CAREER AND TECHNOLOGY STUDIES

A. PROGRAM RATIONALE AND PHILOSOPHY

Through Career and Technology Studies (CTS), secondary education in Alberta is responding to the many challenges of modern society, helping young people develop daily living skills and nurturing a flexible, well-qualified work force.

In Canada's information society, characterized by rapid change in the social and economic environment, students must be confident in their ability to respond to change and successfully meet the challenges they face in their own personal and work lives. In particular, they make decisions about what they will do when they finish high school. Many students will enter the work force, others will continue their education. All students face the challenges of growing independence and responsibility, and of entering post-secondary programs and/or the highly competitive workplace.

Secondary schools also face challenges. They must deliver, on a consistent basis, high quality, cost-effective programs that students, parents and the community find credible and relevant.

CTS helps schools and students meet these challenges. Schools can respond more efficiently and effectively to student and community needs and expectations by taking advantage of the opportunities in the CTS curriculum to design courses and access school, community and distance learning resources. Students can develop the confidence they need as they move into adult roles by assuming increased responsibility for their learning; cultivating their individual talents, interests and abilities; and by defining and acting on their goals.

As an important component of education in Alberta secondary schools, CTS promotes student achievement by setting clear expectations and recognizing student success. Students in CTS develop competencies—the knowledge, skills and attitudes they are expected to demonstrate, that is, what they know and what they are able to do.

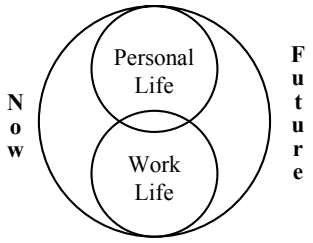
Acquired competencies can be applied now and in the future as students make a smooth transition into adult roles in the family, community, workplace and/or further education. To facilitate this transition, clearly stated expectations and standards have been defined in cooperation with teachers, business and industry representatives and post-secondary educators.

CTS offers all students important learning opportunities. Regardless of the particular area of study chosen, *students* in CTS *will*:

- develop skills that can be applied in their daily lives, now and in the future
- refine career-planning skills
- develop technology-related skills
- enhance employability skills
- apply and reinforce learnings developed in other subject areas.

In CTS, students build skills they can apply in their everyday lives. For example, in the CTS program, particularly at the introductory levels, students have the opportunity to improve their ability to make sound consumer decisions and to appreciate environmental and safety precautions.

CAREERS



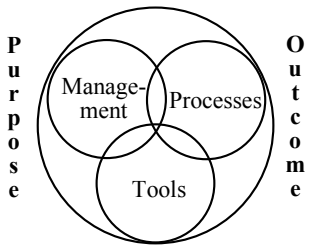
A career encompasses more than activities just related to a person's job or occupation; it involves one's personal life in both local and global contexts; e.g., as a family member, a friend, a community volunteer, a citizen of the world.

The integration of careers throughout the CTS program helps students to make effective career decisions and to target their efforts. CTS students will have the opportunity to expand their knowledge about careers, occupations and job opportunities, as well as the education and/or training requirements involved. Also, students come to recognize the need for lifelong learning.

Students in CTS have the opportunity to use and apply technology and systems effectively and efficiently. This involves:

- a decision regarding which processes and procedures best suit the task at hand
- the appropriate selection and skilled use of the tools and/or resources available
- an assessment of and management of the impact the use of the technology may have on themselves, on others and on the environment.

TECHNOLOGY



Integrated throughout CTS are employability skills, those basic competencies that help students develop their personal management and social skills. Personal management skills are improved as students take increased responsibility for their learning, design innovative solutions to problems and challenges, and manage resources effectively and efficiently. Social skills improve through learning experiences that require students to work effectively with others, demonstrate teamwork and leadership, and maintain high standards in safety and accountability.

As well as honing employability skills, CTS reinforces and enhances learnings developed in core and other optional courses. The curriculum emphasizes, as appropriate, the effective application of communication and numeracy skills.

In addition to the common outcomes described above, students focusing on a particular area of study will develop career-specific competencies that support entry into the workplace and/or related post-secondary programs. Career-specific competencies can involve understanding and applying appropriate terminology, processes and technologies related to a specific career, occupation or job.

PROGRAM OUTCOMES

The program outcomes describe the basic competencies integrated throughout the CTS program.

Within an applied context relevant to personal goals, aptitudes and abilities; *the student* in CTS *will*:

- demonstrate the basic knowledge, skills and attitudes necessary for achievement and fulfillment in personal life

- develop an action plan that relates personal interests, abilities and aptitudes to career opportunities and requirements

- use technology effectively to link and apply appropriate tools, management and processes to produce a desired outcome

- develop basic competencies (employability skills), by:
  - selecting relevant, goal-related activities, ranking them in order of importance, allocating necessary time, and preparing and following schedules (managing learning)
  - linking theory and practice, using resources, tools, technology and processes responsibly and efficiently (managing resources)
  - applying effective and innovative decision-making and problem-solving strategies in the design, production, marketing and consumption of goods and services (problem solving and innovation)
  - demonstrating appropriate written and verbal skills, such as composition, summarization and presentation (communicating effectively)
  - participating as a team member by working cooperatively with others and contributing to the group with ideas, suggestions and effort (working with others)
  - maintaining high standards of ethics, diligence, attendance and punctuality, following safe procedures consistently, and recognizing and eliminating potential hazards (demonstrating responsibility).

PROGRAM ORGANIZATION

CURRICULUM STRUCTURE

Career and Technology Studies is organized into **strands** and **courses**.

Strands in CTS define competencies that help students:

- build daily living skills
- investigate career options
- use technology (managing, processes, tools) effectively and efficiently
- prepare for entry into the workplace and/or related post-secondary programs.

In general, strands relate to selected industry sectors offering positive occupational opportunities for students. Some occupational opportunities require further education after high school, and some allow direct entry into the workplace. Industry sectors encompass goods-producing industries, such as agriculture, manufacturing and construction; and service-producing industries, such as business, health, finance and insurance.

Courses are the building blocks for each strand. They define what a student is expected to know and be able to do (exit-level *competencies*). Courses also specify prerequisites. Recommendations for course parameters, such as instructional qualifications, facilities and equipment can be found in the guides to implementation.

The competencies a student must demonstrate to achieve success in a course are defined through *general outcomes.* Senior high school students who can demonstrate the general outcomes defined for a CTS course; i.e., who have the designated competencies, will qualify for 1 credit toward their high school diploma.

Specific outcomes provide a more detailed framework for instruction. Within the context of the general outcomes, the specific outcomes further define the knowledge, skills and attitudes the student should acquire.

The following chart shows the 22 strands that comprise the CTS program and the number of 1-credit courses available in each strand.

Strand	No. of Courses
1. Agriculture	33
2. Career Transitions	30
3. Communication Technology	33
4. Community Health	31
5. Construction Technologies	46
6. Cosmetology Studies	58
7. Design Studies	31
8. Electro-Technologies	47
9. Energy and Mines	26
10. Enterprise and Innovation	8
11. Fabrication Studies	44
12. Fashion Studies	29
13. Financial Management	16
14. Foods	37
15. Forestry	21
16. Information Processing	53
17. Legal Studies	13
18. Logistics	12
19. Management and Marketing	23
20. Mechanics	54
21. Tourism Studies	24
22. Wildlife	17

LEVELS OF ACHIEVEMENT

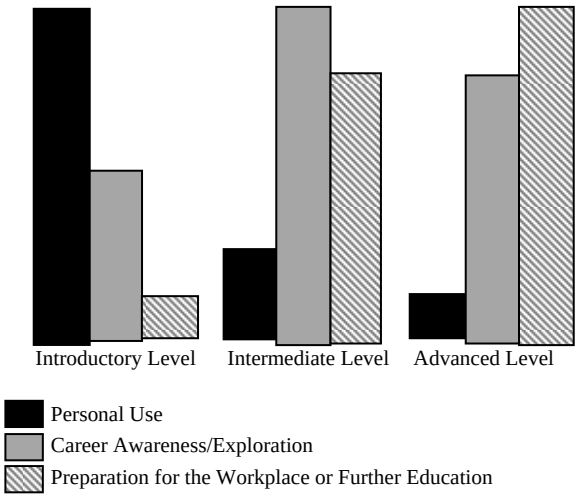
Courses are organized into three levels of achievement: **introductory**, **intermediate** and **advanced**. As students progress through the levels, they will be expected to meet higher standards and demonstrate an increased degree of competence, in both the program outcomes and the general outcomes defined for individual courses.

Introductory level courses help students build daily living skills and form the basis for further learning. Introductory courses are for students who have no previous experience in the strand.

Intermediate level courses build on the competencies developed at the introductory level. They provide a broader perspective, helping students recognize the wide range of related career opportunities available within the strand.

Advanced level courses refine expertise and help prepare students for entry into the workplace or a related post-secondary program.

The graph below illustrates the relative emphasis on the aspects of career planning at each of the levels.



CURRICULUM AND ASSESSMENT STANDARDS

Curriculum standards in CTS define what students must know and be able to do. Curriculum standards are expressed through the program outcomes for CTS, and through general and specific outcomes defined for individual courses within each strand.

Assessment standards define how student performance is to be judged. In CTS, each assessment standard defines the conditions and criteria to be used for assessing the competencies associated with each general outcome. To receive credit for a course, students must demonstrate competency at the level specified by the conditions and criteria defined for each general outcome.

Students throughout the province receive a fair and reliable assessment as they use the standards to guide their efforts, thus ensuring they participate more effectively and successfully in the learning and assessment process. Standards at advanced levels are, as much as possible, linked to workplace and post-secondary entry-level requirements.

TYPES OF COMPETENCIES

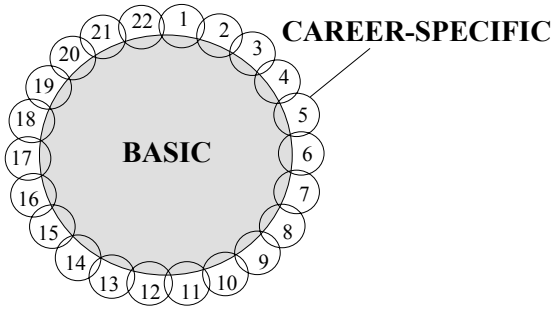
Two types of competencies are defined within the CTS program: basic and career-specific.

Basic competencies are generic to any career area and are developed within each course. Basic competencies include:

- personal management; e.g., managing learning, being innovative, ethics, managing resources
- social; e.g., communication, teamwork, leadership and service, demonstrating responsibility (safety and accountability).

Career-specific competencies relate to a particular strand. These competencies build daily living skills at the introductory levels and support the smooth transition to the workplace and/or post-secondary programs at the intermediate and advanced levels.

The model below shows the relationship of the two types of competencies within the 22 strands of the CTS program.



BASIC COMPETENCIES REFERENCE GUIDE

The chart below outlines basic competencies that students endeavour to develop and enhance in each of the CTS strands and courses. Students' basic competencies should be assessed through observations involving the student, teacher(s), peers and others as they complete the requirements for each course. In general, there is a progression of task complexity and student initiative as outlined in the Developmental Framework★. **As students progress through Stages 1, 2, 3 and 4 of this reference guide, they build on the competencies gained in earlier stages**. Students leaving high school should set themselves a goal of being able to demonstrate Stage 3 performance.

Suggested strategies for classroom use include:

- having students rate themselves and each other
- using in reflective conversation between teacher and student
- highlighting areas of strength
- tracking growth in various CTS strands
- highlighting areas upon which to focus
- maintaining a student portfolio.

Stage 1— *The student:*	**Stage 2**— *The student:*	**Stage 3**— *The student:*	**Stage 4**— *The student:*
Managing Learning			
☐ comes to class prepared for learning	☐ →	☐ →	☐ →
☐ follows basic instructions, as directed	☐ follows instructions, with limited direction	☐ follows detailed instructions on an independent basis	☐ →
	☐ sets goals and establishes steps to achieve them, with direction	☐ sets clear goals and establishes steps to achieve them	☐ demonstrates self-direction in learning, goal setting and goal achievement
☐ acquires specialized knowledge, skills and attitudes	☐ applies specialized knowledge, skills and attitudes in practical situations	☐ transfers and applies specialized knowledge, skills and attitudes in a variety of situations	☐ transfers and applies learning in new situations; demonstrates commitment to lifelong learning
☐ identifies criteria for evaluating choices and making decisions	☐ identifies and applies a range of effective strategies for solving problems and making decisions	☐ uses a range of critical thinking skills to evaluate situations, solve problems and make decisions	☐ thinks critically and acts logically to evaluate situations, solve problems and make decisions
☐ uses a variety of learning strategies	☐ explores and uses a variety of learning strategies, with limited direction	☐ selects and uses effective learning strategies	☐ →
		☐ cooperates with others in the effective use of learning strategies	☐ provides leadership in the effective use of learning strategies
Managing Resources			
☐ adheres to established timelines; uses time/schedules/planners effectively	☐ creates and adheres to timelines, with limited direction; uses time/schedules/planners effectively	☐ creates and adheres to detailed timelines on an independent basis; prioritizes task; uses time/schedules/planners effectively	☐ creates and adheres to detailed timelines; uses time/schedules/planners effectively; prioritizes tasks on a consistent basis
☐ uses information (material and human resources), as directed	☐ accesses and uses a range of relevant information (material and human resources), with limited direction	☐ accesses a range of information (material and human resources), and recognizes when additional resources are required	☐ uses a wide range of information (material and human resources) in order to support and enhance the basic requirement
☐ uses technology (facilities, equipment, supplies), as directed, to perform a task or provide a service	☐ uses technology (facilities, equipment, supplies), as appropriate, to perform a task or provide a service, with minimal assistance and supervision	☐ selects and uses appropriate technology (facilities, equipment, supplies) to perform a task or provide a service on an independent basis	☐ recognizes the monetary and intrinsic value of managing technology (facilities, equipment, supplies)
☐ maintains, stores and/or disposes of equipment and materials, as directed	☐ maintains, stores and/or disposes of equipment and materials, with limited assistance	☐ maintains, stores and/or disposes of equipment and materials on an independent basis	☐ demonstrates effective techniques for managing facilities, equipment and supplies
Problem Solving and Innovation			
☐ participates in problem solving as a process	☐ identifies the problem and selects an appropriate problem-solving approach, responding appropriately to specified goals and constraints	☐ thinks critically and acts logically in the context of problem solving	☐ identifies and resolves problems efficiently and effectively
☐ learns a range of problem-solving skills and approaches			
☐ practices problem-solving skills by responding appropriately to a clearly defined problem, specified goals and constraints, by: – generating alternatives – evaluating alternatives – selecting appropriate alternative(s) – taking action	☐ applies problem-solving skills to a directed or a self-directed activity, by: – generating alternatives – evaluating alternatives – selecting appropriate alternative(s) – taking action	☐ transfers problem-solving skills to real-life situations, by generating new possibilities ☐ prepares implementation plans ☐ recognizes risks	☐ identifies and suggests new ideas to get the job done creatively, by: – combining ideas or information in new ways – making connections among seemingly unrelated ideas – seeking out opportunities in an active manner

Stage 1— *The student:*	**Stage 2**— *The student:*	**Stage 3**— *The student:*	**Stage 4**— *The student:*
Communicating Effectively ☐ uses communication skills; e.g., reading, writing, illustrating, speaking ☐ uses language in appropriate context ☐ listens to understand and learn ☐ demonstrates positive interpersonal skills in selected contexts	☐ communicates thoughts, feelings and ideas to justify or challenge a position, using written, oral and/or visual means ☐ uses technical language appropriately ☐ listens and responds to understand and learn ☐ demonstrates positive interpersonal skills in many contexts	☐ prepares and effectively presents accurate, concise, written, visual and/or oral reports providing reasoned arguments ☐ encourages, persuades, convinces or otherwise motivates individuals ☐ listens and responds to understand, learn and teach ☐ demonstrates positive interpersonal skills in most contexts	☐ negotiates effectively, by working toward an agreement that may involve exchanging specific resources or resolving divergent interests ☐ negotiates and works toward a consensus ☐ listens and responds to understand, learn, teach and evaluate ☐ promotes positive interpersonal skills among others
Working with Others ☐ fulfills responsibility in a group project ☐ works collaboratively in structured situations with peer members ☐ acknowledges the opinions and contributions of others in the group	☐ → ☐ cooperates to achieve group results ☐ maintains a balance between speaking, listening and responding in group discussions ☐ respects the feelings and views of others	☐ seeks a team approach, as appropriate, based on group needs and benefits; e.g., idea potential, variety of strengths, sharing of workload ☐ works in a team or group: – encourages and supports team members – helps others in a positive manner – provides leadership/ followership as required – negotiates and works toward consensus as required	☐ leads, where appropriate, mobilizing the group for high performance ☐ understands and works within the context of the group ☐ prepares, validates and implements plans that reveal new possibilities
Demonstrating Responsibility **Attendance** ☐ demonstrates responsibility in attendance, punctuality and task completion **Safety** ☐ follows personal and environmental health and safety procedures ☐ identifies immediate hazards and their impact on self, others and the environment ☐ follows appropriate/emergency response procedures **Ethics** ☐ makes personal judgements about whether or not certain behaviours/actions are right or wrong	☐ → ☐ recognizes and follows personal and environmental health and safety procedures ☐ identifies immediate and potential hazards and their impact on self, others and the environment ☐ → ☐ assesses how personal judgements affect other peer members and/or family; e.g., home and school	☐ → ☐ establishes and follows personal and environmental health and safety procedures ☐ → ☐ → ☐ assesses the implications of personal/group actions within the broader community; e.g., workplace	☐ → ☐ transfers and applies personal and environmental health and safety procedures to a variety of environments and situations ☐ → ☐ → ☐ demonstrates accountability for actions taken to address immediate and potential hazards ☐ analyzes the implications of personal/group actions within the global context ☐ states and defends a personal code of ethics as required
★**Developmental Framework** • *Simple task* • *Structured environment* • *Directed learning*	• *Task with limited variables* • *Less structured environment* • *Limited direction*	• *Task with multiple variables* • *Flexible environment* • *Self-directed learning, seeking assistance as required*	• *Complex task* • *Open environment* • *Self-directed/self-motivated*

ENERGY AND MINES

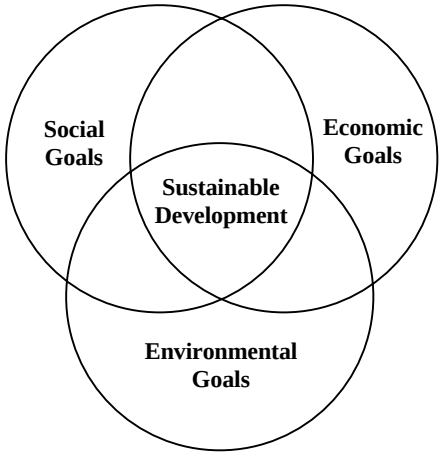
B. STRAND RATIONALE AND PHILOSOPHY

Alberta's hydrocarbon resources are primary energy sources for Alberta and the rest of Canada and contribute to an important export market. Because our province is so richly endowed with oil, gas, oil sands, heavy oil and coal, the exploration, recovery, production, marketing and management of these resources will likely continue to provide a major contribution to Alberta's economy for the foreseeable future.★

Although Alberta owes much of its present development, lifestyle and demographics to the development of fossil fuels, these resources may, over time, become less readily available and more costly to develop and use. Furthermore, public concern for the environment at local and global levels has expanded to embrace practices that ensure sustainable energy use. The development of renewable energy—the energy generated by water, wind, sun, biomass, waste material and geothermal sources—has the potential to extend the life of Alberta's fossil fuels and supplement conventional energy supplies in specific regions of the province.

The potential of the minerals sector in Alberta has not been fully determined, nor have known deposits been fully developed. In the future, development of metallic, nonmetallic and structural materials could be profoundly important to economic diversification, employment and technological development in Alberta. At present, the recovery and production of minerals for industrial applications have significant effects on Alberta's economy.

Energy and Mines, a strand in Career and Technology Studies, provides a comprehensive view of energy and mineral development in Alberta and Canada. It encompasses resource exploration, recovery, production, marketing and management. Conservation is viewed throughout the strand as a process for managing human use of natural resources to ensure such use is sustainable. Students will develop first-hand knowledge of practices specific to Alberta's energy and mineral industries and will examine technologies that support sustainable development and efficient use of natural resources.



★ *Alberta in the Global Energy Spectrum.* Edmonton, AB: Alberta Energy Information Centre, Government of Alberta, 1995.

Students in Energy and Mines will develop the knowledge, skills, attitudes, motivation and commitment to work individually and collectively, as private citizens and members of the work force, toward the conservation and responsible use of water, land, air, forests and wildlife. Within the philosophy of Career and Technology Studies, *students* in Energy and Mines *will*:

- develop greater awareness of the economic, environmental and social significance of energy and mineral resources in Alberta and the rest of the world, and develop awareness of factors affecting industry decisions

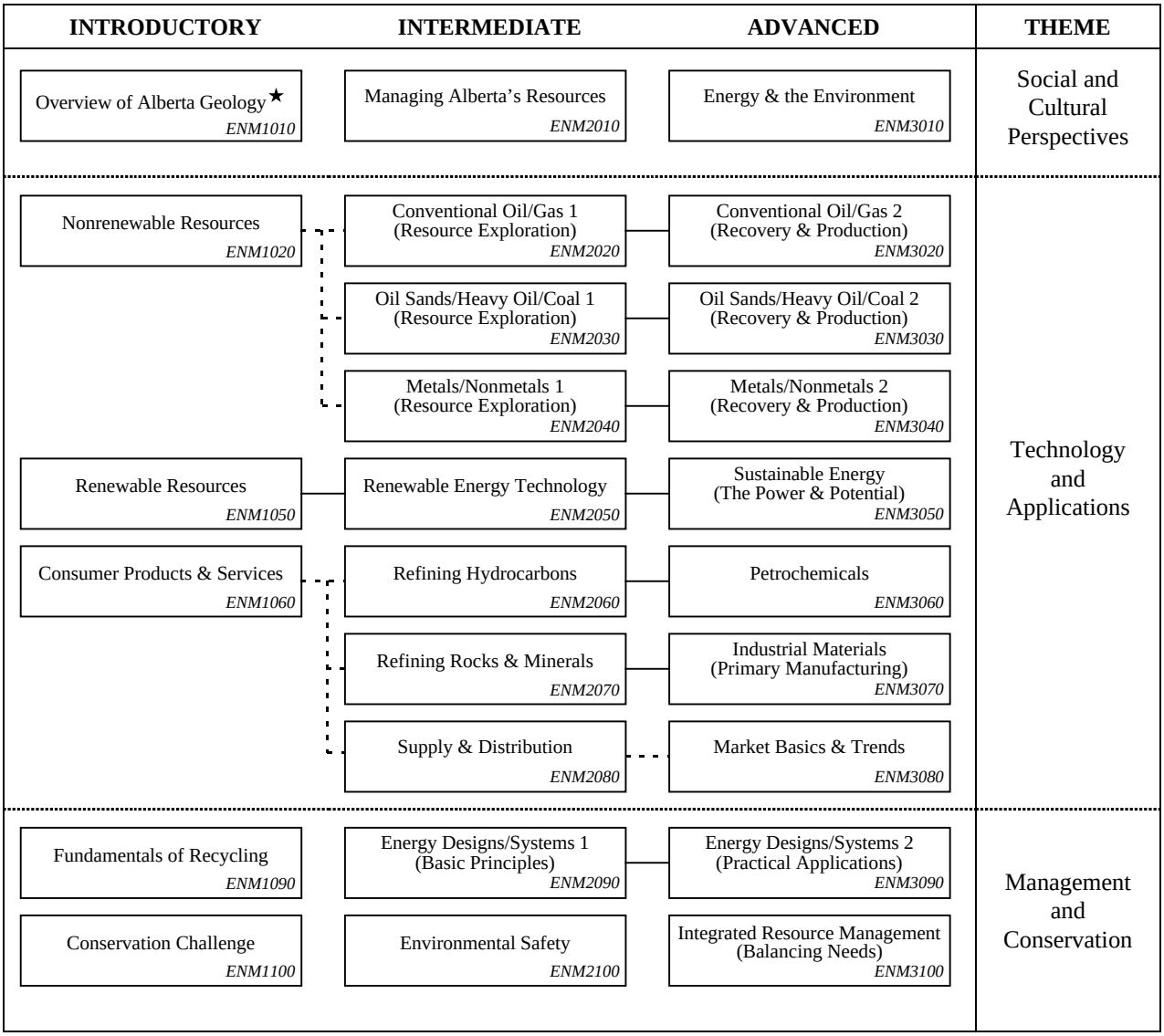
- describe the characteristics of energy and mineral development in Alberta and Canada, and identify resulting products and services

- describe technologies and research programs designed to enhance the development of a range of products and services and to achieve sustainable use of natural resources

- translate sustainable development and conservation goals into viable plans for developing and marketing energy and mineral products and services

- develop competencies and behaviours that have broad application to environmental career paths, and specific application to careers within Alberta's energy and mineral industries.

SCOPE AND SEQUENCE



——— Prerequisite - - - - Recommended sequence

★ Module provides a strong foundation for further learning in this strand.

MODULE LEARNER EXPECTATIONS: INTRODUCTORY LEVEL

MODULE ENM1010: OVERVIEW OF ALBERTA GEOLOGY

Level: Introductory

Theme: Social and Cultural Perspectives

Prerequisite: None

Module Description: Students describe the nature and origin of Alberta's energy and mineral resources, explain their significance in society, and identify related career opportunities.

Module Learner Expectations: *The student will:*

- describe the nature and origin of Alberta's energy and mineral resources within the North American geological context
- explain the social, economic and environmental significance of energy and mineral resources in Alberta
- identify career opportunities relevant to the field of geology
- demonstrate basic competencies.

MODULE ENM1020: NONRENEWABLE RESOURCES

Level: Introductory

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine general applications of exploration, recovery and production, refining, and reclamation technologies within a nonrenewable energy or mineral industry; and they identify related career opportunities. Potential areas of investigation include conventional crude oil, oil sands, natural gas, coal, nuclear fuels, metallic minerals, nonmetallic minerals and structural materials.

Module Learner Expectations: *The student will:*

- describe the formation and development of a nonrenewable energy or mineral resource in Alberta
- explain basic exploration, recovery and production, refining, and reclamation practices within a nonrenewable energy or mineral industry
- identify career opportunities relevant to a nonrenewable energy or mineral industry
- demonstrate basic competencies.

MODULE ENM1050: RENEWABLE RESOURCES

Level: Introductory

Theme: Technology and Applications

Prerequisite: None

Module Description: Students demonstrate applications of one or more renewable energy technologies, examine the contributions of each to sustainable energy development, and identify related career opportunities. Potential areas of investigation include solar, hydro, wind, tidal, biomass and geothermal energy, as well as energy generated from waste.

Module Learner Expectations: *The student will:*

- describe applications of renewable energy technology
- explain current and potential contributions of renewable energy to sustainable energy development
- identify career opportunities relevant to renewable energy development
- demonstrate basic competencies.

MODULE ENM1060: CONSUMER PRODUCTS & SERVICES

Level: Introductory

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine the basic techniques involved in developing consumer products and/or services within an energy or mineral industry, and they identify related career opportunities.

Module Learner Expectations: *The student will:*

- describe the range of consumer products and services derived from energy and mineral resources
- explain the processes used to develop a consumer product or to provide a related service
- identify career opportunities relevant to an energy or mineral processing, refining or manufacturing industry
- demonstrate basic competencies.

MODULE ENM1090: FUNDAMENTALS OF RECYCLING

Level: Introductory

Theme: Management and Conservation

Prerequisite: None

Module Description: Students examine opportunities to recycle natural and manufactured materials, and they present the results of research on one or more recycling systems.

Module Learner Expectations: *The student will:*

- present a rationale for waste reduction through recycling, and describe trade-offs that occur through the recycling process
- identify opportunities to recycle organic and inorganic materials, and describe the resulting products that may be developed
- describe one or more recycling systems
- demonstrate basic competencies.

MODULE ENM1100: CONSERVATION CHALLENGE

Level: Introductory

Theme: Management and Conservation

Prerequisite: None

Module Description: Students examine relationships between energy and mineral development and the environment, and they propose individual and shared actions that foster environmental stewardship.

Module Learner Expectations: *The student will:*

- describe ways in which energy or mineral development may affect the environment
- identify trends in the consumption of an energy or mineral resource, and explain the objectives of a conservation strategy
- propose personal and shared actions that foster conservation and responsible use of an energy or mineral resource
- demonstrate basic competencies.

MODULE LEARNER EXPECTATIONS: INTERMEDIATE LEVEL

MODULE ENM2010: MANAGING ALBERTA'S RESOURCES

Level: Intermediate

Theme: Social and Cultural Perspectives

Prerequisite: None

Module Description: Students research agencies and structures used to manage the development of Alberta's energy and mineral resources.

Module Learner Expectations: *The student will:*

- explain how Alberta's energy and mineral resources are managed
- describe government legislation and policies that influence the development of an energy or mineral resource
- explain methods of allocating land and resources for exploration and development
- demonstrate basic competencies.

MODULE ENM2020: CONVENTIONAL OIL/GAS 1 (RESOURCE EXPLORATION)

Level: Intermediate

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine specific exploration techniques and technologies within the context of Alberta's conventional oil and/or gas deposits, and they describe related career opportunities.

Module Learner Expectations: *The student will:*

- demonstrate knowledge of current and emerging technologies used in the exploration of conventional oil and gas deposits
- interpret sample seismic log data and well logs in order to predict the nature and extent of a hydrocarbon deposit
- describe career opportunities relevant to the exploration sector of the conventional oil and gas industry
- demonstrate basic competencies.

MODULE ENM2030: OIL SANDS/HEAVY OIL/COAL 1 (RESOURCE EXPLORATION)

Level: Intermediate

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine specific exploration techniques and technologies within the context of Alberta's oil sands, heavy oil or coal deposits, and they describe related career opportunities.

Module Learner Expectations: *The student will:*

- demonstrate knowledge of current and emerging technologies used in the exploration of oil sands, heavy oil or coal deposits
- explain applications of low-depth drilling and log analysis in predicting the nature and extent of an oil sands, heavy oil or coal deposit
- describe career opportunities relevant to the exploration sector of the oil sands, heavy oil or coal industry
- demonstrate basic competencies.

MODULE ENM2040: METALS/NONMETALS 1 (RESOURCE EXPLORATION)

Level: Intermediate

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine specific exploration techniques and technologies within the context of a metallic and/or nonmetallic mineral deposit, and they describe related career opportunities.

Module Learner Expectations: *The student will:*

- demonstrate knowledge of current and emerging technologies used in the exploration of economic mineral deposits
- interpret geological logs in order to predict the nature and extent of a metallic or nonmetallic mineral deposit
- describe career opportunities relevant to the exploration sector of the mineral industry
- demonstrate basic competencies.

MODULE ENM2050: RENEWABLE ENERGY TECHNOLOGY

Level: Intermediate

Theme: Technology and Applications

Prerequisite: ENM1050 Renewable Resources

Module Description: Students define and explain the need for sustainable energy development, research one or more renewable energy technologies; e.g., hydro, wind, solar, tidal, biomass, geothermal, nuclear, hydrogen, ethanol, blended fuel, fuel cell, and construct a model of a renewable energy system.

Module Learner Expectations: *The student will:*

- explain the role of renewable energy sources in sustainable energy development
- demonstrate applications of one or more renewable energy technologies
- describe career opportunities relevant to renewable energy development
- demonstrate basic competencies.

MODULE ENM2060: REFINING HYDROCARBONS

Level: Intermediate

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine the principles and technologies involved in processing natural gas, refining crude oil, upgrading heavy oils and bitumen, or processing coal. Students also describe related career opportunities.

Module Learner Expectations: *The student will:*

- describe commodity inputs and consumer products characteristic of the hydrocarbon processing industry
- explain techniques used to process natural gas, refine crude oil, upgrade heavy oils and bitumen, or process coal
- describe career opportunities relevant to the processing or refining sector of a hydrocarbon industry
- demonstrate basic competencies.

MODULE ENM2070: REFINING ROCKS & MINERALS

Level: Intermediate

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine the principles and processes involved in refining an industrial (nonmetallic) mineral or a metallic mineral, and they describe related career opportunities.

Module Learner Expectations: *The student will:*

- describe commodity inputs and consumer products characteristic of the mineral processing industry
- explain techniques used to refine an industrial (nonmetallic) mineral or a metallic mineral
- describe career opportunities relevant to the processing sector of a rock or mineral industry
- demonstrate basic competencies.

MODULE ENM2080: SUPPLY & DISTRIBUTION

Level: Intermediate

Theme: Technology and Applications

Prerequisite: None

Module Description: Students research marketing and distribution networks within an energy or mineral industry; examine regulatory structures and policies that influence supply of a commodity, product or service; and describe related career opportunities.

Module Learner Expectations: *The student will:*

- explain marketing and distribution systems used within an energy or mineral industry
- describe regulatory structures and policies that influence supply of a commodity, product or service
- describe career opportunities relevant to the marketing and distribution of an energy or mineral resource
- demonstrate basic competencies.

MODULE ENM2090: ENERGY DESIGNS/SYSTEMS 1 (BASIC PRINCIPLES)

Level: Intermediate

Theme: Management and Conservation

Prerequisite: None

Module Description: Students investigate the basic principles of energy conservation and efficiency and relate them to energy designs and systems used in the residential, commercial or transportation sector.

Module Learner Expectations: *The student will:*

- explain basic principles of energy conservation and efficiency
- demonstrate applications of energy technology in the residential, commercial or transportation sector
- describe career opportunities relevant to low energy design and technology
- demonstrate basic competencies.

MODULE ENM2100: ENVIRONMENTAL SAFETY

Level: Intermediate

Theme: Management and Conservation

Prerequisite: None

Module Description: Students identify environmental hazards that result from activities within an energy or mineral industry, and describe specific environmental monitoring and management practices adopted by the industry.

Module Learner Expectations: *The student will:*

- identify environmental hazards and issues relevant to one of Alberta's energy or mineral industries
- describe environmental policies and legislation that influence operations within an energy or mineral industry
- explain environmental monitoring and management practices conducted by an energy or mineral industry
- describe career opportunities relevant to environmental assessment and management
- demonstrate basic competencies.

MODULE LEARNER EXPECTATIONS: ADVANCED LEVEL

MODULE ENM3010: ENERGY & THE ENVIRONMENT

Level: Advanced

Theme: Social and Cultural Perspectives

Prerequisite: None

Module Description: Students assess the social, economic and environmental benefits and costs of resource development, and demonstrate personal and shared actions that foster energy conservation and environmental stewardship.

Module Learner Expectations: *The student will:*

- describe the social, economic and environmental significance of energy development
- plan and implement a strategy for personal action that fosters an environmentally sensitive lifestyle
- plan and implement a group; e.g., class, school, community, action campaign that fosters environmental awareness, energy conservation and energy efficiency
- explain career opportunities relevant to environmental management
- demonstrate basic competencies.

MODULE ENM3020: CONVENTIONAL OIL/GAS 2 (RECOVERY & PRODUCTION)

Level: Advanced

Theme: Technology and Applications

Prerequisite: ENM2020 Conventional Oil/Gas 1 (Resource Exploration)

Module Description: Students examine specific recovery and production techniques within the context of a conventional oil and/or gas industry, and they explain related career opportunities.

Module Learner Expectations: *The student will:*

- describe techniques used to complete and service a conventional oil or gas well
- explain applications of enhanced oil recovery technology in maximizing recovery rates for conventional oil or gas
- describe field gathering facilities and distribution systems used in the conventional oil or gas industry
- explain career opportunities relevant to the recovery and production sector of the conventional oil and gas industry
- demonstrate basic competencies.

MODULE ENM3030: OIL SANDS/HEAVY OIL/COAL 2 (RECOVERY & PRODUCTION)

Level: Advanced

Theme: Technology and Applications

Prerequisite: ENM2030 Oil Sands/Heavy Oil/Coal 1 (Resource Exploration)

Module Description: Students examine specific recovery and production techniques within the context of Alberta's oil sands, heavy oil or coal deposits; and they explain related career opportunities.

Module Learner Expectations: *The student will:*

- describe techniques used to recover a nonconventional hydrocarbon resource
- describe field gathering facilities and distribution systems used in the oil sands, heavy oil or coal industry
- explain current and emerging applications of technology in maximizing recovery of heavy oil, bitumen or coal in Alberta
- explain career opportunities relevant to the recovery and production sector of a nonconventional hydrocarbon industry
- demonstrate basic competencies.

MODULE ENM3040: METALS/NONMETALS 2 (RECOVERY & PRODUCTION)

Level: Advanced

Theme: Technology and Applications

Prerequisite: ENM2040 Metals/Nonmetals 1 (Resource Exploration)

Module Description: Students examine specific recovery and production techniques within the context of a metallic and/or nonmetallic mineral deposit, and they explain related career opportunities.

Module Learner Expectations: *The student will:*

- describe techniques used to recover metallic and nonmetallic commodities from mineral deposits
- describe field gathering facilities and distribution systems used in the mineral industry
- explain current and emerging applications of technology in enhancing recovery methods for mineral deposits
- explain career opportunities relevant to the recovery and production sector of a mineral industry
- demonstrate basic competencies.

MODULE ENM3050: SUSTAINABLE ENERGY (THE POWER & POTENTIAL)

Level: Advanced

Theme: Technology and Applications

Prerequisite: ENM2050 Renewable Energy Technology

Module Description: Students examine opportunities for planning renewable energy development and conserving conventional energy for its ideal use.

Module Learner Expectations: *The student will:*

- identify alternatives and consequences associated with current issues involving energy supply and demand
- describe the benefits and obstacles associated with demand-side energy management
- present a plan for sustainable energy development
- explain career opportunities relevant to energy planning and development
- demonstrate basic competencies.

MODULE ENM3060: PETROCHEMICALS

Level: Advanced

Theme: Technology and Applications

Prerequisite: ENM2060 Refining Hydrocarbons

Module Description: Students investigate the conversion of hydrocarbons into consumer products within a petrochemical industry, and they explain related career opportunities.

Module Learner Expectations: *The student will:*

- identify consumer and industrial products made available through petrochemical processes
- explain how petroleum molecules are sorted, broken apart and reassembled at petrochemical plants
- describe technologies used to manufacture a petrochemical product
- explain career opportunities relevant to a petrochemical industry
- demonstrate basic competencies.

MODULE ENM3070: INDUSTRIAL MATERIALS (PRIMARY MANUFACTURING)

Level: Advanced

Theme: Technology and Applications

Prerequisite: ENM2070 Refining Rocks & Minerals

Module Description: Students investigate technologies used to convert petroleum and mineral resources into industrial (stock) materials used in secondary manufacturing processes, and they explain related career opportunities.

Module Learner Expectations: *The student will:*

- describe industrial (stock) materials produced through primary manufacturing processes
- describe relationships between the molecular structure, properties and applications of an industrial (stock) material
- explain technologies used to manufacture a metallic, polymeric, ceramic or composite material
- explain career opportunities relevant to a primary manufacturing industry
- demonstrate basic competencies.

MODULE ENM3080: MARKET BASICS & TRENDS

Level: Advanced

Theme: Technology and Applications

Prerequisite: None

Module Description: Students explain the basic principles involved in marketing an energy or mineral resource, and analyze trends in the development and marketing of energy or mineral products.

Module Learner Expectations: *The student will:*

- identify basic marketing principles and their application in an energy or mineral industry
- describe market demands for an energy or mineral product, and describe the impact of government policies on marketing practices
- identify market trends and development opportunities in domestic and international markets
- explain career opportunities relevant to the development and marketing of energy or mineral products
- demonstrate basic competencies.

MODULE ENM3090: ENERGY DESIGNS/SYSTEMS 2 (PRACTICAL APPLICATIONS)

Level: Advanced

Theme: Management and Conservation

Prerequisite: ENM2090 Energy Designs/Systems 1 (Basic Principles)

Module Description: Students analyze energy-saving technologies and systems and design a residential/commercial structure or transportation technology that demonstrates the principles of energy conservation and efficiency.

Module Learner Expectations: *The student will:*

- describe energy use within a residential/commercial environment or transportation sector
- design a residential/commercial structure or transportation technology that uses energy conservation and efficiency
- explain career opportunities relevant to energy design and technology
- demonstrate basic competencies.

MODULE ENM3100: INTEGRATED RESOURCE MANAGEMENT (BALANCING NEEDS)

Level: Advanced

Theme: Management and Conservation

Prerequisite: None

Module Description: Students develop and present an integrated plan for sustainable resource development that incorporates supply side and demand side resource management.

Module Learner Expectations: *The student will:*

- describe basic principles of resource management
- present a plan for the sustainable development and integrated use of an energy or mineral resource
- explain career opportunities relevant to resource management
- demonstrate basic competencies.