



**Anishinaabe and American  
Elementary Education Program**

**Fond du Lac Tribal and  
Community College**



**COURSE:**

Name: Heidi Ojibway

Course Title: Investigative Science I-Fa24 SCI 1280-20

MTC Goal Area: \_\_\_\_\_

Credits: 4      Pre-requisites: \_\_\_\_\_      Co-requisites: \_\_\_\_\_

Successful admittance into the Elementary Education Teacher program

**Course Description:**

This course is an introduction to chemistry and life science for aspiring elementary education teachers. Basic concepts in chemistry and biology will be covered with an emphasis on the scientific methods, inquiry based with hands on exercises in a lab setting. Anishinaabe aspects of science will be explored. Lecture and lab.

**Recommend Text and/or other Resources (journals, articles, and/or any other additional materials):**

*Integrated Science; Sixth Edition Bill Tillery, Eldon D. Enger and Frederick C Ross; McGraw Hill; 2011*

Standard Composition notebook (approx. 8 X 10")

**Course Content:**

- A. Careers and contributions in chemistry and the life sciences
- B. Physical and chemical properties of matter and changes
  1. Periodic table of elements, elements symbol, atomic weight, atomic number, number of electrons, protons and neutrons, compounds, mixtures
  2. Chemical bonding and balancing chemical equations
- C. Life Sciences
  1. Ecology and Environment
  2. Classifying life and kingdoms of life:
  3. Cells and cellular processes
  4. Genetics, heredity, and DNA/RNA
  5. Human Body Systems



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- D. Understand the importance of Anishinaabe perspective of science in shaping tradition and protecting native traditions vital to the people.

**Outcomes and Assessments**

Learning Outcomes

- Apply the scientific method to the sciences of chemistry and life sciences.
- Identify examples of indigenous chemistry and the life sciences scientific phenomena
- Describe the basics principals of matter as it relates to the science of chemistry.
- Describe and apply the basic principles of chemical and physical properties of matter.
- Describe how matter interacts to form molecules and compounds.
- Describe and apply the major sub-divisions of Life Science.
- Demonstrate the importance of a balanced environment for the sustainability of ecosystems and cultures.

**Cultural Standards:**

*Each course within the BS in Elementary Education program must meet a minimum of 2 measurable learning outcomes for 3 different **Cultural Standards**. If your course does not meet the Cultural Standards, please justify your rationale.*

<b>Cultural Standard (must meet 3)</b>	<b>Learning Outcomes that Align to Cultural Standards (2 for each standard) The student will:</b>	<b>Cultural Assessment</b>
<p><b>1. GIKENDAASOWIN <i>Knowing knowledge</i></b> To prepare our students to be problem solvers who strive for continuous learning and growth.</p> <p><u>Outcome:</u> Content/Pedagogical Knowledge and Technology Integration To develop teachers who value and utilize knowledge, learning, and critical thinking that is central to an Ojibwe-Anishinaabe way of knowing.</p>	<p>Describe how matter interacts to form molecules and compounds.</p>	<p><b>The chemistry of tanning hides</b> Students will research how indigenous peoples, especially the Native Americans, tanned hides to get the variety of leather that was available for building materials, clothing, etc. What natural processes are used to tan hides in comparison to industrial chemicals that are used in large quantities for a greater output of leather.</p> <p>Questions such as, how do hides get colors? How do hides get white? How do hides get so soft? Students will be evaluated on their ability to describe what chemical process/reaction worked to tan the</p>



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	<p>Identify examples of indigenous chemistry and the life sciences scientific phenomena</p>	<p>hides to the people's goal/specification for their hide.</p> <p>Ex: The lecithin in brain material is a natural tanning material which aids in making the hide soft by lubricating it. Lecithin is an amphiphilic substance being attractive to both water and fatty substances.</p> <p>Students will compare the advantages and disadvantages of commercial to hand tanning processes to include using natural products as compared to industrial chemicals.</p> <p><b>Influential Native American Scientists: past and present</b> Students will be evaluated on their research of one Native American or indigenous person and their contribution to the field of chemistry or the life sciences and how their contributions affected the scientific world and their people. The research can include a discovery or an invention. Students will share their scientist so the class can be exposed to many Native American scientists.</p> <p>EX: the Olmec people of Mexico were the first to create rubber (chemistry) in the shape of a ball they played games with. One of their balls was taken by Christopher Columbus and spread to the European community and now has widespread use in industry.</p>
<p><b>2. GWAYAKWAADIZIWIN <i>Living a balanced way:</i></b> To provide students the opportunity to recognize the</p>	<p>Demonstrate the importance of a balanced environment for the sustainability of ecosystems and cultures.</p>	<p>Traditional food webs of Native People; how did the extinction of the buffalo destroy the culture of indigenous peoples? Students will be</p>



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importance of living in harmony with the community and are prepared to use a collective approach to understanding and deciding on a course of action.

Outcome: Community and Collaboration

To develop teachers who are reflective, connected educators who understand the interrelatedness of educating the whole child by including the community.

Describe and apply the major subdivisions of Life Science.

Subdivisions: ecology, human anatomy, and genetics

evaluated on their ability to show a food web that respected all living things of the time and helped to maintain a healthy food web.

Example: Native Americans only took what was needed and did not waste any of the material. In their food web, they should show how food was obtained from several different sources as not to focus on one thing and hunt or gather it to extinction.

Students will participate in a discussion on food webs and how the extinction of buffalo destroy the food web in the plains? Students will be evaluated on their ability to link, then communicate the extinction of the buffalo to a breakdown in the food web and the incredible effort it takes by nature to rebalance when a major organism is removed and the ripple effect that results, in addition to the breakdown of a major source of food for the Native American populations during that time.

In the human body systems unit, students will be tying into the events of indigenous peoples being forced onto reservations and how that disrupted the people's food sources and contributed to generational and current health concerns that make Native Peoples have so many genetic health conditions and vulnerable, especially in this current pandemic. Students will be evaluated on their ability to communicate how moving to the reservations took these people away from their normal habitat, made them quickly change their



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		<p>niche, the forced adaptation that followed and how this can affect the DNA over many generations.</p>
<p><b>4. AANGWAAMIZIWIN</b> <b><i>Diligence and caution</i></b> To develop a student’s capacity to proceed carefully, after identifying, discussing and reflecting on ethical dimensions of political, social, and personal life.</p> <p><u>Outcome:</u> Ethical Practitioner To develop teachers’ capacity to be ethically responsive in respecting their role as an educator and to the community.</p>	<p>Identify examples of indigenous chemistry and the life sciences scientific phenomena.</p> <p>Describe and apply the major subdivisions of Life Science.</p> <p>This subdivision will focus on human anatomy</p> <p>Describe and apply the major subdivisions of Life Science.</p> <p>This subdivision will focus on human anatomy</p>	<p>During the human body systems unit, students will be evaluated on their ability to discuss the pathology that affects the Native population, i.e. diabetes, high blood pressure. Students will be evaluated on their ability to communicate how this makes their people a target of this pandemic.</p> <p>Students will search current events on the covid-19 pandemic with an emphasis on the corona virus (covid-19) and the current data available showing why Native populations are at risk, students will be asked to use knowledge learned throughout the course to discuss ideas on how vulnerable peoples can protect themselves, the perception of government aid and the perception of the tribal government aid.</p> <p>Elder interviews of their memories of the polio outbreak of 1942-50. How was the polio outbreak of 1942-50 similar and different to the novel corona virus pandemic? Students will be evaluated on how well they share their interview in their paper. This will include perceptions of the disease and how it affected the native community and surrounding community, and how the outbreak affected family and friends.</p> <p>The papers will be further evaluated on how well students stick to the interview question requirements of the paper and their discussion of how they protected their elder during the</p>



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interview since this interview could not take place face-to-face.

**FDLTCC Competencies Across the Curriculum (CAC)\***

- A. Information Literacy (the ability to use print and/or non-print tools effectively for the discovery, acquisition, and evaluation of information)
- B. Ability to Communicate (the ability to listen, read, comprehend, and/or deliver information in a variety of formats.)
- C. Problem Solving (the ability to conceptualize, apply, analyze, synthesize, and/or evaluate information to formulate and solve problems.)
- D. Culture (knowledge of Anishinaabe traditions and culture, knowledge of one's traditions and culture, knowledge of others' traditions and cultures, the culture of work, culture of academic disciplines, and/or respect for global diversity.)



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**Minnesota Professional Education License and Standards Board Standards (MN PELSB)\*\*** listed at the end of the syllabus. (Insert more rows as needed)

MN PELSB Content Standard	8710.3200 Elementary Education: Subject Matter	Assignment & Assessment	How does this show students will meet the standard?  Based on the assignments and assessments, the student will:	FDLTCC Learning Outcomes	Cultural Standard
J.2.c.	use appropriate scientific instrumentation and equipment and mathematics as tools to improve scientific investigations and communications	<p>Week one: Review of the scientific method, identification/use of scientific lab equipment, a review of the metric system and how to interpret units in data and on data collection instrumentation.</p> <p>Week two quiz: students will be tested on their knowledge of how to use tools, units, and the metric system.</p>	<p>During this week, students will get the opportunity to observe or use scientific equipment and mathematical tools that is common in data collection, how to read the measurements, how to calibrate and what units are being used.</p> <p>Students will demonstrate the ability to use the equipment properly and take measurements.</p> <p>Students will be able to demonstrate they can convert English units to metric and vice versa.</p> <p>Students will demonstrate they know which metric base unit to use with a specific type of matter collection and the size of the metric unit that is</p>	<p>Apply the scientific method to the sciences of chemistry and life sciences.</p> <p>Describe the basics principals of matter as it relates to the science of chemistry.</p>	<b>GIKENDA ASOWIN</b> <i>Knowing knowledge</i>



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		<p>Week 2: Native American Scientists Discussion</p> <p>Week 3: Native American Scientist Paper</p> <p>Most textbooks and science courses do not focus on the contributions of minority groups and what they have brought to the field.</p>	<p>appropriate to the data being collected.</p> <p>Students will research one Native American or indigenous person and what their contribution to the field of science was, past or present.</p> <p>In addition to sharing their information through discussion, students submit a paper to me as part of a grade. Students will be evaluated on items they are to discuss in their paper about their person(s) that highlights the discovery/invention, timeframe, consequence of discovery and what group of Native Americans or indigenous people they represent.</p>	<p>Identify examples of indigenous chemistry and the life sciences scientific phenomena</p>	
		<p>Week 12: Punnett Squares:</p> <p>Punnett squares are a tool that has been used by geneticists</p>	<p>In the classroom and through a weekly quiz, students will use these simple genetics tool to calculate the</p>	<p>Describe and apply the major sub-divisions of Life Science.</p>	



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		<p>for a long time to predict the arrangement of genes (genotype) and the physical characteristics of the gene (phenotype).</p> <p>The square can be representative of a simple monohybrid cross of more complex di- and trihybrid crosses.</p> <p>The top and sides of the square represent the parent haploid genes seen through meiosis and the inner squares show the possible outcome of offspring from the parents.</p> <p>Quiz 11.</p>	<p>mathematical probability of the genetic traits (genotype and phenotypes) that may be seen in offspring for a given genetic cross of the parents.</p>		
J.2.e.	evaluate alternative explanations and models based on evidence, current scientific understanding, and logic	<p>Week 2 and 3 lectures.</p> <p>Quiz 3</p> <p>Week 2 reading assignment</p> <p>During class time and through reading assignments,</p>	<p>During class time and through reading assignments, students will be learning the history of the atomic model.</p> <p>Students will be evaluated through class discussion and a formal</p>	Describe and apply the basic principles of chemical and physical properties of matter.	<b>GIKENDA ASOWIN</b> <i>Knowing knowledge</i>



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		<p>students will be learning the history of the atomic model.</p> <p>The current atomic model is vastly different from the first model suggested due to the technological advances and discoveries of former science/scientists. From a plum pudding model to now a quantum model, science has had to use past discoveries, inventions, scientific findings, and new technological advances to continually improve upon the atomic model theory.</p> <p>Week 4-5: atomic model project</p> <p>In this project, students will be creating a physical model from the conceptual model of</p>	<p>assessment of their understanding of how past models and scientific evidence of the time was used to create alternative explanations that allowed science to move from past models to the current accepted model we have today.</p> <p>For example, students should be able to show how the discovery of the charge of the electron was and still is the norm for science, but newer discoveries have shown the electron does not behave as once thought.</p> <p>Students will be evaluated on their ability to create an atomic model of an element based upon current evidence, scientific knowledge, and the logical</p>		



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		<p>one of the elements on the periodic table.</p> <p>Quiz 4</p> <p>Week 4 lab: periodic trends and properties</p> <p>When the periodic table was created, it was methodically put in an order that categorized the elements into groupings and similar characteristics simply based upon the atomic number and the horizontal arrangement of those numbers. We call this the Periodic Law.</p> <p>By studying the periodic table and periodic law, students get to evaluate how the trends such as electronegativity, ionization energy, atomic radii, make sense and help</p>	<p>arrangement of subatomic particles seen in current quantum models.</p> <p>In the periodic characteristics and trends lab, students will be evaluated on identifying elements from a set of trends or characteristics and support their reasoning using the periodic law.</p>		<p><b>AANGW AAMIZI WIN Diligence and caution</b></p>



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		<p>Chemists use the tool to its fullest.</p> <p>Quiz 5 Week 9: Edible cell project</p> <p>This project is designed to help students understand the structure of the organelles is important to its function.</p>	<p>Working with current models of the eukaryotic cell accepted in science, students will be evaluated on their ability to properly select the correct items to use to represent the cell organelles and components of their model.</p> <p>For instance: The structure of the mitochondria has a great amount of surface area for the synthesis of ATP (molecule of energy). Some students pick a raisin because the skin of raisins appears to have the same membrane folding as microscopic views of the mitochondria.</p>	<p>Describe and apply the major sub-divisions of Life Science.</p>	<p><b>GIKENDA ASOWIN</b> <i>Knowing knowledge</i></p>

J.2.f.	communicate and defend a scientific argument	<p>Week 6: “you be the taxonomist”-activity lab</p> <p>In this activity, students are shown 20 pictures of different organisms</p>	Students are evaluated on their ability to communicate and support their choice using key indicators of a specific domain and kingdom.	Describe and apply the major sub-divisions of Life Science.	<b>GIKENDA ASOWIN</b> <i>Knowing knowledge</i>
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		that represent all three of the domains and six kingdoms. Characteristics are shared with students along with the picture. The characteristics that are shared are common items that distinguish organisms into the three domains and then further into the kingdoms.  Quiz 6	For example: if a student is shown a picture of plant, they should select the domain “Eukarya” because it has cells that are eukaryotic in nature, but also lead to organisms that are multicellular. Students should go on to select the Plantae Kingdom because plants are multicellular, and they can perform photosynthesis to make their own food.		
J.3.	know how to make connections across the domains of science, between science and technology, and between science and other school subjects	Week 5: biomolecules lecture and biomolecule vocabulary activity  Students get to witness the importance and necessity of chemistry in the life sciences by understanding the four major classes of biochemical molecules structure and function.  Quiz 4	Students will be assessed in lab and in a quiz their ability to identify the structure of the base unit, function of the macromolecule and real-life examples in science and everyday life.  For example, students should be able to identify that carbohydrates’ base unit is a monosaccharide in an arrangement of 1C:2H:1O ratios.	Describe how matter interacts to form molecules and compounds  Describe and apply the major sub-divisions of Life Science.	<b>GIKENDA ASOWIN</b> <i>Knowing knowledge</i>  <b>GWAYAK WAADIZI WIN</b> <i>Living a</i>



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		<p>Week 4 discussion: the chemistry of tanning hides. Tanning hides is still conducted by individual people, but mass production in industry has taken methods from indigenous peoples, considered the chemistry and have been able to tan hides at a much greater pace. Where persons that hand- tan use natural components, industry uses industrial chemicals.</p> <p>Weeks 13-15: Elder interview/Polio paper</p> <p>Students investigate the historical event from 1942-1950 when the United States had a polio epidemic.</p> <p>There is a portion of this paper that addresses the historical importance</p>	<p>Students will be able to contrast and compare newer technological traits to traditional methods of tanning hides.</p> <p>Students will be evaluated on their ability to discuss natural methods of tanning can perform the chemistry of tanning hides to the specification they are wanting and how that compares to the current industrial technology.</p> <p>Students will be evaluated on their ability to recount the historical event of the 1942-50 polio epidemic from historical data/demographics, technological advances of the time, and finally the perspective of a</p>	<p>Identify examples of indigenous chemistry and the life sciences scientific phenomena</p> <p>Identify examples of indigenous chemistry and the life sciences scientific phenomena</p>	<p><i>balanced way</i></p> <p><b>AANGW AAMIZI WIN Diligence and caution</b></p>



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		<p>of this epidemic from an elder’s point of view and the field of medicine/public health.</p> <p>Students are required to look up historical demographics on case numbers and deaths.</p> <p>An important aspect of the history is from the elders of the students’ communities and what they remember during the time of the epidemic.</p> <p>From a technological standpoint, this paper is to research and discuss the technology available at the time to save people’s lives.</p>	<p>person who lived through the epidemic.</p>		
J.6.	know and apply the fundamental concepts and principles of life science concerning the characteristics of organisms, the life	<p>Week 6: Characteristic of Life lecture and reading assignment.</p> <p>Quiz 7</p>	<p>During the characteristics of life lab and formal assessments, students will be able to show their knowledge of what science uses as</p>	<p>Describe and apply the major sub-divisions of Life Science.</p>	<p><b>GIKENDA ASOWIN</b> <i>Knowing knowledge</i></p>



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	<p>cycle of organisms, the interrelationships of organisms and environments, structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems and their interrelationships, and diversity and adaptations of organisms</p>	<p>Students learn and use the 10 characteristics of life science that has established to consider an organism living. Some of the characteristics included but are not limited to cells, cells organization, heredity, homeostasis, etc.</p> <p>Characteristic of life lab</p> <p>This is a reinforcement lab after lecture to give students the opportunity to demonstrate their knowledge of the scientific characteristics that determine if something is a living thing.</p> <p>Week 6 Discussion: characteristics of life and indigenous philosophies</p>	<p>factors to consider something living.</p> <p>For the characteristics of life lab, students are evaluated on their ability to select the appropriate choice for the object that is being evaluated as being living or once living or a non-living them.</p> <p>For the discussion, students are expected to come up with compassionate ideas on</p>	<p>Identify examples of indigenous chemistry and the life sciences</p>	<p><b>AANGW AAMIZI WIN Diligence and caution</b></p>

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		<p>Characteristics of Life and indigenous beliefs discussion. Indigenous peoples have differing ideas on what has a living spirit, and this can extend beyond science's idea of what is considered living.</p> <p>Week 7: The ecosystem Text readings ch 23, pages 562-592 Lecture</p> <p>Text reading, lecture, and quiz 7 surround the concepts of a balanced ecological system. Concepts include living and non-living factors that interact, habitats and niches, ecosystems (biomes) around the world, symbiotic relationships, biogeochemical cycles for recycling important nutrients and material throughout the</p>	<p>how to address the science but also maintain and respect the ideology of the people.</p> <p>Students will be formally assessed on their knowledge of what components and factors make up a balanced ecosystem.</p>	<p>scientific phenomena</p> <p>Describe and apply the major sub-divisions of Life Science.</p>	<p><b>GWAYAK WAADIZI WIN</b> <i>Living a balanced way</i></p>



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		<p>planet, life, and ecosystems, feeding strategies and food chains and webs.</p> <p>Lab: backyard ecosystem</p> <p>An investigation into what ecosystem is present within a students' living and community area.</p> <p>Lab: Food web design</p> <p>Food webs are much more complex than food chains. In this activity, students will be creating a food web of a southwestern desert area show how and where energy flows within trophic levels. This lab also is designed to show how one organism can be more than one type of consumer based upon what they eat.</p>	<p>Students are assessed on their evaluation of the living and nonliving factors in their own backyards to understand that even in a urban or rural area, ecosystems are established and try to be maintained.</p> <p>Students are evaluated on this lab on how they put assemble the organisms and then how they label the trophic level(s) they occupy based upon where the energy is flowing.</p>	<p>Demonstrate the importance of a balanced environment for the sustainability of ecosystems and cultures.</p> <p>Describe and apply the major sub-divisions of Life Science.</p>	<p><b>AANGW AAMIZI WIN Diligence and caution</b></p>



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		<p>Week 6 Discussion: Food chains and webs:</p> <p>This discussion is designed to get students to think, then debate how people moved from their normal niche to a new one can have sweeping changes not only to the old ecosystem, but to the organisms forced to adapt to a new life.</p> <p>The other aspect of this discussion is the overall harm that is done to an ecosystem when a major component is completely removed by overhunting.</p> <p>Week 8: Cells and Cellular processes Reading assignment, pages 467-487 Lecture</p> <p>Students are introduced to the</p>	<p>Students will be evaluated on their ability to discuss the massive impact the extinction of the buffalo was on the plains Native Americans and the organisms that lived there as well.</p> <p>Students will be evaluated on how they can tie in ecosystem factors and generational genetic changes that may have occurred by moving Native Americans from a long- held niche to one that forced these peoples to adapt to survive.</p> <p>Students will be formally assessed (quiz midterm) on their knowledge of the components of a cell, cellular processes conducted by cells, and other foundational aspects of cell biology.</p>	<p>Demonstrate the importance of a balanced environment for the sustainability of ecosystems and cultures.</p> <p>Describe and apply the major sub- divisions of Life Science.</p>	<p><b>AANGW AAMIZI WIN Diligence and caution</b></p> <p><b>GIKENDA ASOWIN Knowing knowledge</b></p>



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		<p>foundational science aspect of cell biology. Cell coloring sheet assignment</p> <p>Students are required to color three different cells for comparison and contrast of the cell's anatomy. The three cells are a bacterium (prokaryotic), plant and animal (eukaryotic).</p> <p>Edible cell project</p> <p>Week 10: Sexual and Asexual reproduction Lecture Reading Assignment, pg. 489-492</p> <p>Quiz 9</p>	<p>Students are assessed on their edible cell project on the similarities and differences between a prokaryotic and eukaryotic cell and a plant and animal cell. The coloring sheets are study tools for students to use to study for assessments.</p> <p>Students are also assessed in the edible cell project on how they can support the choices they used to represent cell components with that demonstrates their appropriate structure.</p> <p>Students are formally assessed through quizzes their knowledge of how and when mitosis is used to asexually to create more cells and how meiosis is used to sexually to create cells that lead to organisms with greater</p>	<p>Describe and apply the major sub-divisions of Life Science.</p>	<p><b>GIKENDA ASOWIN</b> <i>Knowing knowledge</i></p>

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MN PELSB Content Standard	8710.3200 <i>Elementary Education: Subject Matter</i>	Assignment & Assessment	How does this show students will meet the standard?  Based on the assignments and assessments, the student will:	FDLTCC Learning Outcomes	Cultural Standard
		<p>Reinforcement of the steps of mitosis and meiosis.</p> <p>Students learn the pathways of asexual and sexual reproduction of cells and organisms.</p> <p>Week 8: DNA and its processes Lecture Reading assignment, pages 678-689</p> <p>Students learn the central dogma of life: DNA to RNA to Proteins.</p> <p>Students learn about the DNA molecule and the three basic components that make up the blueprint of life.</p> <p>Students learn the about the three important functions of DNA; replication (making more DNA), transcription (making RNA from DNA) and</p>	<p>Students are evaluated on the reinforcement of mitosis and meiosis lab by being able to recognize each process and the steps involved to create new daughter cells or new reproductive cells.</p> <p>Students will be formally assessed on the ability to discuss the central dogma of life, their ability to recognize the three parts of the DNA molecule. Students are also assessed on their ability to recognize the three jobs of DNA.</p> <p>Students are assessed on their ability to replicate a DNA strand, create RNA from DNA and to create a protein.</p>	<p>Describe and apply the major sub-divisions of Life Science.</p>	<p><b>GIKENDA ASOWIN Knowing knowledge</b></p>



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<b>MN PELSB Content Standard</b>	<b>8710.3200 Elementary Education: Subject Matter</b>	<b>Assignment &amp; Assessment</b>	<b>How does this show students will meet the standard?</b>  <b>Based on the assignments and assessments, the student will:</b>	<b>FDLTCC Learning Outcomes</b>	<b>Cultural Standard</b>
		<p>translation (protein synthesis).</p> <p>Quiz 7</p> <p>Lab: DNA replication, transcription, and translation</p> <p>In this lab, students get to visualize how the central dogma of life is seen in one graphic. In this lab, students will label the parts of the central dogma as the three parts of DNA, DNA replication, Transcription, and translation.</p> <p>Week 11 and 12: Medelian and modern genetics. Lecture Reading Assignment, pgs. 666-6777</p> <p>In this material students learn about the father of genetic, his study and results and how this was</p>	<p>In this lab students will be evaluated on their ability to recognize and correctly label the following: DNA, mRNA, tRNA, ribosomes, replication, transcription, translation, amino acids, and proteins.</p> <p>This is a study sheet also for students to study for when they are formally assessed on requirements previously mentioned.</p> <p>Students are formally assessed on their knowledge of Mendelian genetics, predicting offspring genotype and phenotypes from parent genes to include genetic disorder and disease.</p> <p>Students must be able to successfully complete and describe the</p>	<p>Describe and apply the major sub-divisions of Life Science.</p>	<p><b>GIKENDA ASOWIN Knowing knowled ge</b></p>



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MN PELSB Content Standard	8710.3200 <i>Elementary Education: Subject Matter</i>	Assignment & Assessment	How does this show students will meet the standard?  Based on the assignments and assessments, the student will:	FDLTCC Learning Outcomes	Cultural Standard
		<p>helpful in formulating modern genetics.</p> <p>Students learn how modern geneticists use Punnett squares to predict the probability of genotypical and phenotypical outcomes based upon parents.</p> <p>Students learn how to predict mono and dihybrid dominant/recessive crosses, x-linked disorders, incomplete and codominant crosses (including blood types).</p> <p>Students learn how genetic disorders and diseases can be passed to offspring.</p> <p>Quizzes 10 &amp;11</p> <p>Weeks 13-16: Human body systems Lecture Reading Assignment, pgs. 597-631</p>	<p>outcome of a dominant/recessive cross, x-linked cross, incomplete and codominance crosses.</p> <p>Students are evaluated on their ability to determine the possible blood types of offspring from parental types.</p> <p>Students are formally assessed through a quiz 11 and 12 on their ability to identify organ systems by name,</p>	<p>Describe and apply the major sub-divisions of Life Science.</p>	<p><b>AANGW AAMIZI WIN Diligence</b></p>



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MN PELSB Content Standard	8710.3200 <i>Elementary Education: Subject Matter</i>	Assignment & Assessment	How does this show students will meet the standard?  Based on the assignments and assessments, the student will:	FDLTCC Learning Outcomes	Cultural Standard
		<p>In this section of life science, students will be introduced to the eleven organ systems of the human body. This introduction will include the major organs and functions of the system.</p> <p>Students are given more depth on the functioning of the immune system and the cellular response to antigens (foreign substances) and the antibody response.</p> <p>Weeks 12-13 quizzes</p> <p>Polio paper and elder interview</p> <p>Students are tasked with investigating polio as a disease and a historical look into the 1942-50 U.S. epidemic. Students are to interview an elder of their community who would have been</p>	<p>function and major organs contained within.</p> <p>Students are evaluated on the completeness of their research relating to their elder interview and polio as a disease.</p> <p>Students are also evaluated on their ability to discuss the similarities of the two diseases.</p>	<p>Identify examples of indigenous chemistry and the life sciences scientific phenomena</p> <p>Describe and apply the major sub-</p>	<p><i>and caution</i></p>



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MN PELSB Content Standard	8710.3200 <i>Elementary Education: Subject Matter</i>	Assignment & Assessment	How does this show students will meet the standard?  Based on the assignments and assessments, the student will:	FDLTCC Learning Outcomes	Cultural Standard
		alive during this time to give them perspective of the disease, the impact on native people from the medical community and the government.	Evaluation on student's ability to discuss the differences in the two diseases is key. Differences will include but are not limited to government response, response time of vaccines due to technology, advanced technology to keep people afflicted alive (iron lung vs ventilator, pharmaceuticals, etc), and the demographics of each diseases. Perceptions of tribal responses to covid vs polio (based upon elder interviews).	divisions of Life Science.	

**Course Requirements & Assessment descriptions:**

**Requirements and Points:**

Assignment	Points
1. Weekly Quizzes	130
2. Weekly Discussions-participation	130
3. Research Paper-elder interview	60
4. Projects	50
5. Assignments	460
6. Midterm	100
7. <u>Final Exam</u>	<u>100</u>
Total Points	1030

To meet the program requirements, students must pass the course with 70% or above which will equal 721 total

points or more.



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Grade	%	Points
A	100-90	1030-927
B	89-80	917-824
C	79-70	814-721
D	69-60	711-618
F	59-0	608-0

*\*Full descriptions of Competencies and Cultural Standards contained in the Appendix*

**Tentative Course Schedule: Please attach the course schedule/outline**

Week	Class Activity-Topic	Assignment: Due
1:	Syllabus and class information Class content Mousetrap car project assignment handout Scientific method overview Matter and measurements Tools of science Chemical and physical properties Chemical and physical changes	Discussion 1 – Introductions Lecture Interactive Lab (Chemical and Physical Changes, Chemical and physical properties) Review of Scientific method and scientific inquiry assignment Reading Assignment: ch 1 pgs. 1-21 intro to science
2:	Finish up from introductory week Start Atomic theory: History of the atomic theory What is the structure of an atom	Quiz 1-intro to science Reading Material: The discovery of the atom, ch 8, page 178-188 Discussion: Native American Scientists Lab: types of matter, mixtures,
3:	Atoms and the Periodic Table How is the periodic table arranged? What trends and properties are seen in this tool? What can you learn about an element from the PT?	Quiz 2: Reading Assignment: Periodic table pages 188-194 Discussion: Periodic table and element research Labs: Using the periodic table Identifying isotopes Native American Scientists paper
4:	Chemical Bonds: Ionic, Covalent, Hydrogen and Metallic Balancing Chemical Equations	Quiz 3: Friday Discussion-Periodic table and element Reading Assignment: ch 9, pages 197-219 Atom Project-atom model Lab-A sticky situation (chemical bonds) Periodic table trends and properties



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5:	Necessities of Life including biochemical molecules The chemistry of water Characteristics of Life: what determines if an organism is living	Quiz 4 Reading Assignment: ch 10, pgs. 224-239; ch 19, pages 439-439; 441-446; and 449-459. Lab: Bio-molecules vocabulary lab Lewis Dot and Bonding Labs Balancing equations lab
6:	Classification of Life: what is the history, what is taxonomy, how are organism classified with modern taxonomy? Kingdoms: characteristics What are the six kingdoms and what are their characteristics? What is a scientific name? How are organisms identified through a dichotomous key?	Quiz 5 Reading Assignment: chap 20, pg. 464-467 Lab: Characteristics of life lab Using a Dichotomous Key Lab You be the taxonomist Discussion: characteristic of life and indigenous philosophies
7:	Ecosystems, factors, relationships, food webs, food chains  Weekly discussion: with an emphasis on extinction of buffalo and movement of Native Americans to reservations and how that interrupted and effected the balanced food web.	Quiz 6- Reading Assignment: chap 23, pages 562-592 Discussion: Food webs with an emphasis on extinction of buffalo and movement of Native Americans to res Lab: Your backyard ecosystem Food web lab
8:	Cells: prokaryote and eukaryote Plant vs. Animal Cells Cell components Cellular processes Nucleus: DNA and RNA	Quiz 7 - Reading Assignment: ch 20: pg. 467-487; ch 26; pgs678-689 Discussion: Teaching about DNA and reproduction Lab: Cell coloring sheets Lab: DNA replication, transcription, and translation
9:	Viruses and Bacteria Covid-19 vs. Polio and other epidemics Vaccines and Antibiotics	Project: Edible cell presentation  Midterm
10:	Asexual and Sexual reproduction. Mitosis and Meiosis	Quiz 8- Reading Assignment: chap 20: pg. 489-492 Lab: Reinforcement of the steps of Mitosis and meiosis
11:	Human Traits Activity Genetics: Mendel and his peas Phenotypes and genotypes	Quiz 9 - Reading Assignment: chap 26: pgs. 666-670



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	Discussion: This week's discussion will help to pull some ecological information into the genotypes of Native Americans.	Lab: Punnett squares for monohybrid crosses Discussion: movement of Native Americans to reservations and genetic issues
<b>12:</b>	Punnett Squares and genetic probability Mutations: how are they passed, how do they occur with the interruption and hinderance of DNA	Quiz 10 - Reading Assignment: ch 26: pgs. 670-677 Discussion: Genetic disorders Lab: Punnett Square practice for complete/incomplete dominance, and sex-linked crosses
<b>13:</b>	Human body systems Antigens, antibodies, antibiotics, vaccines, and antivirals.  11 systems to be covered in this unit System name, system major functions, system major organs	Quiz 11 – Reading Assignment: pgs. 597-631 Discussion: Vaccines and Antibiotics Lab: Start Polio paper and elder interview
<b>14:</b>	Human body systems	Quiz 12 - Reading Assignment: pg. 597-631 Lab: continue polio paper and elder interview Discussion: Native American genetic health conditions that make them vulnerable to disease.
<b>15:</b>	The immune system: antigens and antibody responses  COVID-19: what is it, how does it affect the human body systems, what are the	Quiz 13- Discussion: Share your paper Polio and Elder Interview paper due
<b>16:</b>	Look up and summarize an article to do with the covid-19 to do with spread, incubation period, treatment, testing and vulnerable populations.	Current Event Article on covid 19
	Final Exam	Final Exam

**FDLTCC Competencies Across the Curriculum (CAC)**

**Information Literacy** – the ability to use print and/or non-print tools effectively for the discovery, acquisition, and evaluation of information.

**Ability to Communicate** – the ability to listen, read, comprehend, and/or deliver information in a variety of formats.



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**Problem Solving** – The ability to conceptualize, apply, analyze, synthesize, and/or evaluate information to formulate and solve problems.

**Culture** – knowledge of Anishinaabe traditions and culture, knowledge of one's own traditions and culture, knowledge of others' traditions and cultures, culture of work, culture of academic disciplines and/or respect for global diversity.

### Conceptual Framework

#### Vision

The vision of the FDLTCCC Education Unit is to be transformational leaders in culturally responsive pedagogy and Indigenous knowledge by embracing Niindaa'iwedaa o'o gikendaasowin, which means sending knowledge into the future by embedding Anishinaabe knowledge, culture, and traditions into the curriculum and instilling these teaching practices in our future educators.

#### Mission

The mission of the FDLTCC Education Unit is to work within our communities to prepare caring, competent educators by promoting equitable, inclusive, and transformative educational practices that are based on Anishinaabe knowledge, traditions, and culture.

#### GIKENDAASOWIN – Knowing Knowledge

To prepare our teacher candidates to be problem solvers who strive for continuous learning and growth.

#### Disposition: Integrates Content and Pedagogical Knowledge

Teacher candidates demonstrate their ability to integrate content and pedagogical knowledge by weaving the following into their teaching:

- *Technology*: Use technology effectively to improve student learning.
- *Theory to Practice*: Applies current theory, research, and best practices to improve one's professional practice as a teacher.
- *Critical and Connected Thinking*: Engages in critical thinking that reflects analysis, problem solving, and incorporates world views and community knowledge to create culturally relevant instruction.
- *Reflective Practice*: Demonstrates self-reflection and incorporates professional feedback to adjust for continuous improvement in professional practices and effective instruction.



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Professional Outcome: [Content and Pedagogical Knowledge](#)

To develop teachers who value and utilize knowledge, learning, and critical thinking that is central to Indigenous and other ways of knowing.

#### **GWAYAKWAADIZIWIN – Living a Balanced Way**

To provide teacher candidates the opportunity to recognize the importance of living in harmony with the community and are prepared to use a collective approach to understanding and deciding on a course of action.

Disposition: [Communication and Collaboration](#)

Teacher candidates demonstrate professional interpersonal and communication skills. These skills are used to promote positive collaborative partnerships with students, families, colleagues, other school professionals, and the global community to support achievement of student learning outcomes.

- *Reflective Collaboration:* Uses insights and inspiration of others to improve practice and can occur in:
  - Professional Learning Communities
  - Mentoring Programs
  - Peer Observations
  - Critical Friends Groups
- *Community Involvement:* Demonstrates positive collaborative skills in interactions with instructors, advisors, students, colleagues, parents/guardians/caregivers, school teams, and those in the wider community.
- *Communication:* Effectively and accurately communicates ideas, thoughts or visions (oral and written) and engages in active listening based on audience and community cultural norms.

Professional Outcome: [Community and Collaboration](#)

To develop teachers who are reflective, connected educators who understand the interrelatedness of educating the whole child by including the community.

#### **ZOONGIDE'EWIN – Strong Hearted**

To provide a foundation on which we build and strengthen each teacher candidate's resilience, innovation, and passion.

Disposition: [Vision and Leadership](#)

Teacher candidates demonstrate the vision and skills necessary to lead and manage classrooms and schools as complex, adaptive systems in a changing world.



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- Demonstrates skills and qualities that lead to meaningful change.
- Models and fosters respect for all cultures, identities, and perspectives in words and actions and considers historical pasts to prepare for the future.
- Listens and responds to community needs and understands cultural norms as opportunities for growth and development.

#### Professional Outcome: **Transformational Leadership**

To increase the teachers' leadership capacity to live and walk with a strong heart, respectful and open to new ideas and courageous enough to confront the accepted truths of history and society.

#### **AANGWAAMIZIWIN – Diligence and Caution**

To develop teacher candidates' capacity to proceed carefully, after identifying, discussing and reflecting on logical and ethical dimensions of political, cultural, social, and personal life.

#### Disposition: **Ethical Behavior**

Teacher candidates demonstrate professional integrity through behaviors and actions that reflect state and FDLTCC ethical and cultural standards.

- Demonstrate professional and ethical conduct with faculty, faculty supervisors, cooperating teachers, students, parents, colleagues, and community.
- Practices, complies, and understands the school site and the college and unit policies (e.g., academic honesty), as well as Minnesota Code of Ethics for Teachers.
- Adheres to all professional standards, including the use of technologies (e.g., accesses authorized websites, social media and other applications, and uses personal electronic devices as appropriate).

#### Professional Outcome: **Ethical Practitioner**

To develop teachers' capacity to be ethically responsive in respecting their role as an educator and understanding community needs.

#### **DEBWEWIN – Honesty and Integrity**

Encourage teacher candidates to develop a deeper appreciation of their own worldview and the worldview of others.

#### Disposition: **Data-Informed Practice**

Teacher candidates demonstrate the ability to make data-driven decisions as they plan, implement, and evaluate instruction.

- Uses student data to plan and implement instructional strategies and activities.



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- Uses assessment data to identify student strengths and deficiencies and adjusts practice based on results.
- Uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual and social development of the student.

#### Professional Outcome: [Assessment and Use of Data](#)

To expand teachers' potential to think and act with honesty and integrity as they use multiple types of assessment strategies to evaluate student progress and guide student learning and development.

#### **ZAAGI' IDIWIN – Loving and Caring**

To encourage the teacher candidates' development of healthy, caring relationships built on respect for all.

#### Disposition: [Equity, Social Justice, and Inclusion](#)

Teacher candidates demonstrate fairness, empathy and compassion based on their belief that everyone can learn. Candidates actively seek out multiple perspectives and diverse experiences to address the academic, interpersonal, and emotional needs of all students.

- Demonstrates and appreciation of the languages, communities, and experiences students bring to the classroom.
- Advocates for and supports Indigenous and other diverse communities and individuals.
- Respects the dignity and essential worth of all individuals.
- Interacts with sensitivity to community and cultural norms.
- Values and responds to all aspects of a child's developmental well-being (cognitive, emotional, psychological, social, and physical).
- Promotes the diversity of opinions, ideas, and backgrounds.

#### Professional Outcome: [Diversity](#)

Promote teachers' acceptance and respect of the diversity within their school, community and environment.

#### **ZHAWENINDIWIN – Compassion**

To encourage teacher candidates to develop an empathetic appreciation of the arts and humanities as a way to understand the human experience.

#### Disposition: [Life-long Learner](#)

Teacher candidates engage in professional growth and encourage curiosity and inquiry as reflective agents of change by sharing knowledge responsibly and participating as a community resource.



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- Demonstrates commitment to professional development and intellectual curiosity.
- Practices current skills while demonstrating ability to adapt and develop new skills.
- Actively participates or fosters the positive professional learning environment within the school community as well as the school- home relationships.
- Analyzes various professional contexts, resulting in more informed decision-making about professional practice.

**Professional Outcome: [Generation of New Knowledge](#)**

To expand teachers' knowledge of the human condition and cultures, and the importance of compassion especially in relation to behavior, ideas, and values.

**Content Standards: *8710.3200 Elementary Education***

**Licensing Rule 8710.3200 Subp. 3. Subject matter standards, elementary education**

J. A teacher of children in kindergarten through grade 6 must demonstrate a fundamental knowledge of scientific perspectives, scientific connections, science in personal and social perspectives, the domains of science, and the methods and materials for teaching science and scientific inquiry. The teacher must:

J.2. know and apply the understandings and abilities of scientific inquiry including the

(c) use appropriate scientific instrumentation and equipment and mathematics as tools to improve scientific investigations and communications;

(e) evaluate alternative explanations and models based on evidence, current scientific understanding, and logic; and

(f) communicate and defend a scientific argument;

3. know how to make connections across the domains of science, between science and technology, and between science and other school subjects; and

6. know and apply the fundamental concepts and principles of life science concerning the characteristics of organisms, the life cycle of organisms, the interrelationships of organisms and environments, structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems and their interrelationships, and diversity and adaptations of organisms.



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**Reference List:**

Websites for free or purchased materials:

- Kesler Science: [www.keslerscience.com](http://www.keslerscience.com)
- Amy Brown Science: [www.amybrownsience.com](http://www.amybrownsience.com)
- Teachers pay Teachers: [www.teacherspayteachers.com](http://www.teacherspayteachers.com)
- Amoeba Sisters [www.amoebasisters.com](http://www.amoebasisters.com)
- Bozeman Science [www.bozemanscience.com](http://www.bozemanscience.com)
- NOVA science [www.pbs.org/wgbh/nova](http://www.pbs.org/wgbh/nova)
- NASA [www.nasa.gov](http://www.nasa.gov)
- NOAA [www.noaa.gov](http://www.noaa.gov)
- MN-DNA [www.dnr.state.mn.us](http://www.dnr.state.mn.us)
- MN-EPA [www.epa.gov/mn](http://www.epa.gov/mn)
- Flinn Scientific: [www.flinnsci.com](http://www.flinnsci.com)
- Chem4kids [www.chem4kids.com](http://www.chem4kids.com)
- Science Project Topics: <https://science-fair.org/students-parents/project-resources/>;  
<http://www.sciencebuddies.org/>; <http://www.madsci.org/>;  
<https://www.education.com/science-fair/engineering/>;  
<https://sciencefaircentral.com/students/engineering-projects>  
<https://www.thoughtco.com/engineering-science-fair-project-ideas-609039>
- National Geographic: [www.nationalgeographic.com](http://www.nationalgeographic.com)
- Montana State University, Bozeman: [www.montana.edu](http://www.montana.edu)

Books:

*Integrated Science*; Sixth Edition Bill Tillery, Eldon D. Enger and Frederick C Ross; McGraw Hill; 2011

*Earth, Portrait of a Planet*, 4<sup>th</sup> Edition, Stephen Marshak, W. W. Norton & Company, 2011

*Chemistry-Structure and Properties*, Nivaldo J. Tro, Pearson, 2015

*Environmental Chemistry-a global perspective*, 3<sup>rd</sup> edition, Gary W VanLoon and Stephen J Duffy, Oxford University Press, 1999.

*Physics*, 4<sup>th</sup> edition, James S. Walker, 4<sup>th</sup> edition, Addison-Wesley, 2019

*Principles of Biochemistry*, 5<sup>th</sup> edition, Moran, Horton, Scrimgeor, and Perry, Person, 2010

*Chemistry in Context Applying Chemistry to Society*, 8th Edition, McGraw Hill, 2015

*Introduction to Organic Chemistry*, 4<sup>th</sup> Edition, William Brown and Thomas Poon, John Wiley & Sons, 2011

*Prescott's Microbiology*, 9<sup>th</sup> edition, Wiley, Sherwood, Wolverton, McGraw Hill, 2013



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*Fundamentals of Anatomy and Physiology*, Fredric Martini, Prentice Hall, 1998  
*Study Guide*", F Martini, Prentice Hall, 1998  
*Lab Manual*", F Martini, Prentice Hall, 1998

*Fundamentals of Anatomy and Physiology-Applications Manual*, Fredric Martini,  
Prentice Hall, 1998

*The Anatomy Coloring Book*, W. Kapit and L. Elson, Addison-Wesley, 1993

*Musculoskeletal Anatomy Coloring Book*, Muscolino, Joseph, Mosby, Inc., 2010

*Coloring Guide to Regional Human Anatomy*", Twietmeyer and McCracken, Lea &  
Febiger, 1988

*Biology Principles and Explorations*, Annotated Teacher Edition, Holt, Rinehart and  
Winston, Harcourt Classroom Education Company, 2001

*Conceptual Physics*, Paul G. Hewitt, Prentice Hall, 2002

*Physics: A Conceptual World View*, 7<sup>th</sup> Edition, Kirkpatrick and Francis, Brooks/Cole,  
2010

*Inquire Within: Implementing Inquiry-and Argument Based Science Standards in Grades 3-8*,  
3<sup>rd</sup> edition (Llewellyn - Sage), Corwin, 2013

**Timeline of Important Dates:**

Full refund is available until September 2, 2024, 11:59PM CT.  
The last day to add this course is August 30, 2024. The last day to drop this course is August 30, 2024.  
The last day to withdraw from this course is December 2, 2024.



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### **Mandatory Statements**

#### Plagiarism

Plagiarism, or presenting the writing of another as your own (a.k.a. “copying”), results in an F for this course and is subject to any other disciplinary actions mandated by this institution and the Minnesota State system.

#### Disabilities Notice

Fond du Lac Tribal & Community College is committed to providing equitable access to learning opportunities for all students. Under the Americans with Disabilities Act and Section 504 of the Rehab Act, Fond du Lac Tribal & Community College provides students with disabilities (e.g., mental health, attentional, learning, chronic health, sensory or physical) reasonable accommodation to participate in educational programs, activities or services. Students with disabilities requiring accommodation to participate in class activities or meet course requirements must first complete an intake form and necessary requirements with Nancy Olsen, Disability Services coordinator, to establish an accommodation plan. She can be reached at [nancy.olsen@fdltcc.edu](mailto:nancy.olsen@fdltcc.edu) or 218-879-0819.

#### Sexual Violence

Fond du Lac Tribal & Community College (FDLTCC) is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence, gender or sex-based bullying and stalking. If you or someone you know has experienced gender or sex-based violence (intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), know that you are not alone. FDLTCC has staff members trained to support survivors in navigating campus life, accessing resources, providing accommodations, assistance completing with protective orders and advocacy. For more information regarding the Campus Security Report, the following link will give you a report on the Clery Compliance and Security Report at FDLTCC: <https://fdltcc.edu/admissions/about-us/policies-reports/campus-security-policies-reports/>.

Please be aware that all FDLTCC employees are required to report any incidents of sexual violence and, therefore it cannot guarantee the confidentiality of a report, but it will consider a request for confidentiality and respect it to the fullest extent possible. If you wish to report sexual misconduct or have questions about school policies and procedures regarding sexual misconduct, please contact Jesse Stirewalt, Director of Housing and Student Activities at 218-590-3345 or [jstirewalt@fdltcc.edu](mailto:jstirewalt@fdltcc.edu).

#### ***Student Success—North Star Communication Platform***

Student success is at the heart of what Fond du Lac Tribal and Community College staff, faculty and administration strive to achieve. To help support our students in their educational journeys, FDLTCC uses a communication platform called North Star. Students can raise their hand for support, set up appointments with staff and faculty and communicate seamlessly with instructors. The college encourages ALL FDLTCC students to use the North Star webpage link to watch video tutorials and to log into the platform to start using its features.