ESL Introduction to Science (2019)1

ESL Introduction to Science (2019)2

Submitted By:

Chinook's Edge School Division No. 73

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Course Basic Information

Outline Number	Hours	Start Date	End Date	Development Type	Proposal Type	Grades
15-5	125.00	09/01/2019	08/31/2023	Acquired	Reauthorization	G10
25-5	125.00	09/01/2019	08/31/2023	Acquired	Reauthorization	G10

Course Description

The primary goal of ESL Introduction to Science 15, 25 is to provide English Language Learners (ELLs) with the opportunity to build communicative competence with the English language while attaining the scientific awareness needed to function as contributing members of society.

Communicative Competence

Communicative Competence is the ability to communicate successfully in any context, be it social, academic, oral, or written (Alberta Education). Communicative competence is required for success in life, work, and continued learning. Canale and Swain (1980) offer a model of language proficiency that outlines the four communicative areas that contribute to communicative competence: linguistic, strategic, sociolinguistic and discourse for each of the four language strands: listening, speaking, reading and writing.

Please note that the following descriptions and examples are not exhaustive. Visit LearnAlberta for a more detailed explanation and examples of communicative competence.

Linguistic Competency:

Understanding and using vocabulary, language conventions (grammar, punctuation, spelling) and syntax (sentence structure).

Strategic Competency:

Using techniques to overcome language gaps, plan and assess the effectiveness of communication, achieve conversational fluency and modify text for audience and purpose.

Socio-Linguistic Competency:

Having an awareness of social rules of language (e.g., formality, politeness, directness), nonverbal behaviours and cultural references (e.g., idioms, expressions, background

knowledge)

Discourse:

Understanding how ideas are connected through patterns of organization and cohesive and transitional devices

Additionally, each language strand has a strand-specific competency. The strand-specific competencies are as follows:

Listening: auditory discrimination

Speaking: pronunciation

Reading: fluency

Writing: editing

The English Language Development Framework

Dutro & Moran's English Language Development (ELD) framework (2003) provides a pedagogical structure to support the development of communicative competence within content area learning. Explicit language instruction based on the function (or purpose) of language in the lesson or task forms the foundation of this instructional approach. Linguistic functions are often identified through the learning outcomes of the course (e.g., describe, analyze, persuade). Vocabulary (subject-specific and academic) and forms (grammar, sentence structures, and text organization) required to communicate these functions are explicitly taught and practiced in meaningful and authentic learning experiences to develop fluency in usage.

The ELD framework is applied to intellectually engaging tasks that are situated within a broader instructional approach of personalized learning and cultural responsiveness. ELD is comprised of the following components:

1. Explicit language instruction

☐ targets the communicative competencies outlined in the Alberta K-12 ESL Proficiency Benchmarks

☐ focuses on the language function, vocabulary and forms necessary to access the content objective/task demands and provides practice and ongoing language-specific feedback to build fluency.

2. Frontloading challenging vocabulary and linguistic structures to render content understandable

3. Capitalizing on the teachable language learning moments.

4. Ongoing assessment based on the Alberta K-12 Proficiency Benchmarks that informs next steps in teaching and learning.

Note: Possible linguistic functions have been identified for the specific learning outcomes for this course.

Adjusting Scaffolds as Language Develops

As students gain autonomy in using academic language fluently and accurately, language instruction and learner scaffolds are adjusted accordingly. For example, a beginner ELL may rely strongly on visuals, realia, and first language translation when acquiring subject-specific vocabulary, whereas an intermediate ELL may be able to understand the meaning of the word through a description of the target word that uses familiar English synonyms.

Academic Language – The Language of Success for All

Academic language is the language used to access and engage with Programs of Study. Proficiency in academic language requires students to comprehend and produce increasingly complex vocabulary, grammar, sentence structures and text organization. Students who acquire a high level of proficiency in academic language experience greater success in school and beyond. As such, explicit instruction in academic language benefits all learners, both ELLs and native English speakers.

This course requires the use of a high school science lab and high school science equipment. As with all Science courses, teachers should refer to Health and Safety in the Science Classroom: Kindergarten to Grade 12 (2019) from Alberta Education to inform their practice regarding the health and safety of themselves and their students.

Course Prerequisites

No prerequisite.

Sequence Introduction (formerly: Philosophy)

ESL Introduction to Science 15, 25 develop students' academic English language proficiency through scientific concepts and processes. This goal is achieved through the implementation of the English Language Development (ELD) framework, an instructional approach to explicit language instruction within content area learning. Students will use their growing proficiency with language functions, forms, and vocabulary to explore and develop a range of scientific concepts and skills. Targeted language functions in this course are drawn from and connected to Alberta Science Program of Study.

The content for Science 15, 25 is organized around essential understandings and the following guiding questions:

☐ Receptive Language: How does development of receptive language skills (listening and reading) enable students to comprehend information and ideas related to course content?

☐ Expressive Language: How does development of expressive language skills (speaking and writing) enable students to communicate information and ideas related to course content?

☐ Scientific Inquiry: What are the characteristics of scientific understanding?

☐ Life Science: What are the characteristics of living things? How do living things adapt to changes over time?

☐ Chemistry: What is matter? How does matter react when combined?

☐ Physical Science: How does energy affect the movement of objects?

Student Need (formerly: Rationale)

ELLs face language-related barriers to achievement in science due to the extensive use of subject-specific vocabulary, the complexity of discourse (e.g., text structures), grammatical structures (e.g., nominalization) and language functions in the discipline. ELLs may also face content-related barriers due to limited background knowledge in science and the scientific method. These courses support ELLs who are attempting to catch up to a moving target, namely, native-speakers of English whose academic language and literacy skills are increasing significantly from one grade level to the next.

Scope and Sequence (formerly: Learner Outcomes)

Developing communicative competence supports students to grow their science-related knowledge, skills, attitudes, and literacy thereby enabling students to make informed decisions, solve problems and critically address science-related societal, economic, ethical and environmental issues.

The content for ESL Introduction to Science 15, 25 is organized around essential understandings and the following guiding questions:

☐ Receptive Language: How does development of receptive language skills (listening and reading) enable students to comprehend information and ideas related to course content?

☐ Expressive Language: How does development of expressive language skills (speaking and writing) enable students to communicate information and ideas related to course content?

☐ Scientific Inquiry: What are the characteristics of scientific understanding?

☐ Life Science: What are the characteristics of living things? How do living things adapt to changes over time?

☐ Chemistry: What is matter? How does matter react when combined?

☐ Physical Science: How does energy affect the movement of objects?

NOTE: Language outcomes are derived directly from the Alberta K-12 ESL Proficiency Benchmarks, Grades 10-12. (See Alberta K-12 ESL Proficiency Benchmarks Grades 10 – 12, LP 1, 2, and 3 for illustrative examples.)

Key: "Comp" means "Competency" in the charts below. Strands: L=Listening, S=Speaking, R=Reading, W=Writing.

Guiding Questions (formerly: General Outcome

1   Receptive Language: How does development of receptive language skills (listening and reading) enable students to comprehend information and ideas related to course content?

2   Expressive Language: How does development of expressive language skills (speaking and writing) enable students to communicate information and ideas related to course content?

3   Scientific Inquiry: What are the characteristics of scientific understanding?

4   Life Science: What are the characteristics of living things? How do living things adapt to changes over time?

5   Chemistry: What is matter? How does matter react when combined?

6   Physical Science: How does energy affect the movement of objects?

Learning Outcomes (formerly: Specific Outcomes)

	15-5 25-5
1 Receptive Language: How does development of receptive language skills (listening and reading) enable students to comprehend information and ideas related to course content?	
1.1 LP1 - Linguistic Vocabulary | L - Understand some words, approximately 5000, including utility words, descriptive words, subject-specific words and academic words with visual support.	X
1.2 LP1 - Linguistic Vocabulary | R - Understand some words, approximately 5000, including utility words, descriptive words and subject-specific vocabulary.	X
1.3 LP2 - Linguistic Vocabulary | L - Understand more words, approximately 15,000, including utility words, descriptive words, subject-specific words and academic words.	X
1.4 LP2 - Linguistic Vocabulary | R - Understand more words, approximately 15,000, including utility words, descriptive words and subject-specific vocabulary.	X
1.5 LP3 - Linguistic Vocabulary | L - Understand a range of words, approximately 25,000, including utility words, descriptive words, subject-specific words, academic words and words with multiple meanings.	X
1.6 LP3 - Linguistic Vocabulary | R - Understand a range of words, approximately 25,000, through contextual cues.	X
1.7 LP1 - Linguistic Syntax | L - Understand subject-verb-object sentence structure in familiar contexts.	X
1.8 LP1 - Linguistic Syntax | R - Understand simple sentences.	X
1.9 LP2 - Linguistic Syntax | L - Understand compound sentences in familiar contexts.	X
1.10 LP2 - Linguistic Syntax | R - Understand compound sentences and simple detailed sentences.	X

1.11 LP3 - Linguistic Syntax | L - Understand compound sentences and complex sentences in unfamiliar contexts		X
1.12 LP3 - Linguistic Syntax | R - Understand complex sentences containing subordinate clauses, relative clauses and conditional clauses.		X
1.13 LP1 - Strategic | L - Respond to literal questions with "what," "where," "when," "who" and "how many."	X	
1.14 LP1 - Strategic | R - Decode familiar words and sight words.	X	
1.15 LP1 - Strategic | L - Seek clarification by using familiar expressions.	X	
1.16 LP1 - Strategic | R - Rely on pictures, familiar phrases, patterned sentences, context, shared experiences and first language and culture to comprehend simple texts on familiar topics.	X	
1.17 LP2 - Strategic | L - Respond to open-ended questions.	X	
1.18 LP2 - Strategic | R - Decode word families, consonant blends and long- and short-vowel sounds.	X	
1.19 LP2 - Strategic | L - Seek clarification by restating, paraphrasing.	X	
1.20 LP2 - Strategic | R - Use rereading, reading on, contextual cues and root-word recognition to comprehend texts on familiar topics.	X	
1.21 LP3 - Strategic | L - Respond to hypothetical questions.		X
1.22 LP3 - Strategic | R - Decode root words, prefixes, suffixes and vowel digraphs.		X
1.23 LP3 - Strategic | L - Seek clarification by asking questions.		X
1.24 LP3 - Strategic | R - Use predicting, inferencing, contextual cues, and/or affix analysis to understand texts on unfamiliar topics.		X
1.25 LP1 - Socio-Linguistic | L - Respond appropriately to common social expressions in formal and informal contexts.	X	

Outcome	Col A	Col B
1.26 LP1 - Socio-Linguistic | R - Understand the literal meaning of simple texts on familiar topics.	X	
1.27 LP2 - Socio-Linguistic | L - Respond appropriately to common social expressions, intonation, idiomatic expressions in formal and informal contexts.	X	
1.28 LP2 - Socio-Linguistic | R - Understand common social expressions and figurative language in texts on familiar topics.	X	
1.29 LP3 - Socio-Linguistic | L - Respond appropriately to slang, humour, common idioms and common social expressions. Recognize register, intonation in a variety of contexts.		X
1.30 LP3 - Socio-Linguistic | R - Understand explicit social references, explicit cultural references and figurative language in a variety of texts.		X
1.31 LP1 - Discourse | L - Understand familiar commands, two-step instructions, the gist of discussions and presentations containing phrases and simple related sentences connected with "and" and "then" on familiar topics with visual support.	X	
1.32 LP1 - Discourse | R - Understand simple narratives and descriptive texts containing common conjunctions.	X	
1.33 LP2 - Discourse | L - Understand the gist of discussions and presentations containing simple related sentences connected with common conjunctions, time markers, and sequence markers on familiar topics.	X	
1.34 LP2 - Discourse | R - Understand ideas in simple explanations and procedural texts connected with conjunctions, time markers and sequence markers.	X	
1.35 LP3 - Discourse | L - Understand main ideas, examples, clauses in detailed paragraphs connected with common cohesive devices in academic explanations.		X
1.36 LP3 - Discourse | R - Understand ideas in related paragraphs connected with cohesive devices indicating comparison and contrast; transition words.		X
1.37 LP1 - Auditory Discrimination | L - Recognize common contractions and distinguish minimal pairs in speech spoken at a slower rate.	X	
1.38 LP2 - Auditory Discrimination | L - Understand contractions and familiar reduced speech.	X	

1.39 LP3 - Auditory Discrimination | L - Understand rapid speech on familiar topics.	X
1.40 LP1 - Fluency | R - Read word-by-word with some phrasing.	X
1.41 LP2 - Fluency | R - Read with some phrasing, rereading, sounding out of words, pausing to refer to visuals; substitution of unknown words with familiar words.	X
1.42 LP3 - Fluency | R - Read increasingly with expression and attention to common punctuation; meaningful word substitutions.	X

2 Expressive Language: How does development of expressive language skills (speaking and writing) enable students to communicate information and ideas related to course content?	15-5 25-5
2.1 LP1 - Linguistic Vocabulary | S - Use some words, approximately 5000, including utility words, descriptive words, and subject-specific words to express needs, express feelings, express preferences and respond to questions.	X
2.2 LP1 - Linguistic Vocabulary | W - Use some words, approximately 5000, including utility words, descriptive words and subject-specific words.	X
2.3 LP2 - Linguistic Vocabulary | S - Use more words, approximately 15,000, including utility words, descriptive words, subject-specific words to express ideas, ask and answers questions and make statements.	X
2.4 LP2 - Linguistic Vocabulary | W - Use more words, approximately 15,000, including utility words, descriptive words and subject-specific words.	X
2.5 LP3 - Linguistic Vocabulary | S - Use a range of words, approximately 25,000, including utility words, descriptive words, subject-specific words, and academic words to comment, state opinions, clarify and express agreement or disagreement.	X
2.6 LP3 - Linguistic Vocabulary | W - Use a range of words, approximately 25,000, including utility words, descriptive words, subject-specific words and academic words.	X

2.7 LP1 - Linguistic Grammar | S - Use common pronouns, adjectives, nouns, and verbs in present tense with errors and omissions.	X	
2.8 LP1 - Linguistic Grammar | W - Use familiar nouns, pronouns, adjectives, adverbs, prepositions, articles and verbs with tense errors and omissions.	X	
2.9 LP2 - Linguistic Grammar | S - Use regular plurals, possessives, prepositions, verbs in continuous and simple past tenses with agreement and tense errors.	X	
2.10 LP2 - Linguistic Grammar | W - Use regular plurals, possessive pronouns, prepositional phrases, regular verbs in continuous and simple past tenses, irregular verbs in continuous and simple past tenses with tense and usage errors.	X	
2.11 LP3 - Linguistic Grammar | S - Use negatives, noun phrases, adjective phrases, irregular plurals, possessives, prepositions, verbs in future continuous and irregular past tenses with some usage errors.		X
2.12 LP3 - Linguistic Grammar | W - Use negatives, irregular plurals, object pronouns, prepositions, regular verbs in past and future continuous tenses, and irregular verbs in past and future continuous tenses with occasional errors.		X
2.13 LP1 - Linguistic Syntax | S - Follow patterned sentences, phrases, and subject-verb-object sentences.	X	
2.14 LP1 - Linguistic Syntax | W - Write simple declarative sentences, negative sentences and question sentences using sentence frames.	X	
2.15 LP2 - Linguistic Syntax | S - Use patterned and predictable affirmative and negative statements, questions and commands.	X	
2.16 LP2 - Linguistic Syntax | W - Write simple compound sentences and simple detailed sentences.	X	
2.17 LP3 - Linguistic Syntax | S - Add detail to affirmative and negative statements, questions and commands.		X
2.18 LP3 - Linguistic Syntax | W - Write a variety of compound sentences and complex sentences.		X
2.19 LP1 - Strategic | S - Use known phrases, simple questions and first-language translation.	X	

Outcome		
2.20 LP1 - Strategic | W - Use copying, spelling from memory, words with similar sounds, sentence frames to spell familiar words, write ideas, complete patterned sentences and use basic punctuation.	X	
2.21 LP2 - Strategic | S - Use message replacement, everyday expressions and everyday questions.	X	
2.22 LP2 - Strategic | W - Use familiar vocabulary, known phrases, common expressions, cognates, word lists, templates and models, personal dictionary to find appropriate words, spell irregularly spelled words, distinguish homophones and homonyms and increase use of punctuation.	X	
2.23 LP3 - Strategic | S - Use circumlocution and clarifying questions.		X
2.24 LP3 - Strategic | W - Use circumlocution, word substitution, format samples, visual dictionary, bilingual dictionary, and punctuation modelled in books to add descriptions to writing, make better word choices, confirm spelling and improve accuracy of punctuation.		X
2.25 LP1 - Socio-Linguistic | S - Use greetings, common courtesy expressions, familiar social expressions to participate in social and classroom situations.	X	
2.26 LP1 - Socio-Linguistic | W - Produce texts using familiar words, familiar phrases, sentence frames to complete forms, create graphic organizers and label diagrams.	X	
2.27 LP2 - Socio-Linguistic | S - Use common expressions, slang, idioms and gestures to communicate with peers.		X
2.28 LP2 - Socio-Linguistic | W - Produce texts for specific purposes using templates, samples, story plans or graphic organizers.		X
2.29 LP3 - Socio-Linguistic | S - Use expressions, idioms, and common social references in appropriate contexts.		X
2.30 LP3 - Socio-Linguistic | W - Produce expository texts and narrative texts using knowledge of culturally appropriate forms and styles.		X
2.31 LP1 - Discourse | S - Connect familiar phrases and simple sentences with "and" to express needs, feelings, and opinions.	X	

2.32 LP1 - Discourse | W - Connect ideas in simple sentences using common conjunctions, common time markers and common sequence markers.	X	
2.33 LP2 - Discourse | S - Connect ideas using common conjunctions, time markers, and sequence markers to share ideas, ask questions, describe and explain.	X	
2.34 LP2 - Discourse | W - Connect ideas in a basic paragraph using common conjunctions, time markers and sequence markers.	X	
2.35 LP3 - Discourse | S - Connect ideas using conjunctions and prepositional phrases to elaborate, describe, sequence and explain.		X
2.36 LP3 - Discourse | W - Connect ideas in a three-paragraph narrative and a three-paragraph descriptive composition using transition words and subordinate conjunctions.		X
2.37 LP1 - Pronunciation | S - Approximate English rhythm and intonation in familiar and rehearsed activities, although pronunciation errors may interfere with meaning.	X	
2.38 LP2 - Pronunciation | S - Demonstrate comprehensible pronunciation and appropriate intonation in familiar and rehearsed activities, although pronunciation errors may still occur.	X	
2.39 LP3 - Pronunciation | S - Demonstrate comprehensible pronunciation and appropriate intonation in unfamiliar and unrehearsed activities, with occasional errors.		X
2.40 LP1 - Editing | W - Edit sentences for capitalization of names and words at the beginning of sentences, periods and regular spelling of familiar words.	X	
2.41 LP2 - Editing | W - Edit and revise paragraphs for regular spelling, end punctuation, commas in lists and addition of detail.	X	
2.42 LP3 - Editing | W - Edit and revise expository and narrative texts for capitalization of proper nouns, apostrophes, quotation marks, hyphens, dashes and commas, regular and irregular spelling, spelling of homophones and homonyms and subject-verb agreement appropriate word choice addition of supporting details.		X

3 Scientific Inquiry: What are the characteristics of scientific understanding?	15-5	25-5
3.1 Engage in collaborative scientific inquiry to explain and apply scientific concepts. Possible linguistic functions: summarize and inform, justify and explain.	X	X
3.2 Identify and demonstrate science safety rules including Workplace Hazardous Materials Information System WHMIS for school laboratories. Possible linguistic functions: summarize and inform.	X	X
3.3 Ask questions. Possible linguistic functions: inquiry/seek information.	X	X
3.4 Formulate a hypothesis. Possible linguistic functions: hypothesize.	X	X
3.5 Identify controlled, manipulated and responding variables. Possible linguistic functions: seek information, summarize and inform, compare and contrast, classify.	X	
3.6 Design an experiment and determine controlled, manipulated and responding variables. Possible linguistic functions: inquiry/seek information, analyze.		X
3.7 Investigate and test scientific principles and their applications, using models or appropriate tools, for example a microscope. Possible linguistic functions: inquiry, evaluate.	X	X
3.8 Gather, organize and present experimental data, graphically, if applicable. Possible linguistic functions: seek information, summarize and inform.	X	X
3.9 Analyze and assess experimental data and evaluate model design when appropriate. Possible linguistic functions: analyze, synthesize, evaluate.	X	X
3.10 Draw conclusions based on experimental data and explain how evidence gathered support or refutes the initial hypothesis. Possible linguistic functions: summarize, synthesize, justify and persuade, infer.	X	X
3.11 Reflect on scientific method and pose further questions. Possible linguistic functions: inquire, evaluate.	X	X
3.12 Identify and debate multiple-perspectives on scientific issues using evidence. Possible linguistic functions: seek information, justify and persuade.		X

4 Life Science: What are the characteristics of living things? How do living things adapt to changes over time?	15-5 25-5
4.1 Describe the characteristics of living things. Possible linguistic functions: inform, classify.	X
4.2 Describe the basic structure and function of systems in animals, including human nervous, circulatory, respiratory, digestive systems. Possible linguistic functions: inform, compare and contrast, classify.	X
4.3 Describe lifestyle factors that contribute to good health. Possible linguistic functions: inform, compare and contrast.	X
4.4 Classify common plants and animals. Possible linguistic functions: summarize and inform, classify.	X
4.5 Investigate and describe the history of the cell theory. Possible linguistic functions: inquiry and seek information, sequence / order, summarize and inform.	X
4.6 Using a diagram, identify and describe the function of cell organelles. Possible linguistic functions: summarize and inform.	X
4.7 Compare and contrast plant and animal cells. Possible linguistic functions: compare and contrast.	X
4.8 Using the appropriate tool, apply laboratory skills to observe and record scientific observations (microscope, hand lens). Possible linguistic functions: summarize and inform.	X X
4.9 Using a microscope, identify visible cell organelles. Possible linguistic functions: summarize and inform, classify.	X
4.10 Compare and contrast passive transport, including osmosis and diffusion, and active transport, including carrier and channel proteins, in relation to semi-permeable membranes. Possible linguistic functions: compare and contrast.	X
4.11 Identify and describe the interactions of organisms, including humans, in an ecosystem, including food web, habitat characteristics, needs, adaptations. Possible linguistic functions: summarize and inform.	X
4.12 Explain seasonal change and animal and human adaptations to seasonal change. Possible linguistic functions: inform, compare and contrast, cause and effect.	X

4.13 Investigate and interpret diversity within species and among species with a focus on adaptations. Possible linguistic functions: inquiry, classify, analyze, synthesize, evaluate, cause and effect.	X

5 Chemistry: What is matter? How does matter react when combined?	**15-5 25-5**
5.1 Investigate and describe the history of the particle model of matter. Possible linguistic functions: inquire, inform.	X
5.2 Investigate and describe the properties of states of matter, including water, methanol, ethanol as solids, liquids and gases and associated changes of state. Possible linguistic functions: inquire, inform.	X
5.3 Describe the heating curve of water. Possible linguistic functions: seek info and inform.	X
5.4 Estimate and accurately measure, such as volume, mass, density, pH, temperature using the appropriate tool, including beakers, graduated cylinders, scales, litmus paper, thermometers. Possible linguistic functions: inform, predict.	X X
5.5 Explain concepts related to heat and heat transfer, including temperature scales Celsius and Kelvin, conduction, convection, radiation. Possible linguistic functions: inform, compare and contrast.	X
5.6 Explain physical and chemical properties in everyday materials. Possible linguistic functions: inform, compare and contrast.	X
5.7 Investigate and describe subatomic particles, including electrons, protons, neutrons. Possible linguistic functions: seek information, inform, compare and contrast.	X
5.8 Examine and evaluate patterns in the first 18 elements of the periodic table including nomenclature, atomic symbol, atomic mass, atomic number, ionic charge, chemical properties of groups and families. Possible linguistic functions: summarize and inform, classify.	X
5.9 Investigate nomenclature of elements and compounds and apply to classification of pure substances or mixtures. Possible linguistic functions: classify, analyze.	X

5.10 Investigate chemical nomenclature of compounds, both molecular and ionic. Possible linguistic functions: inform, compare and contrast, classify, analyze.	X
5.11 Investigate and describe the properties of acids and bases. Possible linguistic functions: inquire and seek info, inform, compare and contrast.	X
5.12 Investigate and describe chemical reactions to identify reactants and products in chemical or physical changes. Possible linguistic functions: inquire and seek information, inform, compare and contrast, cause and effect.	X
5.13 Investigate different types of chemical reactions, such as acid, base, endothermic, exothermic. Possible linguistic functions: inquire, inform, classify.	X
5.14 Represent chemical reactions with word equations and chemical formulas. Possible linguistic functions: sequence/order, problem solve.	X
5.15 Balance chemical reactions. Possible linguistic functions: sequence/order, problem solve.	X
5.16 Using the appropriate tool, apply laboratory skills to observe and record scientific observations, including beakers, graduated cylinders, spot plates. Possible linguistic functions: summarize and inform.	X X

6 Physical Science: How does energy affect the movement of objects?	15-5 25-5
6.1 Use appropriate scientific, SI, notation. Possible linguistic functions: classify, analyze.	X X
6.2 Identify, describe and interpret examples of mechanical, chemical, thermal, electrical and light energy. Possible linguistic functions: inform, classify, compare and contrast, analyze.	X
6.3 Describe the use, production and impact of common sources of renewable and non-renewable energy. Possible linguistic functions: summarize and inform, compare and contrast, analyze and evaluate, cause and effect.	X
6.4 Investigate and explain kinetic and potential energy. Possible linguistic functions: inquire and seek information, summarize and inform.	X X

6.5 Investigate and explain the electromagnetic radiation spectrum. Possible linguistic functions: inquire and seek information, summarize and inform.	X X	
6.6 Investigate and describe evidence of energy transfer and transformation. Possible linguistic functions: inquire and seek information, summarize and inform, compare and contrast.	X	
6.7 Evaluate the efficiency of energy conversions. Possible linguistic functions: analyze, evaluate.	X	
6.8 Explain common movement and forces, including friction, magnetism, structural stresses, gravity. Possible linguistic functions: inform, compare and contrast.	X	
6.9 Compile and display evidence and information in a variety of formats, such as diagrams, flow charts, tables, graphs, scatterplots. Possible linguistic functions: analyze, synthesize.	X X	
6.10 Interpret patterns and trends in data. Possible linguistic functions: analyze, infer.	X X	

Facilities or Equipment

Facility

Access to high school science laboratory space is required for this course.

Facilities:

Equipment

Access to high school science laboratory equipment is required for this course.

Learning and Teaching Resources

No required resources

Sensitive or Controversial Content

No sensitive or controversial content.

Issue Management Strategy

Health and Safety

As with all Science courses, teachers should refer to Health and Safety in the Science Classroom: Kindergarten to Grade 12 (2019) from Alberta Education to inform their practice regarding the health and safety of themselves and their students

Risk Management Strategy

Statement of Overlap with Existing Programs

Provincial Courses with Overlap and/or Similarity

Science 14

Science 10

Identified Overlap/Similarity

Some of the science-related learning outcomes in this course overlap slightly with Science 14 or Science 10 learning outcomes.

Reasoning as to Why LDC Is Necessary

Science 10 and Science 14 emphasize the study of concepts from a very specific scientific perspective mainly to native English speakers or LP4 or LP5 ELLs in order to focus on science education. The ESL Introduction to Science 15, 25 courses are necessary to allow LP1, LP2 and LP3 ELLs to learn foundational scientific concepts and skills while simultaneously learning English, in order to be successful in further high school science courses.

Locally Developed Courses with Overlap and/or Similarity

ESL Introduction to Canadian Studies 15, 25.

Identified Overlap/Similarity

The language learning outcomes in this course overlap with ESL Introduction to Canadian Studies 15, 25 because the language learning outcomes are based on the Alberta K-12 ESL Proficiency Benchmarks, which apply to both courses.

Reasoning as to Why LDC Is Necessary

The language skills, conceptual understandings and procedural knowledge acquired in ESL Introduction to Science 15, 25 bridge the gap for ELLs and form the foundation for success in future science courses. Once knowledge of scientific language, concepts and procedures have been established through these courses, students will be able to enter into Alberta Education Science programming. Students will continue to require differentiated instruction focused on academic language development in future science courses.

Student Assessment

Ongoing language assessment in relation to the Alberta K-12 ESL Proficiency Benchmarks informs teaching and learning throughout this course.

Course Approval Implementation and Evaluation