



Dyersburg High School  
 Career and Technical Education  
 Instructor: Seth Coleman  
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### STEM III: STEM In Context Pacing Guide First Semester

1 <sup>st</sup> Quarter	TN Standards	Lesson Focus	Additional Notes
Week 1-2	Accurately read and interpret safety rules, including but not limited to rules published by the National Science Teachers Association (NSTA), rules pertaining to electrical safety, Occupational Safety and Health Administration (OSHA) guidelines, and state and national code requirements. Be able to distinguish between the rules and explain why certain rules apply. (TN Reading 3, 4, 6)	Study of Laboratory and Field Safety, Including Proper Use of Chemical Substances.	Demonstrate proper lab & field safety procedures in regards to OSHA guidelines, and learn about SDS (Material Safety Data Sheets).
Week 3	Identify and explain the intended use of safety equipment available in the classroom. For example, demonstrate how to properly inspect, use, and maintain safe operating procedures with tools and equipment. Incorporate safety procedures and complete safety test with 100 percent accuracy. (TN Reading 3, 4)	Lab and Field Equipment Safety Procedures, SDS Utilization.	Demonstrate proper use and care of lab and field equipment and tools, and exhibit proficiency in use and review of SDS.
Week 4-5	Explore how research teams are formed in order to answer scientific questions or design solutions to engineering problems. Using a scholarly database such as the Education Resources Information Center (ERIC), or searching on the websites of universities and other research institutions, investigate a well-known team of scientists or engineers (for example, the most recent Nobel Prize-winning teams in the sciences) and report to the class on how they collaborated to produce new scientific knowledge or solve an engineering problem. (TN Reading 2, 4; TN Writing 2, 4, 7)	Examination of Scientific or Engineering Team Formation and Intra and Inter-Team Collaborations to Achieve Objectives.	Utilize websites of recognized scientists in academia to address lesson focus and present findings.



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<p>Week 6-7</p>	<p>Examine how scientists, engineers, and other STEM professionals obtain funding, seek sponsorship, and/or gain approval to conduct their research. Explore websites such as the National Science Foundation or the National Institutes of Health to identify common processes around submitting proposals for research studies and procuring the necessary funds. Explain specific terminology such as request for proposals (RFP), competitive grants versus formula grants, and seed funding. (TN Reading 2, 4, 6; TN Writing 2, 4, 7)</p>	<p>Investigation of Funding Paths/Processes/Opportunities, and Methods which Enhance Probability of Obtaining Funding For Scientific Research.</p>	<p>Explore and report on both public (governmental) and non-public (private) funding and associated terminology, as well as possible influence on the direction of scientific research based on the source of funding. Project will be performed by teams of 2-3 students.</p>
<p>Week 8-9</p>	<p>Research the ethical requirements for conducting scientific research or testing a prototype that will involve the public. For example, investigate the process for obtaining Institutional Review Board (IRB) approval when proposing a biomedical or human behavioral research study. Describe the concept of risk-benefit analysis in the production of new scientific knowledge; detail the rights and responsibilities of researchers—and, if applicable, their subjects—as they relate to conducting research in STEM fields. (TN Reading 2, 4, 7; TN Writing 2, 4, 7)</p>	<p>Utilization of High Ethical Standards that include Reporting Data, Results, and Conclusions without Manipulation while Performing Scientific Research, and Recognizing the Negative Outcome of Fraudulent Work.</p>	<p>Investigate and report on an example of recent fraudulent scientific work and its effect on the scientist, the scientific community, and/or the public. Project will be performed by teams of 3-4 students.</p>
<p><b>End of 1<sup>st</sup> Quarter</b></p>			
<p><b>Fall Break</b></p>			
<p><b>2<sup>nd</sup> Quarter</b></p>	<p><b>TN Standards</b></p>	<p><b>Lesson Focus</b></p>	<p><b>Additional Notes</b></p>
<p>Week 1-2</p>	<p>Research the ethical requirements for conducting scientific research or testing a prototype that will involve the public. For example, investigate the process for obtaining Institutional Review Board (IRB) approval when proposing a biomedical or human behavioral research study. Describe</p>	<p>Utilization of High Ethical Standards that include Reporting Data, Results, and Conclusions without Manipulation while Performing Scientific Research, and Recognizing the Negative Outcome of Fraudulent Work.</p>	<p>Investigate and report on an example of recent fraudulent scientific work and its effect on the scientist, the scientific community, and/or the public. Teams present final report that includes 2 cases of scientific misconduct.</p>



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		the concept of risk-benefit analysis in the production of new scientific knowledge; detail the rights and responsibilities of researchers—and, if applicable, their subjects—as they relate to conducting research in STEM fields. (TN Reading 2, 4, 7; TN Writing 2, 4, 7)		
	Week 3-9	Survey and observe people in your school and/or community. Analyze the results to determine potential STEM problems that need investigating or solving. Use these ideas to conduct research to determine and define a team project. Using supporting evidence from the research, write and present a STEM project proposal defining the project’s purpose and goals. Include an outline of how the team intends to follow the scientific inquiry or engineering design process. (TN Reading 3, 4, 7, 9; TN Writing 1, 7, 8)	Identification of the Main Project for the Course following Brainstorming of Several Proposed Projects by the Instructor and the students. In-depth Study of Steps Required for Preparation of Scientific/Engineering Research Proposals. Preparation of Outline and First Draft of Proposed Project by Each Team.	RFID gate project for the purpose of performing daily student attendance has already been identified as a possible project for the course by the instructor. Students will identify and discuss additional projects proposed by classmates. Teams will provide outline and first draft of project proposals.
	<b>End of 2<sup>nd</sup> Quarter</b>			
	<b>End of 1<sup>st</sup> Semester</b>	<b>Semester Exam</b>		
	<b>Winter Break</b>			
<b>STEM III: STEM In Context Pacing Guide Second Semester</b>				
	<b>3<sup>rd</sup> Quarter</b>	<b>TN Standards</b>	<b>Lesson Focus</b>	<b>Additional Notes</b>
	Week 1-9	Based on the project proposal and project plan, identify projected costs and estimate a hypothetical budget. The projected costs may include but are not limited to materials, labor, equipment, and travel. Create a method to track the actual costs. For example, spreadsheets can be used to analyze and track project expenses. (TN Reading 7; TN Writing 4, 9)  Survey and observe people in your school and/or community. Analyze the results to	Investigation of Budget Requirements for Each Team’s Proposed Project. Preparation of the Final Draft of Project Proposal (to Include Detailed Budgetary Requirements) by Each Team, and Formal Presentation of Proposed Project by Each Team.	Teams have already proposed projects. Teams will finalize project proposals and formally present proposals.



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		determine potential STEM problems that need investigating or solving. Use these ideas to conduct research to determine and define a team project. Using supporting evidence from the research, write and present a STEM project proposal defining the project's purpose and goals. Include an outline of how the team intends to follow the scientific inquiry or engineering design process. (TN Reading 3, 4, 7, 9; TN Writing 1, 7, 8)		
<b>End of 3<sup>rd</sup> Quarter</b>				
<b>4<sup>th</sup> Quarter</b>	<b>TN Standards</b>	<b>Lesson Focus</b>	<b>Additional Notes</b>	
Week 1	Survey and observe people in your school and/or community. Analyze the results to determine potential STEM problems that need investigating or solving. Use these ideas to conduct research to determine and define a team project. Using supporting evidence from the research, write and present a STEM project proposal defining the project's purpose and goals. Include an outline of how the team intends to follow the scientific inquiry or engineering design process. (TN Reading 3, 4, 7, 9; TN Writing 1, 7, 8)	Investigation of Budget Requirements for Each Team's Proposed Project. Preparation of the Final Draft of Project Proposal (to Include Detailed Budgetary Requirements) by Each Team, and Formal Presentation of Proposed Project by Each Team.	Teams have already proposed projects. Teams will finalize project proposals and formally present proposals.	
Week 2-3	Research Tuckman's stage model for team development (i.e., forming, storming, norming, performing, and adjourning). Prior to starting the STEM project, understand and explain each stage. After completing the project, write a brief evaluation of the team's growth at each stage. (TN Reading 2, 6; TN Writing 4, 9)	Expansion of Findings from Weeks 1-5 to Include Tuckman's Stages of Group Development, and Implementation of Findings within Individual Teams within the Class.	Investigate and report on the research performed and how the findings apply to and may be implemented in each team formed within the class.	
Week 4-10	As a team, determine the professional attributes that must be embodied by team members in order to successfully complete the proposed project. Collaboratively develop a professionalism rubric with performance	Investigation and Examination of Intellectual Property (IP), Specifically Patents. Identification of the Patent Process in the US, to Include Preparation of the Invention Disclosure, Patent Application Preparation	Investigate the different stages of filing for a patent in the US. Prepare a mock invention disclosure that could be submitted to a patent attorney for the purpose of preparing a patent application.	



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		<p>indicators for each attribute agreed upon. Include the rubric in the team handbook. Attributes may include the following:</p> <ul style="list-style-type: none"> <li>a. Effective communication</li> <li>b. Respect for fellow team members</li> <li><b>c. Ethical use of intellectual property and other project resources (including ethical treatment of test subjects, if applicable)</b></li> <li>d. Timely achievement of project deadlines and goals</li> <li>e. Collaborative and equitable distribution of work among all team members (TN Writing 4)</li> </ul>	<p>(Including Preparation of Claims), and Patent Prosecution Stages within the USPTO.</p>	
<b>End of 4<sup>th</sup> Quarter</b>				
<b>End of 2<sup>nd</sup> Semester</b>	<b>Semester Exam</b>			