economic landscape, citing references and examples. | |
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Benchmark D: Analyze ethical and legal technology issues and formulate solutions and strategies that foster responsible technology usage.

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| 1. Predict what might happen if the principles of intellectual property were ignored in one's own community. | |
| 2. Forecast changes in laws and legislation that might result from the exponential growth of technology. | |
| 3. Respect the principles of intellectual freedom and intellectual property rights. | |
| 4. Practice responsible and ethical usage of technology. | |

Benchmark E: Assess the impact of products and systems.

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| 1. Design forecasting techniques to evaluate the results of altering natural systems. | |
| 2. Select a technology that has had national impact and describe its impact. | |

Standard 3 ~ Technology for Productivity Applications

Benchmark A: Integrate conceptual knowledge of technology systems in determining practical applications for learning and technical problem solving.

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| 1. Research and create technology systems, resources and services to solve technical problems. | |
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Benchmark B: Identify, select and apply appropriate technology tools and resources to produce creative works and to construct technology-enhanced models.

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| 1. Assimilate productivity and technological tools into all aspects of solving problems and managing personal information and communications. | |
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Standard 4 ~ Technology and Communication Applications

Benchmark A: Apply appropriate communication design principles in published and presented projects.

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| 1. Analyze the complexities and discrepancies found in communication products. | |
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2. Facilitate message intent by incorporating design elements that contribute to the effectiveness of a specific communication medium into student generated products (e.g., black and white footage to imply documented truth; set design that suggests cultural context).	
3. Interpret ethical considerations and legal requirements involved in construction of communication products.	
Benchmark B: Create, publish and present information, utilizing formats appropriate to the content and audience.	
1. Use Web technologies to disseminate information to a broader audience.	
2. Explain evaluation criteria and processes used in telecommunications.	
Benchmark C: Identify communication needs, select appropriate telecommunication tools and design collaborative interactive projects and activities to communicate with others, incorporating emerging technologies.	
1. Communicate using all manifestations of e-mail as needed for personal and curricular purposes, demonstrating appropriate and responsible use.	
2. Use all available online communication capabilities to make inquiries, do research and disseminate results.	
3. Research emerging communication technologies (e.g., wireless systems, open source software and systems, virtual reality).	
Standard 5 ~ Technology and Information Literacy	
Benchmark A: Determine and apply an evaluative process to all information sources chosen for a project.	
1. Evaluate information collected to answer both personal and curricular needs to determine its accuracy, authority, objectivity, currency and coverage.	
2. Acknowledge intellectual property in using information sources.	
3. Determine and apply an evaluative process to all information sources chosen for a project.	
Benchmark B: Apply a research process model to conduct research and meet information needs.	
1. Derive a personally developed research model to conduct independent research.	
2. Refine the information question to focus the research process, modifying the question as necessary to broaden or narrow the inquiry.	
3. Critique information sources to determine if different points of view are included.	
4. Integrate multiple information sources in the research process.	
5. Create a product to communicate information, representing a personal point of view based on findings.	
6. Adhere to copyright and intellectual property laws and guidelines when creating new products (e.g., standard bibliographic format, permissions to use information created by others).	
7. Monitor progress and evaluate actions during the process, revising and incorporating new information as indicated by personal evaluation.	
8. Archive final product in a format accessible in the future.	

Benchmark C: Formulate advanced search strategies, demonstrating an understanding of the strengths and limitations of the Internet, and evaluate the quality and appropriate use of Internet resources.

1. Synthesize search results retrieved from a variety of Internet resources to create an information product for a targeted audience.	
2. Incorporate defined field searching by initiating a search string identifying the desired field of information to be retrieved (e.g., search author or title).	
3. Create a stand-alone system for tracking Internet resources for personal and academic needs (e.g., post-secondary institutions of interest).	
4. Critique research retrieved through the Internet for authority, accuracy, objectivity, currency, coverage and relevancy.	

Benchmark D: Evaluate choices of electronic resources and determine their strengths and limitations.

1. Research information from electronic archives (e.g., list serv archives, Web log sites).	
2. Use a variety of technology resources for curriculum needs and personal information needs (e.g., streaming video, CD/DVD, subscription database).	
3. Evaluate technology resources and determine strengths and weaknesses for curricular or personal needs.	
4. Select appropriate tool, online resource, or Web-site based on the information need.	

Standard 6 ~ Design

Benchmark A: Identify and produce a product or system using a design process and evaluate the final solution and communicate findings.

1. Implement the design process: 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.	
2. Apply the separation principles to overcome contradictions in systems (e.g., time, space, combining or dividing systems, physical-chemical changes).	
3. Apply the concepts of system dynamics and systems thinking to the solution of problems.	
4. Evaluate a design solution using conceptual, physical, 3-D computer 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 (e.g., check the design solutions against criteria and constraints).	
5. Evaluate final solutions and communicate observations, processes and results of the entire design process using verbal, graphic, quantitative, virtual and written means, in addition to three-dimensional models.	
6. Summarize to another person the enjoyment and gratification of designing/creating/producing a completed illustration, drawing, project, product, or system.	

7. Apply and evaluate appropriate design processes and techniques to develop or improve products or services in one of the technological systems (manufacturing, construction, information and communication, energy and power, transportation, medical, and agricultural and related biotechnologies).	
8. Predict/project the need for changes in copyright, patent and trademark laws, considering the rapid changes in technology and society.	
Benchmark B: Recognize the role of teamwork in engineering design and of prototyping in the design process.	
1. Develop and use a process to evaluate and rate several design solutions to the same problem.	
2. Solve a problem as a group with students each taking a specific engineering role (e.g., design a light rail hub with students taking the roles of architect, civil engineer, mechanical engineer).	
3. Build a prototype to use as working model to demonstrate a design's effectiveness to potential customers.	
4. Explain how the process of engineering design takes into account a number of factors including the interrelationship between systems.	
5. Apply statistical tools to identify a problem in a system (e.g., measures of central tendency, linear regression, symbolic logic, non-decimal number systems).	
Benchmark C: Understand and apply research, development, and experimentation to problem solving.	
1. Explain why technological problems benefit from a multidisciplinary approach (e.g., the research and development of a new video game could benefit from knowledge of physiology (reaction times and hand-eye coordination) as well as psychology (attention span, color theory, and memory).	
2. For a specific problem, list the disciplines that could contribute to a solution.	
3. Apply and evaluate the reverse engineering process in problem solving.	
Standard 7 ~ Designed World	
Benchmark A: Classify, demonstrate, examine, and appraise energy and power technologies.	
1. Explain why no system is one hundred percent energy efficient.	
2. Determine the energy efficiency of a transportation system (e.g., compare the energy used to transport a person from Dayton to Cleveland by automobile, bus, and airplane).	
3. Explain Bernoulli's Principle and its effect on practical applications (e.g., airfoil design, spoiler design, carburetor).	
4. Explain how environmental conditions influence heating and cooling of buildings and automobiles.	

5. Identify and apply appropriate codes, laws, standards, or regulations related to energy and power technologies (e.g., American Society of Heating, Refrigeration, Air-Conditioning Engineers (ASHRAE), Occupational Safety and Health Administration (OSHA), National Electric Code (NEC), International Standards Organization (ISO)).	
Benchmark B: Classify, demonstrate, examine, and appraise transportation technologies.	
1. Design transportation systems using innovative techniques(e.g., a system to more efficiently transport people in the Cincinnati, Columbus, Cleveland corridor).	
2. Identify and apply appropriate codes, laws, standards, or regulations related to transportation technologies (e.g., National Highway Safety Board (NHSB), Occupational Safety and Health Administration (OSHA), National Electric Code (NEC), International Standards Organization (ISO)).	
Benchmark C: Classify demonstrate, examine and appraise manufacturing technologies.	
1. Describe how chemical technologies provide a means for humans to alter or modify materials and to produce chemical products (e.g., adhesives, plastics, ethanol production, coatings).	
2. Explain the process and the programming of robotic action utilizing three axes.	
3. Identify and apply appropriate codes, laws, standards, or regulations related to manufacturing technologies (e.g., Occupational Safety and Health Administration (OSHA), National Electric Code (NEC), International Standards Organization (ISO)).	
Benchmark D: Classify, demonstrate, examine and appraise construction technologies.	
1. Describe how the design of structures requires the interaction of style, convenience, efficiency, and safety (e.g., visit local buildings designed for the same purpose and describe how the style, convenience, efficiency and safety vary).	
2. Calculate quantitatively the resultant forces for live loads and dead loads.	
3. Create a product (or prototype) or system in construction technologies using the appropriate technological tools, machines, equipment and technical processes.	
4. Identify and apply appropriate codes, laws, standards, or regulations related to construction technologies (e.g., local building codes, Occupational Safety and Health Administration (OSHA), National Electric Code (NEC), International Standards Organization (ISO)).	
Benchmark E: Classify, demonstrate, examine and appraise information and communication technologies.	
1. Use information and communications systems to inform, persuade, entertain, control, manage, and educate (e.g., Internet, telephones, cell and satellite phones, smart phones, TVs, radios, computers, fax machines, PDA's, mobile communicators).	
2. Address a communication problem involving the community (e.g., presenting information to the school board or town council).	

3. Analyze a dysfunctional communication system and suggest improvements (e.g., the school PA system).	
4. Identify and explain the applications of laser and fiber optic technologies (e.g., telephone systems, cable TV, medical technology, and photography).	
5. Identify and apply appropriate codes, laws, standards, or regulations related to information and communication technologies (e.g., International Electrical and Electronic Engineers (IEEE), Federal Communication Commission (FCC), Occupational Safety and Health Administration (OSHA), National Electric Code (NEC), International Standards Organization (ISO)).	
Benchmark F: Classify, demonstrate, examine and appraise medical technologies.	
1. Describe how telemedicine reflects the 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.	
2. Classify the ways medical technologies are regulated.	
Benchmark G: Classify, demonstrate, examine, and appraise agricultural and related biotechnologies.	
1. Describe how engineering design and management of agricultural systems require knowledge of artificial ecosystems and the effects of technological development on flora and fauna.	
2. Evaluate the effects of genetic engineering, fertilizers, herbicides, and pesticides on the environment and the production of food.	
3. Identify and apply appropriate codes, laws, standards, or regulations related to agricultural and bio- technologies (e.g., Occupational Safety and Health Administration (OSHA), National Electric Code (NEC), International Standards Organization (ISO)).	