**Conceptual Planning Framework**

**Big Idea:**

Homeostasis is maintained through physiological processes.

**Key Concepts:**

Structure and Function

**Content:**

Biological molecules

* water, acids, bases, buffers
* dehydration and synthesis reactions
* organic molecules: carbohydrates, lipids, proteins, nucleic acids, ATP

**Essential Questions:**

* As scientists, how do we use physical models to visualize, understand and predict scientific phenomena that are difficult to observe directly?
* How are structure and function related at various levels of biochemical organization (atoms, molecules, macromolecules)?
* How are the properties of water and carbon critical for maintaining life?

**Curricular Competencies:**

**Questioning and predicting**

* Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest
* Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world

**Processing and Analyzing**

* Construct, analyze, and interpret graphs, models, and/or diagrams
* Use knowledge of scientific concepts to draw conclusions that are consistent with evidence

**Communicating**

* Formulate physical or mental theoretical models to describe a phenomenon
* Communicate scientific ideas and 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

**First Peoples Principles of Learning**

* Learning involves patience and time.
* Learning is embedded in memory, history and story.
* Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits, and the ancestors.

**Ideas to promote Inquiry through E-learning:**

Incorporate inquiry questions and visible thinking routines from Harvard Project Zero

<http://www.pz.harvard.edu>

Explore stories and resources shared by colleagues experienced with blended learning models such as:

Tips for Designing an Online Learning Experience Using the 5Es Instructional Model

<https://catlintucker.com/2020/03/designing-an-online-lesson/>

8 Ideas Designed to Engage Students in Active Learning Online

<https://catlintucker.com/2020/07/8-ideas-designed-to-engage-students-online/>

7 Big Ideas as you shift towards online learning

<https://www.spencerauthor.com/online-teaching/>

**Summative Performance Assessment:**

Macromolecule Choice Board Option (Refer to Learning Plan below)

Questions to Consider:

* *What are the essential questions students need to answer?*
* *How are the essential questions connected to the performance/summative task?*
* *How can the summative task reflect authentic work connected to the areas of study/discipline?*
* *What problem will the students solve?*
* *Will the inquiry allow students to self-direct and have agency in their learning?*
* *How can you augment or redefine the use of technology to enhance student learning ?*
* *What will the students be able to transfer to their next inquiry?*

**Learning Plan:**

**Planning for Blended Learning**

*Before planning your units, it is important to consider the following features of the NVSD Blended Learning Timetable.*

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| **Session Styles**  |
| **Face to Face** | **Remote** | **Independent** |
| * Synchronous
* Small group
* 50 minutes/session
* 2 interactions/week (40%)
* 1 interaction/week (20%)
* Interactions may occur before or

 after remote sessions  | * Synchronous
* full group
* 60 minutes/session
* 1 interaction/week (40/20%)
* 2 sessions/cycle (40/20%)
* Interactions may occur before or

 after face to face sessions    | * Asynchronous / At home
* Students need to be able to start

 on this independently / prior to  face to face or remote sessions * 3 sessions/week (40%)
* 4 sessions/week (20%)
* 50 minutes/session

   |

**Timeframe:**  One 2-week cycle (approximately 1 month based upon an 8 block rotation)

**Unit Synopsis:**

* Specific strategies, activities and a suggested sequence of topics have been embedded into this sample unit plan.
* Opportunities for formative and summative assessment have been identified throughout.
* “Hands-on” Face to Face interactions include station studies and experimentation.
* Suggestions for chunking Remote Sessions include the use of Mentimeter and Break Out Rooms.
* Choice Boards and the Flipped Model have been suggested for use to direct Independent Sessions.

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| **WEEK ONE: Anatomy and Physiology 12 Biological Molecules**  |
| **Face to Face** | **Remote** | **Independent** |
| “Hands on”  Water Stations * Surface tension, adhesion, polarity

 and solvent * One station to provide direct

 teacher instruction/ interaction * (40%) complete two stations /

 interaction * (20%) complete four stations /

 interaction * Formative Assessment

   | Focus:  Water  Check in * Request students post the first

 word that comes to mind when  they think of “water” * Use mentimeter to build a

 communal word cloud  <https://www.mentimeter.com/> or embed words into a droplet  shaped word art  <https://wordart.com/create>* Discuss/comment

 Set Learning Intentions and Timeline for the session  Powerpoint * Electronegativity, Polarity, Dipoles

 TED-Ed (3:52) <https://ed.ted.com/lessons/how-polarity-makes-water-behave-strangely-christina-kleinberg>  Mentimeter * Use to chunk session - Embed Q

 and A relating to powerpoint and  video  Exit Slip * Colour Symbol Image to be posted

 on Padlet <https://pz.harvard.edu/sites/default/files/Color%20Symbol%20Image_1.pdf> * Formative Assessment

  | FLIP example sequence  Session 1: Water * Reading Passage Excerpt eg. David

 Suzuki’s The Sacred Balance * Provide note taking

 frame/structure * Use Padlet to gather Word,

 Phrase, Sentence Thinking  Routine responses  <http://www.pz.harvard.edu/sites/default/files/Word-Phrase-Sentence.pdf> * Assignment: Walk the Week

 Thinking Routine as Formative  Assessment  <http://www.pz.harvard.edu/sites/default/files/Walk%20the%20Week.pdf>   Session 2: Acids and Bases * Defining Properties
* pH scale <https://phet.colorado.edu/>
* Neutralization Reaction
* Possible Extensions <https://www.flinnsci.com/api/library/Download/5f6db6d0af3d43a8bac20ecb907541c8>

 Session 3: Buffers    |

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| **WEEK TWO: Anatomy and Physiology 12 Biological Molecules**  |
| **Face to Face** | **Remote** | **Independent** |
|  "Hands on”  Plastic Molecular Model Kits * Build macromolecules

 and model dehydration synthesis  and hydrolysis * Plastic pieces to be cleaned by

 students before returning kits  OR  Flashcards * Teacher provides students with

 drawings of models and  summaries of macromolecule  function * Students work to link structural

 drawings to names and functions  to create a personal set of  flashcards * Teacher provides support helping

 students identify key functional  groups, bonding patterns,  etc. (clues for identification)       OR  Food analysis Lab * Glucose, Polysaccharides, Proteins,

 and Lipids  Design Considerations * Procedure to be provided during

 week one of cycle for prereading* All students to test the same

 provided foods * Each student to perform one

 specific test only * Used shared document for data

 summaries   Experimental Analysis * Option to link analysis to

 Macromolecule Choice Board   | Focus: Carbon  Check in * Share out Walk the Week

 feedback from week one * Discuss/comment

 Set Learning Intentions and Timeline for the session  Powerpoint * Carbon Chemistry
* Demonstration how to create

 annotations of a short reading  passage  Break Out Rooms * Collaborative annotations

  <https://catlintucker.com/2020/07/8-ideas-designed-to-engage-students-online/> * Provide students with

 templates/instructions to work  upon. (e.g. shared word  document) * Be sure to provide all reading

 passages to students in advance of  remote session * Grp 1. Carbohydrate reading

 passage * Grp 2. Protein reading passage
* Grp 3. Lipid reading passage
* Grp 4. Nucleic acid reading

 passage  Large Group Sharing * Opportunities for Clarification

 Exit Slip * Forms survey with 5 “tester”

 questions * Formative Assessment

  | Macromolecule Choice Board  * When creating the board, provide

 a variety of offline and online  options as well as options  addressing multiple intelligences * Consider tasks and length of

 independent sessions * To select independent activities for

 the week, students play  Tic Tac Toe drawing a line in any  direction through the centre  square.  Possible organizational framework for Choice Board * Use the centre square as the

 “product” piece for a summative  assessment. Provide choice in  format for evidence of learning. * Use the peripheral squares for

 research, note taking, video  viewing research activities etc.  * Sample board from which to

 gather ideas:<http://ogobio.weebly.com/uploads/3/2/3/9/3239894/macromolecules-_tic_tae_toe_board.pdf>  Session 1: Students complete the activities/tasks outlined in one of their chosen block.  Session 2:Students complete the activities/tasks outlined in their second chosen block.  Session 3: Students complete activities in centre square and submit “product” piece as evidence of learning. * Summative Assessment

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Teaching Online Tips :

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| **Design Considerations**  |
| **Face to Face** | **Remote** | **Independent** |
|  * Consider using the same cohort

 groups as small groups within the  remote sessions to build  community (Connection) * Design desk/table orientations

 that promote peer support and  dialogue eg. circle/ horseshoe   |  * Embed opportunities to promote

 social interactions and build  community (Connection) * Incorporate small groups

 opportunities for discussion and  problem solving (Collaboration) * Chunk time/activities by using

 different technology tools/tasks  such as Padlet <https://padlet.com/>  or Mentimeter  <https://www.mentimeter.com/>to  maintain engagement   |  * Post weekly schedule before

 Monday at 8:30am * Provide articles to read, videos to

 view and any questions to be  discussed prior to remote  meetings * Incorporate on-line discussion

 boards to answer questions and  address misconceptions  (Clarification) * Incorporate inquiry questions and

 visible thinking routines (Critical  and Conceptual Thinking at Project  Zero  [http://www.pz.harvard.edu](http://www.pz.harvard.edu/)   |

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| **Possible Formats**  |
| **Face to Face** | **Remote** | **Independent** |
|  Station Studies  Hands on Labs  Short formative or summative assessments  Q&A Tutorial  Small cohort group collaborations   |  Break Out Rooms <https://www.youtube.com/watch?v=48J7ADQqPco#action=share>  <https://www.youtube.com/watch?v=qo6yqh7erEY>  Platform for Student Presentations  Timed, open book assessments in which students have been provided with the questions in advance  Small cohort group collaborations   |  Flipped classroom <https://www.schoology.com/blog/flipped-classroom>  <https://flippedlearning.org/>  Hyperdocs <https://www.cultofpedagogy.com/hyperdocs/>  <https://hyperdocs.co/>  Choice Boards <https://catlintucker.com/2016/04/design-your-own-digital-choice-board/>  <http://ajjuliani.com/the-ultimate-guide-to-choice-boards-and-learning-menus/>   |

Online Instructional Models:

**E-learning Frameworks to explore**

Blended Learning Model (Connection, Collaboration, Clarification, Critical and Conceptual Thinking)

 <https://www.jenniferchangwathall.com/post/how-blended-learning-has-evolved>

4 Shifts Model (Formally known as Trudacot) <http://dangerouslyirrelevant.org/wp-content/uploads/2018/10/4-Shifts-Protocol-Solution-Tree-Reproducible-2.pdf>

SAMR Model <https://sites.google.com/a/ccpsnet.net/edtechhub/tech-services/samr>