

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_

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

**Program Name: Engineering, General CIP: 140101**

Effective 8/09

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

<b>Competencies</b> (statement that provides the overview and defines the instructional area) <b>Student will:</b>	<b>Knowledge, Content and Skills</b> (what a student needs to know and be able to do and upon which they will be assessed ) <b>Student will:</b>	<b>NH Frameworks</b> <a href="http://www.ed.state.nh.us/frameworks">www.ed.state.nh.us/frameworks</a> <b>Science: S</b> <b>English Language Arts: LA</b> <b>Mathematics: M</b>	<b>Rating Scale -Sample Performance Assessments</b> (Performance tasks the student needs to demonstrate in order to be rated proficient in meeting the competency) <b>Student will:</b>				
<b>Understand the methodologies and engineering disciplines as applied to the engineering design process</b>	1. Demonstrate an understanding of the methodologies involved in the engineering design process. <b>AAI 4. Technical and Production Skills:</b> Identify specific production and technical skills required for this industry.	S:SPS1:11:2:1 S:SPS1:11:5.1	<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			
	2. Describe how the engineering design process impacts the various engineering disciplines.	S:SPS1:11:5.1 S:SPS2:11:1.4 S:SPS2:11:1.7	<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			
	3. Create a design for manufacturing.	S:SPS2:12:1.2	<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			
4. Demonstrate various planning methodologies.		<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 the effective use of design refinement in the engineering design process.		<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 use of modeling as applied to the engineering design process.		<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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	7. Demonstrate the use of cost analysis in the engineering design process.		<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				
	8. Demonstrate an understanding of manpower and facility requirements in the engineering design process.		<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 effective use of engineering design teams as applied to the engineering design process.		<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				
<b>Understand the interaction of multiple disciplines and the underlying principles of the engineering process</b>	10. Describe quality control and its application to the engineering process.		<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. Create an engineering case study. <b>AAI 5. Underlying Principles of Technology:</b> Explain through discussion the technological systems used within this industry.		<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. Demonstrate the use of computer aided design and its relationship to the engineering process.		<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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	13. Demonstrate an understanding of the interrelationships of the various engineering disciplines as applied to the engineering process.		<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				
	14. Demonstrate an understanding of material characteristics as applied to the engineering process.		<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				
	15. Demonstrate the ability to provide data in a formal presentation.		<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				
	16. Demonstrate an understanding of the product development life cycle.		<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				
	17. Demonstrate an understanding of the concept of a closed loop system.		<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				
	18. Demonstrate an understanding of the concept of an open loop system.		<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				
	19. Demonstrate an understanding of control system.		<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 an electrical system.		<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 an understanding of a fluid system.		<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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	22. Demonstrate an understanding of a mechanical system.		<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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<b>Understand the use of problem-solving methodology as applied to the engineering process</b>	23. Demonstrate the ability to solve engineering design problems through the use of a variety of modeling techniques.		<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			
	24. Demonstrate the ability to solve engineering problems utilizing a variety of computer aided design software.		<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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25. Demonstrate the use of a variety of communication techniques to solve engineering problems.		<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				
26. Demonstrate the use electronic spreadsheets to solve a variety of engineering problems.		<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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<b>Understand that making effective choices is essential in meeting an individual career goal</b>	27. Describe professional organizations in the engineering discipline and their relationship to career development.		<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 the educational requirements for various facets of engineering.		<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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	29. Describe career opportunities in engineering.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 25px; height: 20px;">1</td> <td style="width: 25px; height: 20px;">2</td> <td style="width: 25px; height: 20px;">3</td> <td style="width: 25px; height: 20px;">4</td> </tr> </table>	1	2	3	4
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	30. Prepare a proper portfolio of exemplary work.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 25px; height: 20px;">1</td> <td style="width: 25px; height: 20px;">2</td> <td style="width: 25px; height: 20px;">3</td> <td style="width: 25px; height: 20px;">4</td> </tr> </table>	1	2	3	4
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	31. Demonstrate an understanding of ethical standards and how they apply to the engineering profession.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 25px; height: 20px;">1</td> <td style="width: 25px; height: 20px;">2</td> <td style="width: 25px; height: 20px;">3</td> <td style="width: 25px; height: 20px;">4</td> </tr> </table>	1	2	3	4
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	32. Demonstrate the use of presentation tools to create and present professional level presentations.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 25px; height: 20px;">1</td> <td style="width: 25px; height: 20px;">2</td> <td style="width: 25px; height: 20px;">3</td> <td style="width: 25px; height: 20px;">4</td> </tr> </table>	1	2	3	4
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<b>Understand that entrepreneurship is a human endeavor that addresses the needs of a global society</b>	33. Discuss and assess venture creation possibilities and identify the steps in planning the venture. <b>AAI 1. Planning:</b> Explain the key elements of a long-term plan for a successful company. <b>AAI 2. Management:</b> Discuss the different forms of management and ownership within this industry. <b>AAI 3. Finance:</b> Explain the key components of financial management of a company.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 25px; height: 20px;">1</td> <td style="width: 25px; height: 20px;">2</td> <td style="width: 25px; height: 20px;">3</td> <td style="width: 25px; height: 20px;">4</td> </tr> </table>	1	2	3	4
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	34. Identify the resources needed for venture startup and operation.		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 25px; height: 20px;">1</td> <td style="width: 25px; height: 20px;">2</td> <td style="width: 25px; height: 20px;">3</td> <td style="width: 25px; height: 20px;">4</td> </tr> </table>	1	2	3	4
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	35. Discuss the options in planning the venture's future (growth, development, demise). <b>AAI 6. Labor Issues:</b> Explain the employees' and employers' rights and responsibilities in this industry. <b>AAI 7. Community Issues:</b> Discuss the ways a company can impact its community and the ways a community can impact a company.		<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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	36. Identify and discuss the traits and behaviors of an entrepreneur (leadership, personal assessment, personal management).		<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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<b>Understand the importance of personal growth and leadership to enhance career success</b>	37. Demonstrate personal growth, community leadership, democratic principles, and social responsibility by participating in activities/events offered through student organizations.		<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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<p><b>Understand the necessary employability skills in order to achieve success in today's workplace</b></p>	<p><b>38. Decision-Making &amp; Problem-Solving:</b> Demonstrate and apply good decision-making and problem-solving skills by outlining issues in situations/problems and determining, collecting, and organizing information needed in order to formulate a solution.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p><b>For Example:</b></p> <ul style="list-style-type: none"> <li>- create an outline</li> <li>- create a troubleshooting log</li> <li>- make class presentation</li> <li>- develop and test strategies or options that work</li> <li>- provide examples of the strategies or options tested or tried</li> <li>- compare and analyze pros and cons of identified strategies or options</li> <li>- through teamwork, arrive at a decision or determine a solution that is well suited to the task</li> <li>- independently arrive at a decision or determine a solution that is well suited to the task</li> <li>- communicate in a clear format how the solution was formed</li> <li>- justify or describe how and why a particular solution option was chosen</li> </ul>	1	2	3	4
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	<p><b>39. Self –Management:</b> Demonstrate and apply self-management skills by adhering to regulations, being responsible, and following through on commitments. <b>AAI 9. Personal Work Habits:</b> Explain the work habits an employer looks for in an employee in this industry.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p><b>For Example:</b></p> <ul style="list-style-type: none"> <li>- have a written test on applicable policies and procedures</li> <li>- assess student orientation knowledge through instructor observations and written unit test</li> <li>- review student handbook</li> <li>- adhere to regulations in school, classroom, and everyday settings</li> <li>- build trust by being consistent, dependable, and verbally positive with others</li> <li>- ask questions and listen to others</li> <li>- keep track of assignments and/or responsibilities</li> <li>- have work done on time</li> <li>- respond positively to constructive feedback</li> <li>- show respect for others and their points of view</li> <li>- set individual goals and document progress toward achieving those goals</li> <li>- take initiative to pursue learning</li> <li>- adapt as necessary to create a positive outcome for self and others</li> <li>- advocate appropriately for himself/herself</li> </ul>	1	2	3	4
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	<p><b>40. Communication Skills:</b> Demonstrate and apply effective communication skills: verbal, written, visual, and listening.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p><b>For Example:</b></p> <ul style="list-style-type: none"> <li>- be given a work order that contains written instructions of a specific job and complete the work order</li> <li>- create a power point presentation</li> <li>- participate in a debate</li> <li>- perform mock interviews</li> <li>- develop a topic</li> <li>- include details to support a main point</li> <li>- use appropriate grammar and sentence structure</li> <li>- organize writing and/or presentation materials</li> <li>- use constructive feedback to improve skill</li> <li>- participate in discussion and conversation by listening, entering in, taking turns, responding to others' remarks, asking questions, summarizing and closing, as appropriate to the given context</li> <li>- use varied vocabulary for clarity and effectiveness</li> <li>- support his/her ideas in a public forum using the appropriate visual/audio aides</li> <li>- select and use the appropriate media and method(s) to communicate the subject effectively</li> <li>- adapt writing, speaking, and/or visual presentations effectively to a particular audience</li> <li>- act on or respond appropriately to verbal and non-verbal cues from the audience</li> </ul>	1	2	3	4
1	2	3	4				

**Key: Rating Scale:** 1 NO EXPOSURE; 2 = NOVICE (Information was covered in class, but student cannot demonstrate skill or knowledge without significant supervision); 3 = PROFICIENT (Student regularly demonstrates the knowledge or skill); 4= MASTERY (Student demonstrates successful completion of this skill numerous times without supervision.)

**Framework:** Targeted= Framework aligns to competency Related= Framework supports competency \* = NECAP Assessment Expectation

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

**Program Name: Engineering, General CIP: 140101**

Effective 8/09

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

<b>Competencies</b> (statement that provides the overview and defines the instructional area) <b>Student will:</b>	<b>Knowledge, Content and Skills</b> (what a student needs to know and be able to do and upon which they will be assessed) <b>Student will:</b>	<b>NH Frameworks</b> <a href="http://www.ed.state.nh.us/frameworks">www.ed.state.nh.us/frameworks</a> <b>Science: S</b> <b>Language Arts: LA</b> <b>Math: M</b>	<b>Rating Scale -Sample Performance Assessments</b> (Performance tasks the student needs to demonstrate in order to be rated proficient in meeting the competency) <b>Student will:</b>
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	<b>41. Ability to Work with Others:</b> Demonstrate and apply the necessary skills in order to work effectively with others.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <b>For Example:</b> <ul style="list-style-type: none"> <li>- role play a situation in which there is a conflict which must be resolved</li> <li>- compose a list of what she/he believes to be the most common problems within that profession after reviewing appropriate work ethics standards</li> <li>- conduct an interview with a manager and share report with classmates</li> <li>- demonstrate knowledge of individual strengths he/she brings to a group</li> <li>- demonstrate knowledge of and respect for cultural and individual differences</li> <li>- demonstrate beginning skills in conflict management by outlining the issues involved and others' points of view</li> <li>- demonstrate knowledge of the possible roles and responsibilities that individuals assume while working with others</li> <li>- demonstrate knowledge of group skills: listening, brainstorming, clarifying information, showing initiative, acknowledging contributions, defining group tasks, and responding positively to constructive feedback</li> <li>- demonstrate increasing skills in conflict management by brainstorming a variety of solutions and their possible outcomes</li> <li>- apply his/her individual strengths to enhance a group's performance</li> <li>- assume responsibilities within a group</li> <li>- demonstrate the use of group skills in a way that enhances a group's performance</li> <li>- demonstrate skills in conflict management by describing, justifying, and applying a resolution process, and reflecting on the outcome</li> </ul>	1	2	3	4
1	2	3	4				

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	<p><b>42. Information Use - Research, Analysis, Technology:</b> Demonstrate and apply the use of information through research, analysis, and technology.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p><b>For Example:</b></p> <ul style="list-style-type: none"> <li>- do a research project and develop a presentation for the class</li> <li>- keep a daily notebook</li> <li>- show use of a plan for gathering information</li> <li>- gather information from a variety of sources, using a variety of technologies</li> <li>- use sources that are current and appropriate to the topic</li> <li>- evaluate sources for correct and trustworthy information</li> <li>- document sources of information appropriately</li> <li>- demonstrate and apply the skills in using software applications (MS Office)</li> <li>- use a filing/organization system for information, such as notebook, disk, etc.</li> <li>- justify the use of a particular organizational system for a particular product</li> <li>- demonstrate effective communication skills (written, oral, listening)</li> <li>- effectively present a thesis, supporting evidence, and a conclusion using a variety of media</li> </ul>	1	2	3	4
1	2	3	4				

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	<b>43. Mathematical Concepts:</b> Demonstrate mathematical and computation skills as applied to real world situations.		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <b>For Example:</b> - keep a log of all possible uses of mathematics noticed throughout the class/lab/worksite - compute accurately, applying addition, subtraction, multiplication, and division on real numbers, fractions, percents, and decimals - collect, interpret, organize and display relevant data for solving a mathematics problem - translate real world problems into mathematical representations - express and present mathematical ideas clearly in everyday written and oral language - express in written and oral language how mathematics connects to other contexts outside the mathematics classroom - use basic numerical concepts such as whole numbers and percentages in practical situations; make reasonable estimates of arithmetic results without a calculator; and use tables, graphs, diagrams, and charts to obtain or convey quantitative information - approach practical problems by choosing appropriately from a variety of mathematical techniques; use quantitative data to construct logical explanations for real world situations; express mathematical ideas and concepts orally and in writing; and understand the role of chance in the occurrence and prediction of events	1	2	3	4
1	2	3	4				

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	<p><b>44. General Safety:</b> Demonstrate and apply safe practices and procedures in the workplace. <b>AAI 8. Health, Safety, and Environment:</b> Explain the health and safety laws and practices affecting the employee, the surrounding community, and the environment in this industry.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p><b>For Example:</b>  - develop scenarios of hazards and accidents using publications and the internet  - be observed by teacher  - take written quizzes/written tests  - demonstrate knowledge of safety and sanitation practices and procedures  - identify and report hazardous conditions and safe working procedures  - use personal protective equipment and clothing</p>	1	2	3	4
1	2	3	4				
	<p><b>45. Career Development:</b> Demonstrate personal/career development skills by completing a career plan.</p>		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table> <p><b>For Example:</b>  - complete a self-awareness inventory  - develop a career portfolio  - use a career software, such as Choices, to measure their aptitudes and abilities for particular careers  - use available resources (college catalogs and websites) to research information about postsecondary educational opportunities  - select a career in the field and outline educational and skill requirements, expected job growth, and salaries  - review with teacher software printout to assess their aptitudes and abilities  - make appropriate choices in pursuit of postsecondary education or training and/or direct entry into the world of work  - plan a senior experiential project to review and evaluate a variety of career choices</p>	1	2	3	4
1	2	3	4				

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