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**Locally Developed Courses**

# **ESL Introduction to Science**

For the 2023-2024 School Year

# Introduction to the ESL Introduction to Science Course Sequence

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*Subject: Sciences - Discipline: General Science*

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The primary goal of ESL Introduction to Science sequence provides 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 achieve communicative goals in a socially appropriate manner (Kiehl C, Fabry G., 2021). It encompasses language proficiency as well as the capacity to select and apply communication and social skills, including verbal and non-verbal behaviours, that are appropriate to the context. Communicative language teaching involves developing language proficiency through interactions embedded in meaningful contexts. Learn Alberta offers an explanation about how 4 areas contribute to communicative competence.

- Linguistic Competency - Understanding and using: vocabulary; language conventions (grammar, punctuation, spelling); syntax (sentence structure)
- Strategic Competency - Using techniques to overcome language gaps; plan and assess the effectiveness of communication; achieve conversational fluency; modify text for audience and purpose
- Socio-Linguistic Competency - Being aware of the social rules of language (e.g., formality, politeness, directness); non-verbal behaviour; cultural references (e.g., idioms, expressions, background knowledge)
- Discourse - Understanding how ideas are connected by patterns of organization; cohesive and transitional devices
- Additionally, each language strand has a specific competency: Language – auditory discrimination; Speaking – pronunciation; Reading – fluency; Writing - editing

The English Language Development (ELD) framework (Dutro & Moran, 2003) provides a pedagogical structure to support the development of communicative competence within content area learning. Explicit language instruction based on the function (purpose) of language in the lesson or task serves as 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, academic and general) 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

- Explicit language instruction: targeting the communicative competencies outlined in the Draft Alberta K-12 English as an Additional Language (EAL) Proficiency Benchmarks (Benchmarks 2.0); focusing 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.
- Frontloading challenging vocabulary and linguistic structures to render content understandable
- Capitalizing on the teachable language learning moments.
- Ongoing language assessment based on the Draft Alberta K-12 English as an Additional Language (EAL) Proficiency Benchmarks (Benchmarks 2.0) that inform next steps in teaching and learning.

## Student Need

### Adjusting Scaffolds for On-going Language Learning

ELLs may face language-related challenges 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. They may also face content-related barriers due to limited background knowledge in science and/or the scientific method. As students gain academic language fluency, instruction and scaffolds are adjusted accordingly. For example, a beginner ELL may rely strongly on visuals, realia, and first language translation, whereas an

intermediate ELL can use familiar English synonyms. As language proficiency increases, inaccuracies in receptive and productive decrease, reducing the need for scaffolding.

#### Academic Language

Academic language is the language used to engage with programs of study. Explicit instruction in academic language benefits all learners, both ELLs and native English speakers. Students who acquire a high level of proficiency in academic language experience greater success in school and beyond. Proficiency in academic language requires students to comprehend and produce increasingly complex: vocabulary (words and their meaning), syntax (word order and sentence structure) and discourse (how ideas are organized and connected). Students will use their growing proficiency with language functions, forms and vocabulary to engage with and examine a range of academic and content-specific materials to understand and produce a variety of texts and types of oral communication.

#### Assessment

Ongoing formative language assessment in relation to the Draft Alberta K-12 English as an Additional Language (EAL) Proficiency Benchmarks (Benchmarks 2.0) inform teaching and learning via science content and processes. Summative assessments are best generated through a variety of sources embedding multiple language strands within science content and processes. For optimal learning, it is important to ensure that single strands are not developed or assessed in isolation.

## Course in the ESL Introduction to Science Course Sequence

### ESL Introduction to Science 15 (LDC1213)

ESL Introduction to Science 15 is intended to meet the needs of Beginner 1 (LP1), Beginner 2, (LP 2) and Intermediate 1 (LP3) and students who would benefit from explicit instruction, scaffolded learning opportunities and additional time to acquire English language competencies and science content and processes. 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 (Cummins, 2012).

Language learning outcomes are directly from the Draft Alberta K-12 English as an Additional Language (EAL) Proficiency Benchmarks (Benchmarks 2.0). Science concepts and processes are aligned with Alberta Education's Science Programs of Study.

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

Prerequisites: None

Versions Available: (Each version must be locally approved by Board Motion prior to offering to students.)

Credit Level	First School Year	Last School Year
5	2023-2024	2026-2027

### ESL Introduction to Science 25 (LDC2213)

ESL Introduction to Science 25 is intended to meet the needs of Beginner 1 (LP1), Beginner 2, (LP 2) and Intermediate 1 (LP3) and students who would benefit from explicit instruction, scaffolded learning opportunities and additional time to acquire English language competencies and science content and processes. Language learning outcomes are directly from the Draft Alberta K-12 English as an Additional Language (EAL) Proficiency Benchmarks (Benchmarks 2.0). Science concepts and processes are aligned with Alberta Education's Science Programs of Study. The typical progression (prerequisites) for this course sequence is the 15 course followed by the 25 level course. For English as and Additional Language (EAL) students whose needs are better met through the 25 level course may be placed in the 25 level course. The principal will record the student as "waived" into the 25 level course in PASI, but waived prerequisite credits are not available for EAL students placed in higher ESL courses

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

Prerequisites:

- All of the following:
  - ESL Introduction to Science 15 (LDC1213)

Versions Available: (Each version must be locally approved by Board Motion prior to offering to students.)

Credit Level	First School Year	Last School Year
5	2023-2024	2026-2027

# Curriculum Outline

Curriculum Elements		ESL Intro to Science 15-5	ESL Intro to Science 25-5
1	<b>Topic</b> Language Proficiency	✓	✓
1.1	<b>General Outcome</b> How does the development of and ability to demonstrate receptive – listening and reading - and productive/expressive -speaking and writing - language skills enable students to comprehend information and ideas related to course content?	✓	✓
1.1.1	<b>Specific Outcome</b> Beginner 1 – Vocabulary   with visual support and gestures, express feelings/preferences, respond to factual/literal questions on familiar topics and follow simple commands by recognizing and using a few high frequency utility, descriptive, subject-specific and instructional words; uses familiar phrases and substitutes words in simple patterned sentences.	✓	
1.1.2	<b>Specific Outcome</b> Beginner 2 – Vocabulary   on familiar topics, express ideas/preferences, ask and respond to questions and commands orally and in writing by recognizing and using a limited range of high frequency utility, descriptive, subject-specific, and instructional words	✓	✓
1.1.3	<b>Specific Outcome</b> Intermediate 1 – Vocabulary   state opinions, ask and respond to questions orally and in writing by recognizing and using a range of common utility, descriptive, subject-specific, inter-disciplinary and instructional words, some with multiple meanings		✓
1.1.4	<b>Specific Outcome</b> Beginner 1 – Sentence Structure   demonstrate understanding of familiar phrases, simple patterned sentences, questions and commands by responding appropriately.	✓	
1.1.5	<b>Specific Outcome</b> Beginner 1 – Sentence Structure – express ideas/preferences, make statements give commands or ask questions using familiar phrases and substituting words in patterned sentences, phrases, or questions orally and in writing	✓	
1.1.6	<b>Specific Outcome</b> Beginner 2 – Sentence Structure   demonstrate understanding of simple sentences, questions and commands and simple compound sentences by responding appropriately	✓	✓
1.1.7	<b>Specific Outcome</b> Beginner 2 – Sentence Structure   express ideas/preferences, make statements, give commands or ask questions in writing using simple, patterned sentence structures and simple compound sentences; begins to use complex sentences in structured texts; uses graphic organizers, templates and word banks.	✓	✓

Curriculum Elements		ESL Intro to Science 15-5	ESL Intro to Science 25-5
1.1.8	<b>Specific Outcome</b> Intermediate 1 – Sentence Structure   demonstrate understanding of structured compound and complex sentences <b>used orally</b> by responding appropriately.		✓
1.1.9	<b>Specific Outcome</b> Intermediate 1 – Sentence Structure   demonstrate understanding of main ideas, supporting details, facts and opinions on familiar topics in written texts by responding appropriately; navigates digital platforms.		✓
1.1.10	<b>Specific Outcome</b> Intermediate 1 – Sentence Structure   elaborate ideas orally by adding detail to compound and complex statements, questions and commands.		✓
1.1.11	<b>Specific Outcome</b> Intermediate 1 – Sentence Structure   create structured, connected written paragraphs using a variety of compound and complex sentences; uses graphic organizers and templates.		✓
1.1.12	<b>Specific Outcome</b> Beginner 1 – Cohesive Devices   demonstrate understanding of familiar instructions and the gist of oral discussions/presentations on familiar topics that contain a few high frequency connector words and time, place or sequence markers by responding appropriately.	✓	
1.1.13	<b>Specific Outcome</b> Beginner 1 – Cohesive Devices   connect, compare, locate and organize ideas orally by using phrases and simple sentences with a few high frequency connector words and time, place or sequence markers.	✓	
1.1.14	<b>Specific Outcome</b> Beginner 1 – Cohesive Devices   demonstrate understanding of simple narratives and descriptive texts with a few high frequency connector words and time, place or sequence markers by responding appropriately.	✓	
1.1.15	<b>Specific Outcome</b> Beginner 1 – Cohesive Devices   with visual support, connect, organize, locate and compare ideas in simple written sentences using a few high frequency connector words time markers place markers and sequence markers	✓	
1.1.16	<b>Specific Outcome</b> Beginner 2 – Cohesive Devices   demonstrate understanding of oral instructions and discussions / explanations with some detail that make comparisons or show cause and effect using a limited range of common connector words, time, place or sequence markers by responding appropriately.	✓	✓
1.1.17	<b>Specific Outcome</b> Beginner 2 – Cohesive Devices   describe or explain ideas, ask questions, make comparisons and show cause and effect orally using a limited range of common connector words, time, place or sequence markers.	✓	✓

Curriculum Elements		ESL Intro to Science 15-5	ESL Intro to Science 25-5
1.1.18	<b>Specific Outcome</b> Beginner 2 – Cohesive Devices   demonstrate understanding of simple explanations and procedural texts with a limited range of common connector words, time, place or sequence markers by responding appropriately orally or in writing.	✓	✓
1.1.19	<b>Specific Outcome</b> <b>Beginner 2 – Cohesive Devices</b>   <b>explain and describe</b> ideas in <b>writing</b> using common connector words time markers, place markers and sequence markers	✓	✓
1.1.20	<b>Specific Outcome</b> Intermediate 1 – Cohesive Devices   demonstrate understanding of explanations, examples and opinions expressed orally and containing many common cohesive devices, by responding appropriately.		✓
1.1.21	<b>Specific Outcome</b> Intermediate 1 – Cohesive Devices   explain ideas, express opinions, or provide examples orally using many common and specific cohesive devices.		✓
1.1.22	<b>Specific Outcome</b> Intermediate 1 – Cohesive Devices   demonstrate understanding of written academic explanations and opinions, with examples, containing many common cohesive devices by responding appropriately		✓
1.1.23	<b>Specific Outcome</b> Intermediate 1 – Cohesive Devices   explain ideas, express opinions, or provide examples in writing using many common and specific cohesive devices		✓
2	<b>Topic</b> Methods of Scientific Investigation	✓	✓
2.1	<b>General Outcome</b> What are the characteristics of scientific understanding?	✓	✓
2.1.1	<b>Specific Outcome</b> Engage in collaborative scientific inquiry to explain and apply scientific concepts.	✓	✓
2.1.2	<b>Specific Outcome</b> Identify and demonstrate science safety rules including Workplace Hazardous Materials Information System (WHMIS) for school laboratories.	✓	✓
2.1.3	<b>Specific Outcome</b> Ask questions about observed relationships and why/how things happen.	✓	✓
2.1.4	<b>Specific Outcome</b> Formulate a hypothesis.	✓	✓

<b>Curriculum Elements</b>		<b>ESL Intro to Science 15-5</b>	<b>ESL Intro to Science 25-5</b>
2.1.5	<b>Specific Outcome</b> Identify and explain controlled, manipulated and responding variables.	✓	
2.1.6	<b>Specific Outcome</b> Design an experiment and determine controlled, manipulated and responding variables.		✓
2.1.7	<b>Specific Outcome</b> Investigate and test scientific principles and their applications, using models or appropriate tools, such as a microscope.	✓	✓
2.1.8	<b>Specific Outcome</b> Gather, organize and present experimental data, graphically, if applicable to the context.	✓	✓
2.1.9	<b>Specific Outcome</b> Analyze and assess experimental data and evaluate model design when appropriate.	✓	✓
2.1.10	<b>Specific Outcome</b> Draw conclusions based on experimental data and explain/justify how evidence gathered supports or refutes the initial hypothesis.	✓	✓
2.1.11	<b>Specific Outcome</b> Analyze and evaluate using the scientific method and pose further questions.	✓	✓
2.1.12	<b>Specific Outcome</b> Identify and debate multiple perspectives on scientific issues using evidence.		✓
3	<b>Topic</b> Life Science – living matter	✓	✓
3.1	<b>General Outcome</b> What are the characteristics of living things? How do living things adapt to changes over time?	✓	✓
3.1.1	<b>Specific Outcome</b> Describe the characteristics of living things.	✓	
3.1.2	<b>Specific Outcome</b> Compare and explain the basic structure and function of the human nervous, circulatory, respiratory, and digestive systems.	✓	
3.1.3	<b>Specific Outcome</b> Describe lifestyle factors that contribute to good health.	✓	
3.1.4	<b>Specific Outcome</b> Classify common plants and animals.	✓	



Curriculum Elements		ESL Intro to Science 15-5	ESL Intro to Science 25-5
3.1.5	<b>Specific Outcome</b> Investigate and describe the history of cell theory.	✓	
3.1.6	<b>Specific Outcome</b> Using a diagram, identify and describe the function of cell organelles.		✓
3.1.7	<b>Specific Outcome</b> Compare and contrast plant and animal cells.		✓
3.1.8	<b>Specific Outcome</b> Using the appropriate tool, apply laboratory skills to observe and record scientific observations.	✓	✓
3.1.9	<b>Specific Outcome</b> Using a microscope, identify visible cell organelles.		✓
3.1.10	<b>Specific Outcome</b> Compare and contrast passive transport, including osmosis and diffusion, and active transport, including carrier and channel proteins, in relation to semi-permeable membranes.		✓
3.1.11	<b>Specific Outcome</b> Identify and describe the interactions of organisms, including humans, in an ecosystem, including food web, habitat characteristics, needs, adaptations.	✓	
3.1.12	<b>Specific Outcome</b> Explain seasonal change and animal and human adaptations to seasonal change.	✓	
3.1.13	<b>Specific Outcome</b> Investigate and interpret diversity within species and among species with a focus on adaptations.		✓
4	<b>Topic</b> Chemistry	✓	✓
4.1	<b>General Outcome</b> What is matter? How does matter react when combined?	✓	✓
4.1.1	<b>Specific Outcome</b> Investigate and describe the history of The Particle Theory of Matter.	✓	
4.1.2	<b>Specific Outcome</b> Investigate and describe the properties of states of matter, including water, methanol, and ethanol as solids, liquids and gases and associated changes of state.	✓	
4.1.3	<b>Specific Outcome</b> Estimate and accurately measure, such as volume, mass, pH, temperature using the appropriate tool, including beakers, graduated cylinders, scales, litmus paper, thermometers.	✓	✓

Curriculum Elements		ESL Intro to Science 15-5	ESL Intro to Science 25-5
4.1.4	<b>Specific Outcome</b> Explain concepts related to heat and heat transfer, including temperature scales Celsius and Kelvin, conduction, convection, radiation.	✓	
4.1.5	<b>Specific Outcome</b> Explain physical and chemical properties in everyday materials.	✓	
4.1.6	<b>Specific Outcome</b> Visually represent and describe subatomic particles, including electrons, protons, and neutrons.	✓	
4.1.7	<b>Specific Outcome</b> Examine and evaluate patterns in the first 18 elements of the periodic table including atomic symbol, atomic mass, atomic number, ionic charge, and general chemical properties of groups and families	✓	
4.1.8	<b>Specific Outcome</b> Apply nomenclature of elements and compounds and utilize to classify pure substances or mixtures.	✓	
4.1.9	<b>Specific Outcome</b> Identify and use appropriate nomenclature of chemical compounds to classify molecular and ionic substances.		✓
4.1.10	<b>Specific Outcome</b> Investigate, describe and compare the properties of acids and bases.		✓
4.1.11	<b>Specific Outcome</b> Investigate and describe chemical reactions to identify reactants and products in chemical or physical changes		✓
4.1.12	<b>Specific Outcome</b> Investigate different types of chemical reactions, such as acid, base, endothermic, exothermic.		✓
4.1.13	<b>Specific Outcome</b> Represent chemical reactions with word equations and chemical formulas.		✓
4.1.14	<b>Specific Outcome</b> Balance chemical reactions		✓
4.1.15	<b>Specific Outcome</b> Using the appropriate tool, apply laboratory skills to observe and record scientific observations.	✓	✓
5	<b>Topic</b> Physical Science	✓	✓
5.1	<b>General Outcome</b> How does energy affect the movement of objects?	✓	✓

Curriculum Elements		ESL Intro to Science 15-5	ESL Intro to Science 25-5
5.1.1	<b>Specific Outcome</b> Identify, describe and interpret examples of mechanical, chemical, thermal, electrical and light energy.	✓	
5.1.2	<b>Specific Outcome</b> Describe the use, production and impact of common sources of renewable and non-renewable energy.	✓	
5.1.3	<b>Specific Outcome</b> Investigate and explain kinetic and potential energy.	✓	✓
5.1.4	<b>Specific Outcome</b> Investigate and explain the electromagnetic radiation spectrum.	✓	✓
5.1.5	<b>Specific Outcome</b> Investigate and describe evidence of energy transfer and transformation.		✓
5.1.6	<b>Specific Outcome</b> Analyze and evaluate the efficiency of energy conversions.		✓
5.1.7	<b>Specific Outcome</b> Explain common movement and forces, including friction, magnetism, and structural stresses.		✓
5.1.8	<b>Specific Outcome</b> Compile and display evidence and information in a variety of formats, such as diagrams, flow charts, tables, graphs, and scatterplots.	✓	✓
5.1.9	<b>Specific Outcome</b> Interpret patterns and trends in data.	✓	✓

## Statement of Overlap with Existing Programs

Similar / Overlapping Courses	Description of Similarity / Overlap - Rationale
Science 10	Some of the science-related learning outcomes in this course overlap slightly with Science 10 or 14 learning outcomes.
	The language skills and science conceptual understandings and procedural knowledge acquired in ESL Introduction to Science 15 and 25 bridge the gap for ELLs and form the foundation for success in future science courses. Once language and knowledge of scientific concepts and procedures has been established through ESL Introduction to Science 15 and/or 25, students will be able to enroll in further Alberta Education Science Programs of Study. ELLs will continue to benefit from differentiated instruction focused on academic language development.
Science 14	Some of the science-related learning outcomes in this course overlap slightly with Science 10 or 14 learning outcomes.
	The language skills and science conceptual understandings and procedural knowledge acquired in ESL Introduction to Science 15 and 25 bridge the gap for ELLs and form the foundation for success in future science courses. Once language and knowledge of scientific concepts and procedures has been established through ESL Introduction to Science 15 and/or 25, students will be able to enroll in further Alberta Education Science Programs of Study. ELLs will continue to benefit from differentiated instruction focused on academic language development.