

Technology Education/ Science Equivalency Crosswalk for The STEM Academy Principles of Engineering

Crosswalk Between: *Wisconsin’s Model Academic Standards for Science* and *Wisconsin’s Model Academic Standards for Technology Education*

Information in the third column includes knowledge, concepts and skills, and a summary of the equivalent instructional time for the equivalent course. The first column lists Wisconsin’s Model Academic Standards for Science. Column two illustrates the various technology education performance standards that have been crosswalked to the science performance standards in the first column.

A. SCIENCE CONNECTIONS	Technology Education Standards	Crosswalk of Local School Curriculum
Performance Standards	Performance Standards	
<i>By the end of Grade 12 students will:</i>	<i>By the end of Grade 12 students will:</i>	
A.12.1 Apply the underlying themes of science to develop defensible visions of the future	A.12.6 Use accepted methods of forecasting and projecting to develop scenarios of future B.12.1 Identify and explain the ways technological systems have evolved and will continue to evolve to satisfy human needs and desires D.12.5 Describe the current challenges and project the future challenges of governing a technology once it has become an integral part of the way people live, work, and play	<ul style="list-style-type: none"> • Research nanotechnology and predict its impact on the future • Identify and quantify the impact of potential failures • Predict the needs of society in the year 2088 • Predict and analyze cultural factors that influence the site design
A.12.2 Show how conflicting assumptions about science themes lead to different opinions and decisions about evolution, health, population, longevity, education, and use of resources, and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future	A.12.2 Understand that humans are faced with moral and ethical issues because technology is enabling very significant modifications to the natural world A.12.3 Explain why decisions regarding the use of technology are dependent on the situation, application, or perception of the group using it B.12.1 Identify and explain the ways technological systems have evolved and will continue to evolve to satisfy human needs and desires D.12.3 Analyze how the values and beliefs of different people can influence their perceived risks and benefits of a given technology D.12.5 Describe the current challenges and project the future challenges of governing a technology once it has become an integral part of the way people live, work, and play D.12.6 Show how the effects of a given technology may be unacceptable under one set	<ul style="list-style-type: none"> • Express that failure is a byproduct of pushing the envelope • Critique tradeoffs in engineering and their effects on decisions • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case study with peers • Discuss the historical perspectives of trebuchets • Review and interpret the seven significant factors in design • Express ideas of “big picture” proportions • Recognize technical progress rate • Discuss change versus evolution • Discuss seamless design • Compare and contrast environmental issues with the wants of society • Predict the needs of society in the year 2088

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	of circumstances but acceptable under a different set of circumstances	<ul style="list-style-type: none"> • Interpret on-site factors that influence design • Interpret off-site factors that influence design • Determine environmental impacts of proposed design • Understand the basic concepts of design analysis
A.12.3 Give examples that show how partial systems, models, and explanations are used to give quick and reasonable solutions that are accurate enough for basic needs	B.12.2 Demonstrate how systems are planned, organized, designed, built, and controlled B.12.3 Explain how enterprises apply technological systems for generating wealth by providing goods and services C.12.1 Implement and evaluate strategies to solve technological problems that are likely to be successful	<ul style="list-style-type: none"> • Express the effects of a global marketplace • Review and give examples of input, process, output and feedback • Construct a simple prototype based on parameters and a rubric • Describe what pressures are prevalent in engineering design • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Describe the components of a Gantt chart • Construct basic Gantt charts • Describe the components of a flow chart • Construct basic flowcharts • Develop spreadsheets to model iterations and maintain cost and weight accounting • Construct and evaluate different typed of bill of materials • Perform costing of a one time and production project • Prepare a project plan for a prospective client • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure

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		<ul style="list-style-type: none"> • Understand the basic concepts of design analysis • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Construct and test designs for an ergonomically correct chair according to parameters and a rubric • Perform the ten step design process • Assess sample case studies using the ten step process • Develop a solution using the engineering design process
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<p>A.12.4 Construct arguments that show how conflicting models and explanations of events can start with similar evidence</p>	<p>A.12.3 Explain why decisions regarding the use of technology are dependent on the situation, application, or perception of the group using it C.12.3 Defend solutions to technological problems and opportunities D.12.6 Show how the effects of a given technology may be unacceptable under one set of circumstances but acceptable under a different set of circumstances</p>	<ul style="list-style-type: none"> • Understand how failure can be an effective tool to inform and inspire new ideas • Critique tradeoffs in engineering and their effects on decisions • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case study with peers • Report evidence of simulation, experiment and analysis • Describe effective communication methods • Demonstrate oral and written communication skills through assignments and learning activities • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Identify and describe estimation techniques • Compile simple experiment data, comparing and contrasting results from peers • Review and interpret the seven significant factors in design • Assess sample case studies using the ten step process • Recognize technical progress rate • Discuss change versus evolution • Contrast environmental issues with the wants of society Interpret on-site factors that influence
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		<p>design</p> <ul style="list-style-type: none"> • In the field, interpret on-site factors that influence design • In the field, interpret off-site factors that influence design
<p>A.12.5 Show how the ideas and themes of science can be used to make real-life decisions about careers, work places, life-styles, and use of resources</p>	<p>A.12.3 Explain why decisions regarding the use of technology are dependent on the situation, application, or perception of the group using it A.12.7 Explain how scientific and technological research can contribute to improved quality of life and a better standard of living C.12.4 Select materials and other resources for a technological design and develop practical solutions C.12.5 Identify constraints present in a given technological process C.12.9 Apply basic engineering concepts in the design and creation of solutions to various problems or opportunities D.12.3 Analyze how the values and beliefs of different people can influence their perceived risks and benefits of a given technology</p>	<ul style="list-style-type: none"> • Participate and offer feedback in a simple team problem solving activity • Design an innovative project for industry • Present ideas to peers • Develop a model that represents the innovation • Describe and apply strategies of risk benefit analysis • Examine and discuss simple machines • Design and illustrate a Rube Goldberg device • Construct a working model in a group setting • Understand and apply design techniques to model a solution to a specific problem • Research nanotechnology and predict its impact on the future • Describe the terms divergence and convergence • Solve thermodynamic heat loss calculations for a simple room design • Generate team based solutions based on a request for proposal and a grading rubric • Design and construct a outdoor shelter out of 90% recycled materials • Discuss employment and experience as they relate to professional work • Develop a list of skills and abilities • Determine which skills could be improved with work experience and which will be developed in the classroom • Develop a list of personal career priorities • Develop a list of strong personal and educational abilities

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		<ul style="list-style-type: none"> • Develop a list of personal and educational abilities that need to be strengthened • Develop Gantt chart and physical storyboards • Design a prototype using 3D solid modeling software • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Explain the involvement of business and industry in the development of the solution • Present valid data in the preparation and testing results of the prototype • Solve appropriate calculations in the development of the prototype • Present results of the team design to business and industry as well as peers • Produce working drawings using industry standard software • Construct a general sample terrain • Validate elevations in a terrain • Create a roadway within a site plan • Create a parking lot within a site plan • Design a pond within a site plan • Combine elements learned with a site plan to generate cut sheets • Generate team based solutions based on discussed parameters and a grading rubric
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<p>A.12.6 Identify and replace inaccurate personal models and explanations of science-related phenomena using evidence learned or discovered</p>	<p>B.12.6 Show how new knowledge is usually, by design or otherwise, an outcome of technological activity that contributes to the exponential growth of technological knowledge C.12.5 Identify constraints present in a given technological process C.12.10 Evaluate a technological solution and make necessary improvement if needed</p>	<ul style="list-style-type: none"> • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Design an innovative project for industry • Present ideas to peers • Develop a model that represents the innovation • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Implement action plan based on assigned responsibilities and completion dates • Understand the basic concepts of design analysis • Assess a problem using the six step evaluation process • Compile simple experiment data, comparing and contrasting results from peers • Assess sample case studies using the ten step process • Recognize technical progress rate • Discuss change versus evolution • Contrast environmental issues with the wants of society
<p>A.12.7 Re-examine the evidence and reasoning</p>	<p>C.12.2 Measure, collect, and analyze data in order to</p>	<ul style="list-style-type: none"> • Understand how failure can be an effective tool

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<p>that led to conclusions drawn from investigations, using the science themes</p>	<p>solve a technological problem C.12.10 Evaluate a technological solution and make necessary improvement if needed D.12.4 Evaluate the relative appropriateness of a given technology by comparing the risks with the benefits or the advantages with the disadvantages D.12.6 Show how the effects of a given technology may be unacceptable under one set of circumstances but acceptable under a different set of circumstances</p>	<p>to inform and inspire new ideas</p> <ul style="list-style-type: none"> • Predict how one would realize the direct effects of their efforts • Express that failure is a byproduct of pushing the envelope • Communicate how decisions impact designs • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Describe the components of a Gantt chart • Construct basic Gantt charts • Describe the components of a flow chart • Construct basic flowcharts • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case study with peers • Report evidence of simulation, experiment and analysis • Perform an analysis of trebuchet precision and accuracy • Investigate various characteristics and reactions of materials through specific experiments • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or
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		<ul style="list-style-type: none"> eliminate the potential failure • Implement action plan based on assigned responsibilities and completion dates • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Assess a problem using the six step evaluation process • Compile simple experiment data, comparing and contrasting results from peers • Present valid data in the preparation and testing results of the prototype • Recognize technical progress rate • Contrast environmental issues with the wants of society • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Validate elevations in a terrain 23c • Interpret off-site factors that influence design • Determine environmental impacts of proposed design • Predict and analyze cultural factors that influence the site design
B. NATURE OF SCIENCE	Technology Education Standards	Crosswalk of Local School Curriculum
Performance Standards	Performance Standards	
<i>By the end of Grade 12 students will:</i>	<i>By the end of Grade 12 students will:</i>	
B.12.1 Show how cultures and individuals have contributed to the development of major ideas in the earth and space, life and environmental,	A.12.2 Understand that humans are faced with moral and ethical issues because technology is enabling very significant modifications	<ul style="list-style-type: none"> • Communicate how decisions impact designs • Critique tradeoffs in engineering and their effects on decisions

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<p>and physical sciences</p>	<p>to the natural world A.12.3 Explain why decisions regarding the use of technology are dependent on the situation, application, or perception of the group using it A.12.4 Explore the way in which human adaptive technological systems interact with ideological and sociological systems A.12.7 Explain how scientific and technological research can contribute to improved quality of life and a better standard of living</p>	<ul style="list-style-type: none"> • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case study with peers • Give examples of “how you want the world to be” • Express self awareness • Research nanotechnology and predict its impact on the future • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Generate team based solutions based on a request for proposal and a grading rubric • Design and construct a outdoor shelter out of 90% recycled materials • Express ideas of “big picture” proportions • Recognize technical progress rate • Discuss change versus evolution • Discuss seamless design • Contrast environmental issues with the wants of society • Predict the needs of society in the year 2088 • Interpret on-site factors that influence design • Interpret off-site factors that influence design • Determine environmental impacts of proposed design • Predict and analyze cultural factors that
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		influence the site design
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<p>B.12.2 Identify the cultural conditions that are usually present during great periods of discovery, scientific development, and invention</p>	<p>A.12.2 Understand that humans are faced with moral and ethical issues because technology is enabling very significant modifications to the natural world A.12.3 Explain why decisions regarding the use of technology are dependent on the situation, application, or perception of the group using it A.12.4 Explore the way in which human adaptive technological systems interact with ideological and sociological systems A.12.5 Portray how a society may not be able to exercise full control over their technological systems D.12.3 Analyze how the values and beliefs of different people can influence their perceived risks and benefits of a given technology</p>	<ul style="list-style-type: none"> • Describe characteristics of great teams • Review team attributes • Define the growth stages of a team • Describe what pressures are prevalent in engineering design • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Describe the components of a Gantt chart • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case study with peers • Develop spreadsheets to model iterations and maintain cost and weight accounting • Give examples of “how you want the world to be” • Express self awareness • Prepare a project plan for a prospective client • Describe the historical periods of materials • Define the terms analytic and creative problem solving • Investigate personal problem solving styles • Identify and practice individual brainstorming strategies • Identify and practice group brainstorming strategies • Recognize technical progress rate • Discuss change versus evolution
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		<ul style="list-style-type: none"> • Contrast environmental issues with the wants of society • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Predict and analyze cultural factors that influence the site design
<p>B.12.3 Relate the major themes of science to human progress in understanding science and the world</p>	<p>B.12.5 Assess the impact new and improved products and services have had on the quality of life; explain how the development of new tools, materials, and processes is necessary to maintain and improve high productivity and quality</p> <p>B.12.6 Show how new knowledge is usually, by design or otherwise, an outcome of technological activity that contributes to the exponential growth of technological knowledge</p>	<ul style="list-style-type: none"> • Understand how failure can be an effective tool to inform and inspire new ideas • Predict how one would realize the direct effects of their efforts • Express that failure is a byproduct of pushing the envelope • Express the effects of a global marketplace • Design an innovative project for industry • Present ideas to peers • Develop a model that represents the innovation • Describe and apply strategies of risk benefit analysis • Discuss the historical perspectives of trebuchets • Give examples of trebuchet mechanics and construct a related design • Report evidence of simulation, experiment and analysis • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Perform costing of a one time and production project • Prepare a project plan for a prospective client • Understand and apply design techniques to model a solution to a specific problem • Research nanotechnology and predict its impact

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		<ul style="list-style-type: none"> on the future • Identify and quantify the impact of potential failures • Implement action plan based on assigned responsibilities and completion dates • Define the ten step design process • Integrate the ten step design process while solving problems • Assess a problem using the six step evaluation process • Identify and describe estimation techniques • Identify and practice group brainstorming strategies • Calculate mean, median and mode of anthropometric data • Construct and test designs for an ergonomically correct chair according to parameters and a rubric • Assess sample case studies using the ten step process • Predict the needs of society in the year 2088 • Research the marketability of the prototype • Determine environmental impacts of proposed design • Predict and analyze cultural factors that influence the site design
<p>B.12.4 Show how basic research and applied research contribute to new discoveries, inventions, and applications</p>	<p>A.12.7 Explain how scientific and technological research can contribute to improved quality of life and a better standard of living B.12.6 Show how new knowledge is usually, by design or otherwise, an outcome of technological activity that contributes to the exponential growth of technological knowledge C.12.1 Implement and evaluate strategies to solve</p>	<ul style="list-style-type: none"> • Develop Gantt chart and physical storyboards • Design a prototype using 3D solid modeling software • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Explain the involvement of business and industry in the development of the solution

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	<p>technological problems that are likely to be successful C.12.9 Apply basic engineering concepts in the design and creation of solutions to various problems or opportunities C.12.11 Select and apply appropriate processes to alter the characteristics of material to make it useful in different situations</p>	<ul style="list-style-type: none"> • Present valid data in the preparation and testing results of the prototype • Solve appropriate calculations in the development of the prototype • Present results of the team design to business and industry as well as peers • Produce working drawings using industry standard software • Construct a general sample terrain • Validate elevations in a terrain • Create a roadway within a site plan • Create a parking lot within a site plan • Design a pond within a site plan • Combine elements learned with a site plan to generate cut sheets • Generate team based solutions based on discussed parameters and a grading rubric
<p>B.12.5 Explain how science is based on assumptions about the natural world and themes that describe the natural world</p>	<p>No significant match found</p>	
<p>C. SCIENCE INQUIRY</p>	<p>Technology Education Standards</p>	<p>Crosswalk of Local School Curriculum</p>
<p>Performance Standards</p>	<p>Performance Standards</p>	
<p><i>By the end of Grade 12 students will:</i></p>	<p><i>By the end of Grade 12 students will:</i></p>	
<p>C.12.1 When studying science content, ask</p>	<p>A.12.4 Explore the way in which human adaptive</p>	<ul style="list-style-type: none"> • Review and give examples of input, process,

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<p>questions suggested by current social issues, scientific literature, and observations of phenomena; build hypotheses that might answer some of these questions; design possible investigations; and describe results that might emerge from such investigations</p>	<p>technological systems interact with ideological and sociological systems C.12.7 Present a design solution that accounts for production of a device; how the device</p>	<p>output and feedback</p> <ul style="list-style-type: none"> • Construct a simple prototype based on parameters and a rubric • Present ideas to peers • Explore the relationship between electricity and magnetism • Generate solutions to mathematical calculations • Research loads and limits on design components • Report evidence of simulation, experiment and analysis • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Perform costing of a one time and production project • Prepare a project plan for a prospective client • Construct a working model in a group setting • Understand and apply design techniques to model a solution to a specific problem • Investigate various characteristics and reactions of materials through specific experiments • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Implement action plan based on assigned responsibilities and completion dates • Investigate personal problem solving styles • Compile simple experiment data, comparing and contrasting results from peers
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		<ul style="list-style-type: none"> • Design a simple structure with limited materials according to parameters and a grading rubric • Solve thermodynamic heat loss calculations for a simple room design • Classify anthropometric data and measurements from team members • Calculate mean, median and mode of anthropometric data • Construct and test designs for an ergonomically correct chair according to parameters and a rubric • Report and present team design for an ergonomically correct chair • Assess sample case studies using the ten step process • Develop a solution using the engineering design process • Generate team based solutions based on a request for proposal and a grading rubric • Design and construct a outdoor shelter out of 90% recycled materials • Present results of a team design to peers for critique • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Present valid data in the preparation and testing results of the prototype • Solve appropriate calculations in the development of the prototype • Present results of the team design to business and industry as well as peers • Generate team based solutions based on discussed parameters and a grading rubric
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<p>C.12.2 Identify issues from an area of science study, write questions that could be investigated, review previous research on these questions, and design and conduct responsible and safe investigations to help answer the questions</p>	<p>C.12.1 Implement and evaluate strategies to solve technological problems that are likely to be successful C.12.4 Select materials and other resources for a technological design and develop practical solutions C.12.5 Identify constraints present in a given technological process</p>	<ul style="list-style-type: none"> • Construct basic flowcharts • Describe and apply strategies of risk benefit analysis • Generate solutions to mathematical calculations • Choose and apply the appropriate mathematical formulas • Research loads and limits on design components • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Construct and evaluate different types of bill of materials • Perform costing of a one time and production project • Prepare a project plan for a prospective client • Examine and discuss simple machines • Describe the historical periods of materials • Classify and describe the characteristics of metals, ceramics, polymers and composites • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Implement action plan based on assigned responsibilities and completion dates • Assess a problem using the six step evaluation process • Design a simple structure with limited materials according to parameters and a grading rubric • Solve thermodynamic heat loss calculations for
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		<ul style="list-style-type: none"> • a simple room design • Classify anthropometric data and measurements from team members • Calculate mean, median and mode of anthropometric data • Develop a solution using the engineering design process • Discuss seamless design • Develop Gantt chart and physical storyboards • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Determine elevations and contour lines in a sample exercise • Combine elements learned with a site plan to generate cut sheets • Determine environmental impacts of proposed design
<p>C.12.3 Evaluate the data collected during an investigation, critique the data-collection procedures and results, and suggest ways to make any needed improvements</p>	<p>C.12.2 Measure, collect, and analyze data in order to solve a technological problem practical solutions C.12.5 Identify constraints present in a given technological process C.12.10 Evaluate a technological solution and make necessary improvement if needed C.12.11 Select and apply appropriate processes to alter the characteristics of material to make it useful in different situations</p>	<ul style="list-style-type: none"> • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Construct basic Gantt charts • Construct basic flowcharts • Perform calculations of force and speed that involve simple machines • Analyze and describe the relationship between voltage, current and resistance to power wattage rating for components • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract

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		<ul style="list-style-type: none"> • Argue the ethics of an industry designed case study with peers • Generate solutions to mathematical calculations • Choose and apply the appropriate mathematical formulas • Research loads and limits on design components • Report evidence of simulation, experiment and analysis • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Construct and evaluate different typed of bill of materials • Perform costing of a one time and production project • Design and illustrate a Rube Goldberg device • Understand and apply design techniques to model a solution to a specific problem • Investigate various characteristics and reactions of materials through specific experiments • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Implement action plan based on assigned responsibilities and completion dates • Calculate a moment of inertia • View the results of an analysis • Calculate the strength to weight ratio • Interpret interferences between assembly
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		<ul style="list-style-type: none"> components • Generate a change to a part while in the assembly • Assess a problem using the six step evaluation process • Compile simple experiment data, comparing and contrasting results from peers • Calculate mean, median and mode of anthropometric data • Construct and test designs for an ergonomically correct chair according to parameters and a rubric • Review and interpret the seven significant factors in design • Assess sample case studies using the ten step process • Design and construct a outdoor shelter out of 90% recycled materials • Contrast environmental issues with the wants of society • Select and manipulate appropriate materials • Research the marketability of the prototype • Solve appropriate calculations in the development of the prototype • Validate elevations in a terrain • Determine environmental impacts of proposed design • Predict and analyze cultural factors that influence the site design
<p>C.12.4 During investigations, choose the best data-collection procedures and materials, use them competently, and calculate the degree of precision of the resulting data</p>	<p>B.12.8 Select and apply appropriate processes to transform information into its most useful format C.12.2 Measure, collect, and analyze data in order to</p>	<ul style="list-style-type: none"> • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering

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	<p>solve a technological problem C.12.4 Select materials and other resources for a technological design and develop practical solutions C.12.5 Identify constraints present in a given technological process</p>	<ul style="list-style-type: none"> • Construct basic Gantt charts • Construct basic flowcharts • Perform calculations of force and speed that involve simple machines • Analyze and describe the relationship between voltage, current and resistance to power wattage rating for components • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case study with peers • Generate solutions to mathematical calculations • Choose and apply the appropriate mathematical formulas • Research loads and limits on design components • Report evidence of simulation, experiment and analysis • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Construct and evaluate different typed of bill of materials • Perform costing of a one time and production project • Design and illustrate a Rube Goldberg device • Understand and apply design techniques to model a solution to a specific problem • Investigate various characteristics and reactions of materials through specific experiments • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode
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		<ul style="list-style-type: none"> • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Implement action plan based on assigned responsibilities and completion dates • Calculate a moment of inertia • View the results of an analysis • Calculate the strength to weight ratio • Interpret interferences between assembly components • Generate a change to a part while in the assembly • Assess a problem using the six step evaluation process • Compile simple experiment data, comparing and contrasting results from peers • Calculate mean, median and mode of anthropometric data • Construct and test designs for an ergonomically correct chair according to parameters and a rubric • Review and interpret the seven significant factors in design • Assess sample case studies using the ten step process • Design and construct a outdoor shelter out of 90% recycled materials • Contrast environmental issues with the wants of society • Select and manipulate appropriate materials • Research the marketability of the prototype • Solve appropriate calculations in the development of the prototype • Validate elevations in a terrain
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		<ul style="list-style-type: none"> • Determine environmental impacts of proposed design • Predict and analyze cultural factors that influence the site design
C.12.5 Use the explanations and models found in earth and space, life and environmental, and physical sciences to develop likely explanations for the results of their investigations	C.12.9 Apply basic engineering concepts in the design and creation of solutions to various problems or opportunities D.12.1 Evaluate technologies based upon various sources of information	<ul style="list-style-type: none"> • Develop Gantt chart and physical storyboards • Design a prototype using 3D solid modeling software • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Explain the involvement of business and industry in the development of the solution • Present valid data in the preparation and testing results of the prototype • Solve appropriate calculations in the development of the prototype • Present results of the team design to business and industry as well as peers • Produce working drawings using industry standard software • Construct a general sample terrain • Validate elevations in a terrain • Create a roadway within a site plan • Create a parking lot within a site plan • Design a pond within a site plan • Combine elements learned with a site plan to generate cut sheets • Generate team based solutions based on discussed parameters and a grading rubric
C.12.6 Present the results of investigations to groups concerned with the issues, explaining the meaning and implications of the results, and answering questions in terms the audience	A.12.3 Explain why decisions regarding the use of technology are dependent on the situation, application, or perception of the group using it	<ul style="list-style-type: none"> • Predict how one would realize the direct effects of their efforts • Review and give examples of input, process, output and feedback

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<p>can understand</p>	<p>A.12.6 Use accepted methods of forecasting and projecting to develop scenarios of future technology needs and uses A.12.7 Explain how scientific and technological research can contribute to improved quality of life and a better standard of living C.12.3 Defend solutions to technological problems and opportunities quality, have value greater than the investment, and meet a societal want or need C.12.7 Present a design solution that accounts for production of a device; how the device</p>	<ul style="list-style-type: none"> • Critique tradeoffs in engineering and their effects on decisions • Present ideas to peers • Report evidence of simulation, experiment and analysis • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Implement action plan based on assigned responsibilities and completion dates • Design a simple structure with limited materials according to parameters and a grading rubric • Calculate mean, median and mode of anthropometric data • Present results of a team design to peers for critique • Present valid data in the preparation and testing results of the prototype • Present results of the team design to business and industry as well as peers • Interpret on-site factors that influence design • Interpret off-site factors that influence design • Predict and analyze cultural factors that influence the site design • Generate team based solutions based on discussed parameters and a grading rubric
<p>C.12.7 Evaluate articles and reports in the</p>	<p>D.12.1 Evaluate technologies based upon various</p>	<ul style="list-style-type: none"> • Review and give examples of input, process,

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<p>popular press, in scientific journals, on television, and on the Internet, using criteria related to accuracy, degree of error, sampling, treatment of data, and other standards of experimental design</p>	<p>sources of information</p>	<p>output and feedback</p> <ul style="list-style-type: none"> • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Analyze and describe the relationship between voltage, current and resistance to power wattage rating for components • Perform an analysis of trebuchet precision and accuracy • Construct and evaluate different typed of bill of materials • Investigate various characteristics and reactions of materials through specific experiments • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Compile simple experiment data, comparing and contrasting results from peers • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Validate elevations in a terrain
<p>D. PHYSICAL SCIENCE</p>	<p>Technology Education Standards</p>	<p>Crosswalk of Local School Curriculum</p>
<p>Performance Standards</p>	<p>Performance Standards</p>	
<p><i>By the end of Grade 12 students will:</i></p>	<p><i>By the end of Grade 12 students will:</i></p>	
<p>Structures of Atoms and Matter</p>	<p><i>The Wisconsin model academic standards for science sections D, E and F are written with specific content. However, the Wisconsin model academic standards for technology education do not have specific content. For the completion of the crosswalk (sections D, E and F) each local district should document curriculum content that crosswalks with these science standards.</i></p>	
<p>D.12.1 Describe atomic structure and the</p>		

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properties of atoms, molecules, and matter during physical and chemical interactions		
D.12.2 Explain the forces that hold the atom together and illustrate how nuclear interactions change the atom		
D.12.3 Explain exchanges of energy in chemical interactions and exchange of mass and energy in atomic/nuclear reactions		
Chemical Reactions		
D.12.4 Explain how substances, both simple and complex, interact with one another to produce new substances		<ul style="list-style-type: none"> • Describe the historical periods of materials • Classify and describe the characteristics of metals, ceramics, polymers and composites • Investigate various characteristics and reactions of materials through specific experiments
D.12.5 Identify patterns in chemical and physical properties and use them to predict likely chemical and physical changes and interactions		
D.12.6 Through investigations, identify the types of chemical interactions, including endothermic, exothermic, oxidation, photosynthesis, and acid/base reactions		<ul style="list-style-type: none"> • Describe the historical periods of materials • Classify and describe the characteristics of metals, ceramics, polymers and composites • Investigate various characteristics and reactions of materials through specific experiments
Motions and Forces		
D.12.7 Qualitatively and quantitatively analyze changes in the motion of objects and the forces that act on them and represent analytical data both algebraically and graphically		<ul style="list-style-type: none"> • Generate solutions to mathematical calculations • Choose and apply the appropriate mathematical formulas • Give examples of trebuchet mechanics and construct a related design • Research loads and limits on design components • Explain the terms: potential energy, work, velocity, acceleration and efficiency

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		<ul style="list-style-type: none"> • Report evidence of simulation, experiment and analysis • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Understand the basic concepts of design analysis • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Calculate a moment of inertia • Understand the importance of triangular bracing in a structure • Describe the stages of a Structural Analysis • Understand the environment of the analysis including restraints and loads • Find the maximum load • View displacement plots • Calculate the strength to weight ratio • Interpret interferences between assembly components
<p>D.12.8 Understand the forces of gravitation, the electromagnetic force, and the intermolecular force, and explain their impact on the universal system</p>		<ul style="list-style-type: none"> • Understand the basic concepts of design analysis • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Calculate a moment of inertia • Understand the importance of triangular bracing in a structure • Describe the stages of a Structural Analysis • Understand the environment of the analysis including restraints and loads

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		<ul style="list-style-type: none"> • Find the maximum load • View displacement plots • Calculate the strength to weight ratio • Interpret interferences between assembly components • Describe and avoid conditions that can cause electrical shocks • Communicate and demonstrate the correct use of a fuse • Determine the basic requirements for and electrical circuit to function • Determine the basic requirements of a series circuit • Examine the differences and similarities of series and parallel circuits • Identify the correct electronic/electrical symbols and arrange the components to form a circuit • Identify and practice the procedures that should be followed to correctly and safely wire a circuit • Describe the differences and similarities of series and parallel circuits • Analyze and describe the relationship between voltage, current and resistance to power wattage rating for components • Explore the relationship between electricity and magnetism • Perform calculations of force and speed that involve simple machines • Describe how air pressure can be controlled and monitored • Determine the basic requirements for and electrical circuit to function • Determine the basic requirements of a series circuit
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		<ul style="list-style-type: none"> • Examine the differences and similarities of series and parallel circuits • Explore the relationship between electricity and magnetism
<p>D.12.9 Describe models of light, heat, and sound and through investigations describe similarities and differences in the way these energy forms behave</p>		<ul style="list-style-type: none"> • Understand the basic concepts of design analysis • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Calculate a moment of inertia • Understand the importance of triangular bracing in a structure • Describe the stages of a Structural Analysis • Understand the environment of the analysis including restraints and loads • Find the maximum load • View displacement plots • Calculate the strength to weight ratio • Interpret interferences between assembly components • Describe and avoid conditions that can cause electrical shocks • Communicate and demonstrate the correct use of a fuse • Determine the basic requirements for and electrical circuit to function • Determine the basic requirements of a series circuit • Examine the differences and similarities of series and parallel circuits • Identify the correct electronic/electrical symbols and arrange the components to form a circuit • Identify and practice the procedures that should be followed to correctly and safely wire a circuit

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		<ul style="list-style-type: none"> • Describe the differences and similarities of series and parallel circuits • Analyze and describe the relationship between voltage, current and resistance to power wattage rating for components • Explore the relationship between electricity and magnetism • Perform calculations of force and speed that involve simple machines • Describe how air pressure can be controlled and monitored • Determine the basic requirements for and electrical circuit to function • Determine the basic requirements of a series circuit • Examine the differences and similarities of series and parallel circuits • Explore the relationship between electricity and magnetism • Explain the terms: potential energy, work, velocity, acceleration and efficiency
Conservation of Energy and the Increase in Disorder		
D.12.10 Using the science themes, illustrate the law of conservation of energy during chemical and nuclear reactions		
Interactions of Matter and Energy		
D.12.11 Using the science themes, explain common occurrences in the physical world		<ul style="list-style-type: none"> • Generate solutions to mathematical calculations • Choose and apply the appropriate mathematical formulas • Give examples of trebuchet mechanics and construct a related design

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		<ul style="list-style-type: none"> • Research loads and limits on design components • Report evidence of simulation, experiment and analysis • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Understand the basic concepts of design analysis • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Calculate a moment of inertia • Understand the importance of triangular bracing in a structure • Describe the stages of a Structural Analysis • Understand the environment of the analysis including restraints and loads • Find the maximum load • View displacement plots • Calculate the strength to weight ratio • Interpret interferences between assembly components
D.12.12 Using the science themes and knowledge of chemical, physical, atomic and nuclear interactions, explain changes in materials, living things, the earth's features, and stars		
E. EARTH AND SPACE SCIENCE	Technology Education Standards	Crosswalk of Local School Curriculum
Performance Standards	Performance Standards	
<i>By the end of Grade 12 students will:</i>	<i>By the end of Grade 12 students will:</i>	
Energy in the Earth System		
E.12.1 Using the science themes, distinguish		

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between internal energies (decay of radioactive isotopes, gravity) and external energies (sun) in the earth's systems and show how these sources of energy have an impact on those systems		
Geochemical Cycles		
E.12.2 Analyze the geochemical and physical cycles of the earth and use them to describe movements of matter		
The Origin and Evolution of the Earth System		
E.12.3: Using the science themes, describe theories of the origins and evolution of the universe and solar system, including the earth system as a part of the solar system, and relate these theories and their implications to geologic time on earth		
E.12.4 Analyze the benefits, costs, and limitations of past, present, and projected use of resources and technology and explain the consequences to the environment		
The Origin and Evolution of the Universe		
E.12.5 Using the science themes, understand that the origin of the universe is not completely understood, but that there are current ideas in science that attempt to explain its origin		
F. LIFE AND ENVIRONMENTAL SCIENCE	Technology Education Standards	Crosswalk of Local School Curriculum
Performance Standards	Performance Standards	
<i>By the end of Grade 12 students will:</i>	<i>By the end of Grade 12 students will:</i>	
The Cell		
F.12.1 Evaluate the normal structures and the general and special functions of cells in single-celled and multiple-celled organisms		

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F.12.2 Understand how cells differentiate and how cells are regulated		
The Molecular Basis of Heredity		
F.12.3 Explain current scientific ideas and information about the molecular and genetic basis of heredity		
F.12.4 State the relationships between functions of the cell and functions of the organism as related to genetics and heredity		
Biological Evolution		
F.12.5 Understand the theory of evolution, natural selection, and biological classification		
F.12.6 Using concepts of evolution and heredity, account for changes in species and the diversity of species, including the influence of these changes on science, e.g., breeding of plants or animals		
The Interdependence of Organisms		
F.12.7 Investigate how organisms both cooperate and compete in ecosystems		
F.12.8 Using the science themes, infer changes in ecosystems prompted by the introduction of new species, environmental conditions, chemicals, and air, water, or earth pollution		
Matter, Energy, and Organization in Living Systems		
F.12.9 Using the science themes, investigate energy systems (related to food chains) to show how energy is stored in food (plants and animals) and how energy is released by digestion and metabolism		
F.12.10 Understand the impact of energy on organisms in living systems		
F.12.11 Investigate how the complexity and		

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organization of organisms accommodates the need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain an organism		
The Behavior of Organisms		
F.12.12 Trace how the sensory and nervous systems of various organisms react to the internal and external environment and transmit survival or learning stimuli to cause changes in behavior or responses		
G. SCIENCE APPLICATIONS	Technology Education Standards	Crosswalk of Local School Curriculum
Performance Standards	Performance Standards	
<i>By the end of Grade 12 students will:</i>	<i>By the end of Grade 12 students will:</i>	
G.12.1 Identify personal interests in science and technology; account for implications that these interests might have for future education, and options to be considered	A.12.6 Use accepted methods of forecasting and projecting to develop scenarios of future technology needs and uses	<ul style="list-style-type: none"> • Predict how one would realize the direct effects of their efforts • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Report evidence of simulation, experiment and analysis • Examine dreams and nightmares as creative influences • Construct and evaluate different typed of bill of materials • Perform costing of a one time and production project • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Investigate personal problem solving styles • Identify and practice individual brainstorming strategies • Discuss employment and experience as they

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		<ul style="list-style-type: none"> • relate to professional work • Develop a list of skills and abilities • Determine which skills could be improved with work experience and which will be developed in the classroom • Develop a list of personal career priorities • Develop a list of strong personal and educational abilities • Develop a list of personal and educational abilities that need to be strengthened • Recognize technical progress rate • Discuss change versus evolution • Predict the needs of society in the year 2088 • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Interpret on-site factors that influence design • Interpret off-site factors that influence design • Predict and analyze cultural factors that influence the site design
<p>G.12.2 Design, build, evaluate, and revise models and explanations related to the earth and space, life and environmental, and physical sciences</p>	<p>C.12.1 Implement and evaluate strategies to solve technological problems that are likely to be successful C.12.6 Design and/or create solutions that are functional, aesthetically pleasing, demonstrate C.12.9 Apply basic engineering concepts in the design and creation of solutions to various problems or opportunities</p>	<ul style="list-style-type: none"> • Develop Gantt chart and physical storyboards • Design a prototype using 3D solid modeling software • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Explain the involvement of business and industry in the development of the solution • Present valid data in the preparation and testing results of the prototype • Solve appropriate calculations in the development of the prototype • Present results of the team design to business

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		<ul style="list-style-type: none"> and industry as well as peers • Produce working drawings using industry standard software • Construct a general sample terrain • Validate elevations in a terrain • Create a roadway within a site plan • Create a parking lot within a site plan • Design a pond within a site plan • Combine elements learned with a site plan to generate cut sheets • Generate team based solutions based on discussed parameters and a grading rubric
<p>G.12.3 Analyze the costs, benefits, or problems resulting from a scientific or technological innovation, including implications for the individual and the community</p>	<p>A.12.2 Understand that humans are faced with moral and ethical issues because technology is enabling very significant modifications to the natural world</p> <p>A.12.3 Explain why decisions regarding the use of technology are dependent on the situation, application, or perception of the group using it</p> <p>D.12.2 Illustrate how a technology can become controversial when people think the cost of the technology is not being equally shared by those who will benefit most from the technology</p> <p>D.12.3 Analyze how the values and beliefs of different people can influence their perceived risks and benefits of a given technology</p> <p>D.12.4 Evaluate the relative appropriateness of a given technology by comparing the risks with the benefits or the advantages with the disadvantages</p> <p>D.12.6 Show how the effects of a given technology may be unacceptable under one set of circumstances but acceptable under a different set of circumstances</p>	<ul style="list-style-type: none"> • Predict how one would realize the direct effects of their efforts • Communicate how decisions impact designs • Express the effects of a global marketplace • Review team attributes • Review and give examples of input, process, output and feedback • Construct a simple prototype based on parameters and a rubric • Describe what pressures are prevalent in engineering design • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case

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		<p>study with peers</p> <ul style="list-style-type: none"> • Research loads and limits on design components • Report evidence of simulation, experiment and analysis • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Understand the environment of the analysis including restraints and loads • Assess sample case studies using the ten step process • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Predict and analyze cultural factors that influence the site design
<p>G.12.4 Show how a major scientific or technological change has had an impact on work, leisure, or the home</p>	<p>A.12.2 Understand that humans are faced with moral and ethical issues because technology is enabling very significant modifications to the natural world</p>	<ul style="list-style-type: none"> • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering

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	<p>A.12.7 Explain how scientific and technological research can contribute to improved quality of life and a better standard of living B.12.5 Assess the impact new and improved products and services have had on the quality of life; explain how the development of new tools, materials, and processes is necessary to maintain and improve high productivity and quality C.12.6 Design and/or create solutions that are functional, aesthetically pleasing, demonstrate quality, have value greater than the investment, and meet a societal want or need</p>	<ul style="list-style-type: none"> • Design an innovative project for industry • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case study with peers • Construct a working model in a group setting • Describe the historical periods of materials • Implement action plan based on assigned responsibilities and completion dates • Understand the basic concepts of design analysis • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Assess a problem using the six step evaluation process • Design a simple structure with limited materials according to parameters and a grading rubric • Construct and test designs for an ergonomically correct chair according to parameters and a rubric • Assess sample case studies using the ten step process • Design and construct a outdoor shelter out of 90% recycled materials • Recognize technical progress rate • Contrast environmental issues with the wants of society • Design a prototype using 3D solid modeling software • Present valid data in the preparation and testing results of the prototype
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		<ul style="list-style-type: none"> • Construct a general sample terrain • Create a roadway within a site plan • Create a parking lot within a site plan • Design a pond within a site plan • Generate team based solutions based on discussed parameters and a grading rubric
<p>G.12.5 Choose a specific problem in our society, identify alternative scientific or technological solutions to that problem and argue its merits</p>	<p>C.12.1 Implement and evaluate strategies to solve technological problems that are likely to be successful C.12.3 Defend solutions to technological problems and opportunities C.12.6 Design and/or create solutions that are functional, aesthetically pleasing, demonstrate C.12.10 Evaluate a technological solution and make necessary improvement if needed C.12.11 Select and apply appropriate processes to alter the characteristics of material to make it useful in different situations</p>	<ul style="list-style-type: none"> • Participate and offer feedback in a simple team problem solving activity • Construct a simple prototype based on parameters and a rubric • Describe what pressures are prevalent in engineering design • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Design an innovative project for industry • Argue the ethics of an industry designed case study with peers • Develop spreadsheets to model iterations and maintain cost and weight accounting • Perform an analysis of trebuchet precision and accuracy • Perform costing of a one time and production project • Implement action plan based on assigned responsibilities and completion dates • Understand the basic concepts of design analysis • Describe how analysis can save time and money

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		<p>by reducing time consuming and expensive design cycles</p> <ul style="list-style-type: none"> • Understand the importance of triangular bracing in a structure • Describe the stages of a Structural Analysis • Understand the environment of the analysis including restraints and loads • Find the maximum load • Calculate the strength to weight ratio • Assess a problem using the six step evaluation process • Compile simple experiment data, comparing and contrasting results from peers • Design a simple structure with limited materials according to parameters and a grading rubric • Solve thermodynamic heat loss calculations for a simple room design • Construct and test designs for an ergonomically correct chair according to parameters and a rubric • Review and interpret the seven significant factors in design • Assess sample case studies using the ten step process • Generate team based solutions based on a request for proposal and a grading rubric • Design and construct a outdoor shelter out of 90% recycled materials • Discuss change versus evolution • Contrast environmental issues with the wants of society • Select and manipulate appropriate materials • Research the marketability of the prototype • Validate elevations in a terrain • Predict and analyze cultural factors that
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		<ul style="list-style-type: none"> influence the site design • Generate team based solutions based on discussed parameters and a grading rubric
H. SCIENCE IN SOCIAL AND PERSONAL PERSPECTIVES	Technology Education Standards	Crosswalk of Local School Curriculum
Performance Standards	Performance Standards	
<i>By the end of Grade 12 students will:</i>	<i>By the end of Grade 12 students will:</i>	
H.12.1 Using the science themes and knowledge of the earth and space, life and environmental, and physical sciences, analyze the costs, risks, benefits, and consequences of a proposal concerning resource management in the community and determine the potential impact of the proposal on life in the community and the region	A.12.1 Contrast the increasing complexities of technology with its ease of use A.12.2 Understand that humans are faced with moral and ethical issues because technology is enabling very significant modifications to the natural world D.12.1 Evaluate technologies based upon various sources of information D.12.2 Illustrate how a technology can become controversial when people think the cost of the technology is not being equally shared by those who will benefit most from the technology D.12.3 Analyze how the values and beliefs of different people can influence their perceived risks and benefits of a given technology D.12.4 Evaluate the relative appropriateness of a given technology by comparing the risks with the benefits or the advantages with the disadvantages D.12.6 Show how the effects of a given technology	<ul style="list-style-type: none"> • Predict how one would realize the direct effects of their efforts • Communicate how decisions impact designs • Participate and offer feedback in a simple team problem solving activity • Describe what pressures are prevalent in engineering design • Critique tradeoffs in engineering and their effects on decisions • Contrast quality and efficiency as significant factors in engineering • Discuss engineering code of ethics with peers through case studies • Describe and apply strategies of risk benefit analysis • Define contract law and breach of contract • Argue the ethics of an industry designed case study with peers • Construct and evaluate different typed of bill of materials

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	<p>may be unacceptable under one set of circumstances but acceptable under a different set of circumstances</p>	<ul style="list-style-type: none"> • Research nanotechnology and predict its impact on the future • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Define the terms analytic and creative problem solving • Assess a problem using the six step evaluation process • Describe the terms divergence and convergence • Investigate personal problem solving styles • Compile simple experiment data, comparing and contrasting results from peers • Review and interpret the seven significant factors in design • Assess sample case studies using the ten step process • Contrast environmental issues with the wants of society • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Present valid data in the preparation and testing results of the prototype • Determine environmental impacts of proposed design • Predict and analyze cultural factors that influence the site design
<p>H.12.2 Evaluate proposed policy recommendations (local, state, and/or national) in science and technology for validity, evidence, reasoning, and implications, both short and long term</p>	<p>A.12.1 Contrast the increasing complexities of technology with its ease of use A.12.5 Portray how a society may not be able to exercise full control over their technological systems</p>	<ul style="list-style-type: none"> • Predict how one would realize the direct effects of their efforts • Communicate how decisions impact designs • Describe what pressures are prevalent in engineering design • Argue the ethics of an industry designed case

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		<ul style="list-style-type: none"> study with peers • Research nanotechnology and predict its impact on the future • Define the terms analytic and creative problem solving • Define the ten step design process • Identify and describe estimation techniques • Review and interpret the seven significant factors in design • Contrast environmental issues with the wants of society • Determine environmental impacts of proposed design • Predict and analyze cultural factors that influence the site design
<p>H.12.3 Show how policy decisions in science depend on many factors, including social values, ethics, beliefs, and time-frames, and considerations of science and technology</p>	<p>A.12.1 Contrast the increasing complexities of technology with its ease of use A.12.5 Portray how a society may not be able to exercise full control over their technological systems</p>	<ul style="list-style-type: none"> • Predict how one would realize the direct effects of their efforts • Communicate how decisions impact designs • Describe what pressures are prevalent in engineering design • Argue the ethics of an industry designed case study with peers • Define the terms analytic and creative problem solving • Contrast environmental issues with the wants of society • Determine environmental impacts of proposed design • Predict and analyze cultural factors that influence the site design

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<p>H.12.4 Advocate a solution or combination of solutions to a problem in science or technology</p>	<p>B.12.7 Explain how new and higher quality products require new and higher quality materials and processing techniques C.12.3 Defend solutions to technological problems and opportunities C.12.7 Present a design solution that accounts for production of a device; how the device</p>	<ul style="list-style-type: none"> • Express the effects of a global marketplace • Participate and offer feedback in a simple team problem solving activity • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Argue the ethics of an industry designed case study with peers • Prepare a project plan for a prospective client • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Implement action plan based on assigned responsibilities and completion dates • Identify and describe estimation techniques • Compile simple experiment data, comparing and contrasting results from peers • Report and present team design for an ergonomically correct chair • Review and interpret the seven significant factors in design • Present results of a team design to peers for critique • Present valid data in the preparation and testing results of the prototype • Present results of the team design to business and industry as well as peers
<p>H.12.5 Investigate how current plans or</p>	<p>A.12.2 Understand that humans are faced with moral</p>	<ul style="list-style-type: none"> • Predict how one would realize the direct effects

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<p>proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment, ecology, and quality of life in a community or region</p>	<p>and ethical issues because technology is enabling very significant modifications to the natural world A.12.4 Explore the way in which human adaptive technological systems interact with ideological and sociological systems C.12.6 Design and/or create solutions that are functional, aesthetically pleasing, demonstrate quality, have value greater than the investment, and meet a societal want or need D.12.3 Analyze how the values and beliefs of different people can influence their perceived risks and benefits of a given technology</p>	<p>of their efforts</p> <ul style="list-style-type: none"> • Communicate how decisions impact designs • Describe what pressures are prevalent in engineering design • Critique tradeoffs in engineering and their effects on decisions • Discuss product specifications and their role in engineering • Contrast quality and efficiency as significant factors in engineering • Argue the ethics of an industry designed case study with peers • Implement action plan based on assigned responsibilities and completion dates • Describe how analysis can save time and money by reducing time consuming and expensive design cycles • Assess a problem using the six step evaluation process • Compile simple experiment data, comparing and contrasting results from peers • Construct and test designs for an ergonomically correct chair according to parameters and a rubric • Review and interpret the seven significant factors in design • Assess sample case studies using the ten step process • Generate team based solutions based on a request for proposal and a grading rubric • Design and construct a outdoor shelter out of 90% recycled materials • Contrast environmental issues with the wants of society • Predict the needs of society in the year 2088
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		<ul style="list-style-type: none"> • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Present valid data in the preparation and testing results of the prototype • Solve appropriate calculations in the development of the prototype • Determine environmental impacts of proposed design
<p>H.12.6 Evaluate data and sources of information when using scientific information to make decisions.</p>	<p>B.12.8 Select and apply appropriate processes to transform information into its most useful format C.12.2 Measure, collect, and analyze data in order to solve a technological problem D.12.1 Evaluate technologies based upon various sources of information</p>	<ul style="list-style-type: none"> • Predict how one would realize the direct effects of their efforts • Express the effects of a global marketplace • Participate and offer feedback in a simple team problem solving activity • Critique tradeoffs in engineering and their effects on decisions • Contrast quality and efficiency as significant factors in engineering • Describe and apply strategies of risk benefit analysis • Perform costing of a one time and production project • Investigate various characteristics and reactions of materials through specific experiments • Identify and evaluate potential failure modes • Identify and evaluate potential causes of the failure mode • Identify and quantify the impact of potential failures • Identify and prioritize actions to reduce or eliminate the potential failure • Describe how analysis can save time and money by reducing time consuming and expensive design cycles

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		<ul style="list-style-type: none"> • Describe the stages of a Structural Analysis • Assess a problem using the six step evaluation process • Identify and describe estimation techniques • Compile simple experiment data, comparing and contrasting results from peers • Review and interpret the seven significant factors in design • Assess sample case studies using the ten step process • Contrast environmental issues with the wants of society • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Predict and analyze cultural factors that influence the site design
<p>H.12.7 When making decisions, construct a plan that includes the use of current scientific knowledge and scientific reasoning.</p>	<p>A.12.7 Explain how scientific and technological research can contribute to improved quality of life and a better standard of living C.12.1 Implement and evaluate strategies to solve technological problems that are likely to be successful C.12.9 Apply basic engineering concepts in the design and creation of solutions to various problems or opportunities</p>	<ul style="list-style-type: none"> • Develop Gantt chart and physical storyboards • Design a prototype using 3D solid modeling software • Select and manipulate appropriate materials • Examine aesthetic components and their impact on customers • Research the marketability of the prototype • Explain the involvement of business and industry in the development of the solution • Present valid data in the preparation and testing results of the prototype • Solve appropriate calculations in the development of the prototype • Present results of the team design to business and industry as well as peers

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		<ul style="list-style-type: none"> • Produce working drawings using industry standard software • Construct a general sample terrain • Validate elevations in a terrain • Create a roadway within a site plan • Create a parking lot within a site plan • Design a pond within a site plan • Combine elements learned with a site plan to generate cut sheets • Generate team based solutions based on discussed parameters and a grading rubric
Total contact hours		226.895 Hours