Science 10 Course Outline

Ms. Pedersen Room F117
Email: tpedersen@sd68.bc.ca

BIG IDEAS *Students are expected **to understand** the following*:

Genes are the foundation for the diversity of living things.	Chemical processes require energy change as atoms are rearranged.	Energy is conserved and its transformation can affect living things and the environment.	The formation of the universe can be explained by the big bang theory.

Curricular Competencies (60%) *Students are expected to be able **to do** the following*:

Questioning and predicting (10%)

1. Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest
2. Make observations aimed at identifying their own questions, including increasingly complex ones, about the natural world
3. Formulate multiple hypotheses and predict multiple outcomes

Planning and conducting (10%)

4. Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)
5. Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods and those of others
6. Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data
7. Ensure that safety and ethical guidelines are followed in their investigations

Processing and analyzing data and information (10%)

8. Experience and interpret the local environment
9. Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information
10. Seek and analyze patterns, trends, and connections in data, including describing relationships between variables (dependent and independent) and identifying inconsistencies
11. Construct, analyze, and interpret graphs (including interpolation and extrapolation), models, and/or diagrams
12. Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
13. Analyze cause-and-effect relationships

Evaluating (10%)

14. Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions
15. Describe specific ways to improve their investigation methods and the quality of the data
16. Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled
17. Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and secondary sources
18. Consider the changes in knowledge over time as tools and technologies have developed
19. Connect scientific explorations to careers in science
20. Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations and to evaluate claims in secondary sources
21. Consider social, ethical, and environmental implications of the findings from their own and others' investigations
22. Critically analyze the validity of information in secondary sources and evaluate the approaches used to solve problems

Curricular Competencies Continued *Students are expected to be able **to do** the following**:***

Applying and innovating (10%)	Communicating (10%)
23. Contribute to care for self, others, community, and world through individual or collaborative approaches 24. Transfer and apply learning to new situations 25. Generate and introduce new or refined ideas when problem solving 26. Contribute to finding solutions to problems at a local and/or global level through inquiry 27. Consider the role of scientists in innovation	28. Formulate physical or mental theoretical models to describe a phenomenon 29. Communicate scientific ideas, claims, information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations 30. Express and reflect on a variety of experiences, perspectives, and worldviews through place

Content (40%): *Students are expected **to know** the following*:

1. **DNA structure and function:**
   a. genes and chromosomes
   b. gene expression
   c. interactions of genes and the environment
2. **patterns of inheritance:** Mendelian genetics, Punnett squares, complete dominance, co-dominance, incomplete dominance, sex-linked inheritance, human genetics
3. **mutation:**
   a. positive, negative, and neutral impacts
   b. mutagens and carcinogens
4. **natural selection:**
   a. adaptive radiation
   b. selection pressure (e.g., adaptation and extinction, invasive species)
   c. adaptations
   d. extinctions
5. **artificial selection:**
   a. in agriculture (e.g., monoculture, polyculture, food sustainability)
   b. breeding (plant and animal)
6. **applied genetics:** genomics, GMOs, gene therapy, cloning, stem cells, reproductive technology, species, population and ecosystems, forensics, genetic engineering
7. **ethical considerations:** the health, environmental, social, and political implications of modern genetics
8. **chemical reactions:** types include synthesis, decomposition, single-double replacement, combustion/oxidation, neutralization
9. **energy change:**
   a. exothermic and endothermic
   b. activation energy
10. **law of conservation of mass**
11. **acid-base chemistry**
12. **practical applications and implications of chemical processes:** household chemical safety (e.g., ammonia and bleach), combustion (e.g., forest fire, fire triangle, kindling temperature, ignition point, oxygen concentration), polymer chemistry, semiconductors, resource extraction (e.g., ore, fracking), pulp and paper chemistry, food chemistry, corrosion/prevention, tanning, traditional medicines, phytochemistry, pharmaceuticals, environmental remediation, water quality, oil spill cleanup
13. **nuclear energy:**
   a. fission versus fusion
   b. nuclear technologies and implications (e.g., nuclear power, medical isotopes, tanning beds, dental X-rays, food irradiation, radioactive dating)
   c. positive and negative impacts, including environmental, health, economic
14. **radiation:**
   a. ionizing versus non-ionizing
   b. alpha, beta, gamma
15. **potential:** stored energy (gravitational PE = mgh)
16. **kinetic:** energy of motion (translational KE = $1/2\ mv^2$)
17. **transformation of energy:**
   a. transfer of energy in closed and open systems
   b. heat ($Q = mc\Delta T$)
18. **impacts of energy transformations:** pollution, habitat destruction, carbon dioxide output
19. **components of the universe over time:** changes to energy, matter, fundamental forces
20. **astronomical data and collection methods:** different types of data are collected and analyzed as evidence to support theories about the universe (e.g., radio telescopes, background microwave radiation, red and blue Doppler shift, Mars rover, SNOLAB, ISS, Canadarm/Dextre)

Core Competencies: Students will be accessing the Core Competencies in all their curricular areas.

COMMUNICATION	THINKING	PERSONAL AND SOCIAL RESPONSIBLITY
The communication competency encompasses the set of abilities that a student uses to impart and exchange information, experience and ideas, to explore the world around them, to understand and effectively engage in the use of digital media.	The thinking competency encompasses the knowledge, skills and processes we associate with intellectual development and is demonstrated through: • creative thinking • critical thinking	The personal and social responsibly competency includes • positive personal and cultural identity • personal awareness and responsibility • social responsibility

Assessment:

- Curricular competencies (60%) and content (40%) - Note: Content is used in the Curricular Competencies
- Self-Assessment – used to inform the student about their on-going learning process
- Formative Assessment –in-process evaluations of student learning needs during a unit
- Summative assessment – evaluate student learning at the end of an instructional unit

Support:

Teacher:	I am available for extra help at lunch or after school most days
Counseling:	Crystal Lynn: A - Ge Kate Gustafson: Gi-Pa Shannon McRae: Pe - Z
Academic:	Aboriginal Support: Ms. N. Wedholm (C120)