

Student Name: _____

Date: _____

PROGRAM COMPETENCY PROFILE FOR CAREER TECHNICAL EDUCATION
Career Cluster: Science, Technology, Engineering & Mathematics

Program Name: Engineering, General CIP: 140101

Effective 8/14

National Standard: International Technology Education Association (ITEA); Pre-Engineering Technology Advisory Council

Competencies (statement that provides the overview and defines the instructional area) Student will:	Knowledge, Content and Skills (what a student needs to know and be able to do and upon which they will be assessed) http://www.careertech.org/career-technical-education/cctc/careerreadypractices.html http://www.education.nh.gov/career/career/aa oi.htm Student will:	NH Common Core State Standards – English/Language Arts/Literacy: ELA Mathematics: M	Rating Scale -Sample Performance Assessments (Performance tasks the student needs to demonstrate in order to be rated proficient in meeting the competency) Student will:				
Understand through principles and practices workplace safety concepts and procedures in order to operate in a safe environment.	1. Demonstrate and apply safe practices and procedures in the workplace. CRP: Attend to personal health and financial well-being	ELA:2,6,	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: All pre-engineering students are required to pass the general safety test with 100% score. To prepare for this familiarize yourself with all safety requirements of your classroom including tooling, equipment.	1	2	3	4
1	2	3	4				
Understand the methodologies and engineering disciplines as applied to the fundamental skills associated with the engineering design process.	2. Describe the engineering design process and how it impacts the various engineering and engineering technology disciplines. AAI 4. Technical and Production Skills	ELA:2,4,6,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a bionics engineer working in a team with medical doctors and trying to come up with a way to reduce head injuries among high school athletes. You will need to research different techniques and present the results to the medical team. Continues #2-6	1	2	3	4
1	2	3	4				
	3. Demonstrate an understanding and application of the methodologies involved in the engineering design process.	ELA:2,4,6,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				

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All Aspects of Industry (AAI) - CTE:Career Ready Practices (CRP)

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	4. Develop a design for a product, process or project. Describe the manufacturing, construction or procedural methods used to convert the design into a finished product, process, or project. CRP: Employ valid and reliable research strategies.	ELA:2,4,6,8,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	5. Demonstrate various engineering product and project planning methodologies.	ELA:2,4,6,8,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	6. Demonstrate the effective use of design refinement in the engineering design process.	ELA:2,4,6,8,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	7. Demonstrate the use of mathematics and models (physical and virtual) as applied to the engineering design process.	ELA 2,4,6,9 M:1-19	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> For Example: You are a peace corp. volunteer a semi urban area where power connection is inconsistent. Using available resources, recycled car parts, scrap, etc., create a non-interrupted power source. The community will demonstrate the use by implementation. Continues #7-12	1	2	3	4
1	2	3	4				

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	8. Demonstrate the use of cost analysis in the engineering design process.	ELA: 2,4,6,9 M:1-3,6,7,16,19	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	9. Demonstrate the use of human resources and facility requirements in the engineering design process. CPR: Work productively in teams while using cultural/global competence.	ELA:2,4,6,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	10. Demonstrate what is meant by a multi-disciplinary design team.	ELA:2,4,6,8,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	11. Demonstrate the effective use of design teams as applied to the engineering design process. AAI: 9 Work Behaviors	ELA:2,4,6,8, 9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	12. Describe quality assurance and quality control and their applications in production and engineering design environments.	ELA:2,4,6,8, 9 M:1,2,3,12,15,16,17,18,19	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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Understand the use of problem-solving.	13. Demonstrate the ability to apply problem solving and decision making methods to an engineering problem. CRP: Communicate clearly, effectively and with reason. CRP: Utilize critical thinking to make sense of problems and persevere in solving them	ELA: 2,4,6,8, 9 M:1-19	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> For Example: You are a space engineer and there is a problem with guidance system of the Hubble telescope. You must put together a group of experts that will brainstorm a find a list of appropriate solutions to the problem. You will then present it to NASA Hubble program managers. Continues # 13-14	1	2	3	4
1	2	3	4				
	14. Demonstrate the use of a variety of written and oral communication techniques to resolve engineering problems. e.g. brainstorming, conference calls, consult experts, internet searches, etc.	ELA: 2,4,6,7, 8, 9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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Understand the interaction of multiple disciplines and the underlying principles of engineering.	15. Create an engineering case study. AAI 5. Underlying Principles of Technology	ELA: 2,3,4,5,6,7, 8, 9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are a major petroleum company and have an oil leak 500 feet below the surface of international waters. A team must assemble to find solutions to the problem that can be implemented immediately and meets all national and international rules and regulations and environmental standards. Present your solutions to a panel of international experts. Continues #15-21	1	2	3	4
1	2	3	4				
	16. Create a product design using computer based tools, e.g. CAD, spreadsheets, simulation packages, etc.	ELA:2,3,4,6,9 M:1-15	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	17. Demonstrate an understanding of the interrelationships of the various engineering disciplines as applied to engineering projects.	ELA: 2,4,6,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	18. Demonstrate an understanding of the concept of open and closed loop systems.	ELA: 2,4,6,8,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
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	19. Demonstrate an understanding of engineering systems , e.g., control, electrical, fluid, and mechanical	ELA: 2,4,6,8,9 M:1,2,4,5,6,7,8,9,10	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	20. Demonstrate an understanding of material characteristics as applied to engineering projects.	ELA: 2,4,6,8,9 M:1,2,3	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	21. Demonstrate the ability to present and defend project information in a formal presentation.	ELA: 2,4,6,8,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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Understand the impact engineering has on society.	22. Demonstrate an understanding of life cycles, e.g., product, sustainability, obsolescence, etc.	ELA: 2,4,6,8,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table> For Example: You are on a team of engineers that are working on a genetically modified corn to improve yield per acre in an arid environment. Research the advantages and disadvantages associated with this project. Present and defend your findings to a panel of stakeholders. Continues # 22-25	1	2	3	4
1	2	3	4				
	23. Demonstrate how engineering impacts society at a local, national, and global level. AAI: 7 Community Issues AAI: 8 Health, Safety, and Environment CRP: Consider the environmental, social and economic impacts of decisions	ELA: 2,4,6,8,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
	24. Demonstrate an understanding of what is meant by infrastructure.	ELA: 2,4,6,8,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td> </tr> </table>	1	2	3	4
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	25. Demonstrate an understanding of professional ethics and how they apply to the engineering profession. AAI 2: Management CRP: Model integrity, ethical leadership and effective management	ELA: 2,4,6,8,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4				
Understand that making effective choices is essential in meeting an individual career goal.	26. Demonstrate an understanding of the value of professional organizations in the engineering disciplines and their relationship to career development. AAI:6 Labor Issues	ELA: 2,4,6,8,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> For Example: You are a high school student that is interested in an engineering field. As part of a project you must identify the various educational and career path levels in the area of engineering that interests you the most. Present the findings to your class. Continues #26-28	1	2	3	4
1	2	3	4				
	27. Describe the educational pathways for various careers in engineering, engineering technologies and related fields. CRP: Plan education and career path aligned to personal goals.	ELA:2,4,6,8,9	<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
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	28. Describe career and employment opportunities in engineering including entrepreneurship AAI:1 Planning	ELA: 2,4,6,8,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table>	1	2	3	4
1	2	3	4				
Understand the importance of personal growth and leadership to enhance career success	29. Prepare a portfolio of their exemplary work. CRP: Demonstrate creativity and innovation	ELA:4,5,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table> For Example: You are participating in an engineering class in High School. Your advisory board is coming to interview you for a scholarship. Document and demonstrate, through your portfolio, why you are the best candidate for this opportunity. Continues #29-30	1	2	3	4
1	2	3	4				
	30. Demonstrate personal growth, community leadership, democratic principles, and social responsibility by participating in activities/events offered through student, industry and/or community organizations. CRP: Act as a responsible and contributing citizen and employee AAI:6 Labor Issues	ELA:4,5,8,9	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">1</td> <td style="width: 25%;">2</td> <td style="width: 25%;">3</td> <td style="width: 25%;">4</td> </tr> </table>	1	2	3	4
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