THE ACADEMY FOR GIFTED CHILDREN – P.A.C.E.
CURRICULUM OUTLINE AND ASSESSMENT AND EVALUATION
GRADE 8 PRE-AP SCIENCE

OVERALL EXPECTATIONS

STRAND A. STEM SKILLS AND CONNECTIONS

Throughout Grade 8, in connection with the learning in the Life Systems, Matter and Energy, Structures and Mechanisms, and Earth and Space Systems strands, students will:

STEM Investigation and Communication Skills

- Use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures.

Coding and Emerging Technologies (Skills learned in P.A.C.E.'s specialized Coding Curriculum)

- Use coding in investigations and to model concepts and assess the impact of coding and of emerging technologies on everyday life and STEM-related fields

Applications, Connections, and Contributions

- Demonstrate an understanding of the practical applications of science and technology, and of contributions to science and technology from people with divers lived experiences.

STRAND B. LIFE SYSTEMS – MICROBIOLOGY – locally designed by P.A.C.E.

- analyse the roles of bacteria and viruses in the natural and laboratory setting.
- investigate some of the factors that affect the replication of bacteria, viruses and parasites.
- demonstrate an understanding of the immune system and how it is impacted by pathogenic organisms

STRAND C. MATTER AND ENERGY – FLUIDS

- analyze uses of various technologies that rely on the properties of fluids, and assess the impact of these technologies on society and the environment
- demonstrate an understanding of basic fluid mechanics, including the properties and uses of fluids

STRAND D. STRUCTURES AND MECHANISMS – SYSTEMS IN ACTION AND MOTION

- assess the social and environmental impacts of various systems, and evaluate improvements to the systems or alternative ways of meeting the same needs
- demonstrate an understanding of different types of systems and the factors that contribute to their safe and efficient operation
- Determine how forces and motion affect machines

STRAND E. EARTH AND SPACE – Plants in the Environment – locally designed by P.A.C.E.

- analyse the roles of plants in ecosystems and assess the impact of human activities on the balance of plants within those ecosystems.
- investigate some of the factors that affect plant growth.
- demonstrate an understanding of the structure and physiology of plants and their role in the natural environment

COURSE CONTENT

STRAND A. STEM SKILLS AND CONNECTIONS

By the end of Grade 8 students will:

***** skills learned in P.A.C.E.'s specialized Coding Curriculum**

- use a scientific research process and associated skills to conduct investigations
- use a scientific experimentation process and associated skills to conduct investigations
- use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems ***
- follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials
- communicate findings, using science and technology vocabulary and formats that are

appropriate for specific audiences and purposes
- write and execute code in investigations and when modelling concepts, with a focus on automating large systems in action***
- identify and describe impacts of coding and of emerging technologies, such as artificial intelligence systems, on everyday life, including skilled trades***
- describe practical applications of science and technology concepts in various occupations, including skilled trades, and how these applications address real-world problems ***
- investigate how science and technology can be used with other subject areas to address real-world problems ***
- analyze contributions to science and technology from various communities ***

STRAND B. LIFE SYSTEMS – MICROBIOLOGY – locally designed by P.A.C.E.

By the end of grade 8 students will:

- Assess some of the effects, both beneficial and harmful, of microorganisms in the environment.
- Analyze ethical issues related to the use of microorganisms in biotechnology.
- Use appropriate terminology related to microbiology, including, but not limited to: *fission, conjugation, phage, dormancy, morphology, mycelium, spore, pathogen,* and *plasmid.*
- Compare and contrast the cell structures of bacteria and viruses.
- Prepare a laboratory culture of microorganisms on agar, using proper aseptic techniques.
- Conduct the gram stain test on bacterial samples.
- Investigate the life cycle of HIV and retroviruses.
- Investigate the effect of antibacterial agents on different bacterial cultures.
- Investigate and analyze the conditions needed by microorganisms.
- Describe the anatomy and morphology of various groups of microorganisms.
- Explain the vital roles of microorganisms in symbiotic relationships with other organisms.
- Explain the different methods of reproduction in various types of bacteria and viruses.
- Describe how different viruses, bacteria, and parasites can affect host organisms, and how those effects are normally treated or prevented.

STRAND C. MATTER AND ENERGY – FLUIDS

By the end of grade 8 students will:

- assess the environmental, social, and economic impacts of various innovations and technologies that are based on the properties of fluids
- assess the environmental and social impacts of fluid spills, including impacts on First Nations, Métis, and Inuit communities, and including the cost and technical challenges related to cleanup and remediation efforts
- demonstrate an understanding of the factors that affect viscosity, and compare the viscosity of various fluids, including volumetric flow rate
- demonstrate an understanding of the relationship between mass, volume, and density
- explain the difference between solids, liquids, and gases in terms of their density, using the particle theory of matter
- explain the difference between liquids and gases in terms of their compressibility and how their compressibility affects their technological applications
- determine the buoyancy of an object, given its density, in a variety of fluids
- explain in qualitative terms the relationship between pressure, volume, and temperature when a liquid or a gas is compressed or heated
- describe how forces are transferred in all directions in fluids, including using Pascal's law to quantify the transfer of forces in fluids
- describe factors that affect the flow of fluids
- describe the differences between pneumatic and hydraulic systems
- use scientific inquiry/experimentation skills to demonstrate how fluids are used and how their flow is regulated in living organisms and in mechanical devices or systems
- use technological problem-solving skills to design, build, and test devices that use pneumatic or hydraulic systems

STRAND D. STRUCTURES AND MECHANISMS – SYSTEMS IN ACTION AND MOTION
By the end of grade 8 students will:

- assess the social, economic, and environmental impacts of automating systems
- assess the impact on individuals, society, and the environment of alternative ways of meeting needs that are currently met by existing systems, taking different points of view into consideration
- calculating and graphing speed, velocity and acceleration of machines
- describe the purpose, inputs, and outputs of various systems, including systems related to food processing
- identify the various processes and components of a system that allow it to perform its function efficiently and safely
- use the scientific terms *displacement*, *force*, *work*, *energy*, and *efficiency* to describe everyday experiences
- demonstrate an understanding of the relationships between work, force, and displacement in simple systems
- explain the relationship between input and output forces and determine the mechanical advantage of various mechanical systems, including simple machines
- identify ways in which energy can dissipate from mechanical systems, and describe technological innovations that make these systems more efficient
- explain how providing information and support to consumers helps to ensure that the systems they use run safely and efficiently
- describe technological innovations involving mechanical systems that have increased productivity in various industries
- identify social factors that influence the evolution of a system

STRAND E. EARTH AND SPACE –PLANTS IN THE ENVIRONMENT – locally designed by P.A.C.E.
By the end of grade 8 students will:

- demonstrate an understanding of the structure and function of cell organelles found within plant cells
- describe the structure and physiology of the specialized plant tissues involved in conduction, support, storage, and photosynthesis
- assess the positive and negative impact of human activities on the natural balance of plants
- explain the chemical changes and energy transformations associated with the process of photosynthesis and compare the reactants to the products
- compare the various means of sexual and asexual reproduction in plants
- use scientific inquiry/experimentation skills to identify factors that affect plant growth
- assess the impact of chemicals and pollution on plants in the natural environment
- identify and classify different types of localized plants and the abiotic factors involved in their survival
- investigate how chemical compounds (e.g., fertilizers, herbicides, pesticides) affect plant growth

RESOURCES
A variety of science resources locally designed by P.A.C.E.

ASSESSMENT AND EVALUATION

	Term 1 (Plants and the Environment)	**Term 2 (Fluids)**	**Term 3 (Microbiology and Systems in Action and Motion)**
Assessment For Learning	**Activities** -Microscopic Diagrams of a Plant Cell and Algae -Mold Activity -Soil Testing Activity -Collecting and Identifying Leaves -Nitrogen Cycle Gizmo	**Activities** - Archimedes Principle -Pneumatic Experiment -Building Molecules using Molecular Kits **Practice Problems** -Density -Pascals Law -Naming Molecules -Bonding and Balancing Equations -Completing Equations	**Activities** -Bacteria in the Environment -Observing Bacteria -Observing Viruses -Immune System Activity **Practice Problems** -Speed, Velocity and Acceleration -Work, Mechanical Efficiency and Mechanical Advantage
Assessment As Learning	-Individual and group conversations -Peer Evaluation -Self Reflection -Exit Cards	-Individual and group conversations -Peer Evaluation -Self Reflection -Exit Cards	-Individual and group conversations -Peer Evaluation -Self Reflection -Exit Cards
Assessment OF Learning	**Experiments** -Observations-following the procedure, making hypotheses, collecting data, drawing conclusions -Drawing and comparing microscopic diagrams of roots, stems and leaves -Growing plants and assessing environmental impacts **Field Trip**: -Collecting and identifying localized plants in the environment -Using a dichotomous key to identify plants **Biology Test**	**Experiments** - Observations-following the procedure, making hypotheses, collecting data, drawing conclusions -Density of Unknown Substances -Flame Test -Bonding, Completing Equations and Naming Molecules -Acid and Base Experiment **Chemistry Test**	**Experiments** - Observations-following the procedure, making hypotheses, collecting data, drawing conclusions -Antibiotic Lab -Gram Staining Lab -Medical Microbiology Presentations -Displacement/Time Graph -Observing and Calculating Mechanical Advantage of Simple Machines -Systems in Action Project **Microbiology Test**
Weighting Per Performance Strand	**K/U: 20%** **T/I: 30%** **App: 30%** **Comm: 20%**	**K/U: 20%** **T/I: 30%** **App: 30%** **Comm: 20%**	**K/U: 20%** **T/I: 30%** **App: 30%** **Comm: 20%**