

**Bemidji Middle School
2017 STEM Curriculum
Course Alignment - Grade 8**

| Standards | Substrands | Standard | Code | Benchmarks |
|--|---|---|-----------|---|
| 1. The Nature of Science and Engineering | 1. The Practice of Science | 1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review. | 8.1.1.1.1 | Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given. For example: Evaluate the use of pH in advertising products related to body care or gardening. |
| | | 2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world. | 8.1.1.2.1 | Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence. |
| | 3. Interactions Among Science, Technology, Engineering, Mathematics and Society | 2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry. | 8.1.3.2.1 | Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. |
| 3. Earth and Space Science | 3. The Universe | 1. The Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects. | 8.3.3.1.1 | Recognize that the sun is a medium-sized star, one of billions of stars in the Milky Way galaxy, and the closest star to Earth. |
| | | | 8.3.3.1.2 | Describe how gravity and inertia keep most objects in the solar system in regular and predictable motion. |
| | | | 8.3.3.1.3 | Recognize that gravitational force exists between any two objects and describe how the masses of the objects and distance between them affect the force. |
| | | | 8.3.3.1.4 | Compare and contrast the sizes, locations, and compositions of the planets and moons in our solar system. |

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| Data Analysis & Probability | | Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data. | 8.4.1.1 | Collect, display and interpret data using scatterplots. Use the shape of the scatterplot to informally estimate a line of best fit and determine an equation for the line. Use appropriate titles, labels and units. Know how to use graphing technology to display scatterplots and corresponding lines of best fit. |
| | | | 8.4.1.2 | Use a line of best fit to make statements about approximate rate of change and to make predictions about values not in the original data set. For example: Given a scatterplot relating student heights to shoe sizes, predict the shoe size of a 5'4" student, even if the data does not contain information for a student of that height. |
| | | | 8.4.1.3 | Assess the reasonableness of predictions using scatterplots by interpreting them in the original context. For example: A set of data may show that the number of women in the U.S. Senate is growing at a certain rate each election cycle. Is it reasonable to use this trend to predict the year in which the Senate will eventually include 1000 female Senators? |
| | | LEARNING AND INNOVATION SKILLS | CREATIVITY AND INNOVATION | <p>Think Creatively</p> <ul style="list-style-type: none"> - Use a wide range of idea creation techniques (such as brainstorming) - Create new and worthwhile ideas (both incremental and radical concepts) - Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts <p>Work Creatively with Others</p> <ul style="list-style-type: none"> - Develop, implement and communicate new ideas to others effectively - Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work - Demonstrate originality and inventiveness in work and understand the realworld limits to adopting new ideas - View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes <p>Implement Innovations</p> <ul style="list-style-type: none"> - Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur |

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| | | | CRITICAL THINKING AND PROBLEM SOLVING | <p>Reason Effectively - Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation</p> <p>Use Systems Thinking - Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems</p> <p>Make Judgments and Decisions - Effectively analyze and evaluate evidence, arguments, claims and beliefs - Analyze and evaluate major alternative points of view - Synthesize and make connections between information and arguments - Interpret information and draw conclusions based on the best analysis - Reflect critically on learning experiences and processes</p> <p>Solve Problems - Solve different kinds of non-familiar problems in both conventional and innovative ways - Identify and ask significant questions that clarify various points of view and lead to better solutions</p> |

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| | | | COMMUNICATION AND COLLABORATION | <p>Communicate Clearly</p> <ul style="list-style-type: none"> - Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts - Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions - Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) - Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact - Communicate effectively in diverse environments (including multi-lingual) <p>Collaborate with Others</p> <ul style="list-style-type: none"> - Demonstrate ability to work effectively and respectfully with diverse teams - Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal - Assume shared responsibility for collaborative work, and value the individual contributions made by each team member |
| | | INFORMATION, MEDIA AND TECHNOLOGY SKILLS | INFORMATION LITERACY | <p>Access and Evaluate Information</p> <ul style="list-style-type: none"> - Access information efficiently (time) and effectively (sources) - Evaluate information critically and competently |

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| <p>Framework for 21 Learning</p> <p>21st Century Student Outcomes</p> | <p>The elements described in this section as “21st century student outcomes” are the skills, knowledge and expertise students should master to succeed in work and life in the 21st century.</p> | | | <p>Use and Manage Information</p> <ul style="list-style-type: none"> - Use information accurately and creatively for the issue or problem at hand - Manage the flow of information from a wide variety of sources - Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information |
| | | | <p>MEDIA LITERACY</p> | <p>Analyze Media</p> <ul style="list-style-type: none"> - Understand both how and why media messages are constructed, and for what purposes - Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors - Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media <p>Create Media Products</p> <ul style="list-style-type: none"> - Understand and utilize the most appropriate media creation tools, characteristics and conventions - Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments |
| | | | <p>ICT (Information, Communications and Technology) LITERACY</p> | <p>Apply Technology Effectively</p> <ul style="list-style-type: none"> - Use technology as a tool to research, organize, evaluate and communicate information - Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy - Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies |

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| | | LIFE AND CAREER SKILLS | FLEXIBILITY AND ADAPTABILITY | <p>Adapt to Change</p> <ul style="list-style-type: none"> - Adapt to varied roles, jobs responsibilities, schedules and contexts - Work effectively in a climate of ambiguity and changing priorities <p>Be Flexible</p> <ul style="list-style-type: none"> - Incorporate feedback effectively - Deal positively with praise, setbacks and criticism - Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments |
| | | | INITIATIVE AND SELF-DIRECTION | <p>Manage Goals and Time</p> <ul style="list-style-type: none"> - Set goals with tangible and intangible success criteria - Balance tactical (short-term) and strategic (long-term) goals - Utilize time and manage workload efficiently <p>Work Independently</p> <ul style="list-style-type: none"> - Monitor, define, prioritize and complete tasks without direct oversight <p>Be Self-directed Learners</p> <ul style="list-style-type: none"> - Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise - Demonstrate initiative to advance skill levels towards a professional level - Demonstrate commitment to learning as a lifelong process - Reflect critically on past experiences in order to inform future progress |
| | | | SOCIAL AND CROSS-CULTURAL SKILLS | <p>Interact Effectively with Others</p> <ul style="list-style-type: none"> - Know when it is appropriate to listen and when to speak - Conduct themselves in a respectable, professional manner <p>Work Effectively in Diverse Teams</p> <ul style="list-style-type: none"> - Respect cultural differences and work effectively with people from a range of social and cultural backgrounds - Respond open-mindedly to different ideas and values - Leverage social and cultural differences to create new ideas and increase both innovation and quality of work |

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| | | | PRODUCTIVITY AND ACCOUNTABILITY | <p>Manage Projects</p> <ul style="list-style-type: none"> - Set and meet goals, even in the face of obstacles and competing pressures - Prioritize, plan and manage work to achieve the intended result <p>Produce Results</p> <ul style="list-style-type: none"> - Demonstrate additional attributes associated with producing high quality products including the abilities to: <ul style="list-style-type: none"> - Work positively and ethically - Manage time and projects effectively - Multi-task - Participate actively, as well as be reliable and punctual - Present oneself professionally and with proper etiquette - Collaborate and cooperate effectively with teams - Respect and appreciate team diversity - Be accountable for results |
| | | | LEADERSHIP AND RESPONSIBILITY | <p>Guide and Lead Others</p> <ul style="list-style-type: none"> - Use interpersonal and problem-solving skills to influence and guide others toward a goal - Leverage strengths of others to accomplish a common goal - Inspire others to reach their very best via example and selflessness - Demonstrate integrity and ethical behavior in using influence and power |
| | | | | <p>Be Responsible to Others</p> <ul style="list-style-type: none"> - Act responsibly with the interests of the larger community in mind |