

Mining

Required Components for the SHSM–Mining

1. A bundle of nine Grade 11 and Grade 12 credits that comprises:
 - four mining major credits
 - three other required credits from the Ontario curriculum, in English, mathematics, and a choice of science or Canadian and world studies
 - two cooperative education credits tied to the sector
2. Seven sector-recognized certifications and/or training courses/programs (four compulsory and a choice of three electives)
3. Experiential learning and career exploration activities within the sector
4. Reach ahead experiences connected with the student’s postsecondary plans
5. Development of Essential Skills and work habits required in the sector, and documentation of them using the OSP

Profile of the Mining Sector

Canada is now one of the largest mining nations in the world, producing more than 60 minerals and metals. The mining industry is a major player in Canada’s economy and contributes nearly 5 per cent of the country’s gross domestic product. Mining also accounts for 19 per cent of Canada’s total exports. The mining industry provides Canadians with job opportunities. In 2007, the mining and mining processing industries directly employed 363,000 Canadians.¹

According to the Mining Industry Human Resources Council, over the next 10 years there will be a shortage of 92,000 workers in the mining and minerals sector.² The shortage will be especially critical in the following occupations: physical scientist, engineer, technician/technologist, skilled tradesperson, mine labourer, and support staff. The anticipated demand is a result of industry growth, retirements (especially in the skilled trades), competition for labour from other economic sectors, and the challenges of recruiting young people into mining occupations.

INSIGHT

The requirements of this SHSM are unique and are geared to the mining sector. However, the design of all SHSM programs follows a consistent model, described in **Section A: Policy**.

¹ Mining Industry Human Resources Council, Mining Industry in Canada, www.acareerinmining.ca/en/industry/index.asp.

² Mining Industry Human Resources Council, www.mihrc.ca.

The SHSM–Mining enables students to build a foundation of sector-focused knowledge and skills before graduating and entering apprenticeship training, college, university, or an entry-level position in the workplace. Depending on local circumstances, this SHSM may be designed to have a particular focus. Where a choice of focus areas is offered, students may select one.

Occupations in the Mining Sector

The following table provides examples of occupations in the mining sector, with corresponding NOCs, sorted according to the type of postsecondary education or training the occupations would normally require.

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See **Section A1.6** for more on occupations and NOCs.

Apprenticeship Training	College
<ul style="list-style-type: none"> • Electrician 7242 • Heavy Duty Equipment Mechanic 7312 • Industrial Mechanic 2433 • Machinist 7231 	<ul style="list-style-type: none"> • Geological Technician 2212 • Instrumentation Technician 2243 • Mechanical Engineering Technologist 2232 • Mine Development Technologist 2212 • Mining Technician 2212
University	Workplace
<ul style="list-style-type: none"> • Geologist 2113 • Mechanical Engineer 2132 • Mining Engineer 2143 	<ul style="list-style-type: none"> • Cage Tender • Control and Process Operator 9231 • Crusher Operator • Geology Technical Assistant 2212 • Heavy Duty Equipment Operator 7421 • Mechanic's Helper 7612 • Mine Labourer 8614 • Sampler 9415 • Underground Mine Service and Support Workers 8411

Note: Some of the names of occupations in this table may differ slightly from the names given in the National Occupation Classification system. The names listed here reflect common usage by institutions and organizations in this sector in Ontario.

Postsecondary Programs and Training in the Mining Sector

The following are examples of programs and training related to careers in the mining sector and the accreditations associated with each.

Apprenticeship Training

Heavy Duty Equipment Mechanic	Certificate of apprenticeship/ certificate of qualification
Mechanic	Certificate of apprenticeship/ certificate of qualification

College

Electrical Engineering Technician – Industrial	Diploma
Mining and Environment – Regulations and Compliance	Bachelor's degree
Mining Engineering Technology	Advanced diploma
Mining Science and Management	Bachelor's degree

University

Earth Sciences – Geology	Bachelor's degree
Geological Engineering	Bachelor's degree
Geology	Bachelor's degree
Metallurgical Control Analyst	Bachelor's degree
Metallurgical Engineer	Bachelor's degree
Mining Engineering	Bachelor's degree

Training for the Workplace

Flux Cored Arc Welding	Certificate
Gas Metal Arc Welding	Certificate
Mechanical Techniques – CNC/CAD/CAM Specialist	Certificate
Mechanical Techniques – Design	Certificate
Mechanical Techniques – Mining	Certificate
Mining Techniques	Certificate
Welding Techniques	Certificate

Required Components for the SHSM–Mining

The SHSM–Mining has the following five required components:

1. A bundle of nine Grade 11 and Grade 12 credits

These credits make up the bundle:

- four mining major credits that provide sector-specific knowledge and skills
- three other required credits from the Ontario curriculum, in English, mathematics, and science or Canadian and world studies, in which some expectations are met through learning activities contextualized to the mining sector
- two cooperative education credits that provide authentic learning experiences in a workplace setting, enabling students to refine, extend, apply, and practise sector-specific knowledge and skills

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See **Section A1.2** for more on SHSM credits.

Credits		Apprenticeship Training		College		University		Workplace	
		Gr. 11	Gr. 12	Gr. 11	Gr. 12	Gr. 11	Gr. 12	Gr. 11	Gr. 12
Mining Major		2	2	2	2	2	2	2	2
includes content delivered in the sector's context	English		1		1		1		1
	Mathematics	1			1		1	1	
	Canadian and World Studies or Science		1		1		1		1
Cooperative Education		2		2		2		2	
Total number of credits		9		9		9		9	

Note: Multiple credits in the Ontario technological education curriculum allow additional instructional time for the practice and refinement of skills needed to develop student performance to the levels required for certification, entry into apprenticeship programs, or participation in school–work transition programs (see *The Ontario Curriculum, Grades 11 and 12: Technological Education, 2009*, page 17).

2. Seven sector-recognized certifications and/or training courses/programs

The SHSM in mining requires students to complete seven sector-recognized certifications and/or training courses/programs. Of these, four are compulsory and the remaining three are electives that must be chosen from the list in the following table. Note that items in the table that are capitalized are the proper names of specific certifications or training courses/programs that are appropriate for the SHSM. Items that are lowercased are names of the areas or categories within which specific certifications or training courses/programs should be selected by the school or board. The requirements are summarized in the table below.

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See **Section A1.3** for more on SHSM certifications and training.

Four compulsory			
Cardiopulmonary Resuscitation (CPR) Level A	generic (i.e., not site-specific) instruction about the Workplace Hazardous Materials Information System (WHMIS)	General Safety Awareness (GSA)	Standard First Aid
Three electives from the list below			
chainsaw safety	compass/map/global positioning system (GPS)	confined space awareness	electrical safety
elevated work platforms	fall protection	hoisting and rigging	lift truck safety
lockout/tagging	personal protective equipment – mining	powder-actuated tools	radio operator
surface miner and underground orientation	suspended access equipment	trenching safety	

3. Experiential learning and career exploration activities

Experiential learning and career exploration opportunities relevant to the sector might include:

- one-on-one observation of a cooperative education student at a placement in the mining sector (example of job twinning)
- a day-long observation of a skilled tradesperson in the mining sector (example of job shadowing)
- a one- or two-week work experience with a member of an industry association or a professional in the sector (example of work experience)
- a field trip to an industry site
- attendance at a conference or symposium related to the mining sector
- participation in a Mine Rescue competition
- attendance at an orientation to engineering day at a university to promote careers in engineering.

FIND IT!

See **Section A1.4** for more on experiential learning and career exploration activities.

POLICY

Note that volunteer activities in an SHSM cannot be counted towards the hours of community involvement required to earn the OSSD.

4. Reach ahead experiences

Students are provided one or more reach ahead experiences – opportunities to take the next steps along their chosen pathway – as shown in the following examples:

- Apprenticeship: visiting an approved apprenticeship delivery agent in the sector
- College: interviewing a college student enrolled in a sector-specific program
- University: observing a university class in a sector-related program
- Workplace: interviewing an employee in the sector

FIND IT!

See **Section A1.5** for more on reach ahead experiences.



5. Essential Skills and work habits and the OSP

Students will develop Essential Skills and work habits required in the sector and document them using the OSP, a component of the SHSM.

FIND IT!

See **Section A1.6** for more on Essential Skills and work habits.



Pathways for the SHSM–Mining

A table illustrating the four pathways and required credits leading to completion of this SHSM is provided below. You will also find tables illustrating sample bundles of credits, and other useful resources, on the ministry's SHSM website.

Awareness building (Grades 7 and 8)

See **Section 5.5** for information on building awareness of SHSM programs among students in Grades 7 and 8.

Exploration (Grades 9 and 10)

See **Section 5.5** for information on providing Grade 9 and 10 students with opportunities for exploration of SHSM programs. In addition, students considering this SHSM can be encouraged to enrol in the following courses to become better informed about careers and postsecondary options in the sector:

- Exploring Technologies: This Grade 9 course is recommended for all students following SHSM pathways that have a technological education focus. The course provides students with opportunities to explore a variety of technologies, including mining technology, by engaging in activities related to them.
- Career Studies (compulsory) and the Discovering the Workplace: Some of the expectations in these Grade 10 courses provide opportunities for students to explore occupations and other postsecondary options in the sector and to participate in experiential learning activities.
- Transportation Technology or Technological Design: These courses are recommended for any Grade 10 student who is considering enrolling in an SHSM–Mining program.

TOOLS AND RESOURCES

Visit the ministry's SHSM website at www.edu.gov.on.ca/eng/teachers/studentssuccess/specialist.html for:

- sample bundles of credits specific to this SHSM
- a list of organizations and resources specific to this SHSM.



Specialization (Grades 11 and 12)

Students acquire the sector-specific knowledge and technical skills required to earn their OSSD with an SHSM–Mining by completing its five required components. Students and their parents/guardians are encouraged to consult with guidance counsellors and teachers to select the courses that will enable students to pursue their goals.

Students pursuing an apprenticeship pathway should consider OYAP, which enables them to start an apprenticeship while earning their OSSD.

Students pursuing a university pathway are advised to complete their required cooperative education credits in Grade 11, in order to allow room in their timetables in Grade 12 for credits needed to meet university entrance requirements.

When helping students plan their SHSMs, particularly with respect to the selection of courses to fulfil the requirement for credits in the major, teachers should bear in mind that technological education courses can be offered as single-credit or multiple-credit courses.

Program pathways: SHSM–Mining

- Shaded boxes – required credits in the bundle for the SHSM–Mining
- (C) – compulsory credit for the OSSD

Grade 9: <i>Exploration</i>	Grade 10: <i>Exploration</i>	Apprenticeship Training Pathway: <i>Specialization</i>		College Pathway: <i>Specialization</i>		University Pathway: <i>Specialization</i>		Workplace Pathway: <i>Specialization</i>	
		Grade 11	Grade 12	Grade 11	Grade 12	Grade 11	Grade 12	Grade 11	Grade 12
An optional or a compulsory credit	An optional or a compulsory credit	An optional or a compulsory credit	An optional or a compulsory credit	An optional or a compulsory credit	An optional or a compulsory credit	An optional or a compulsory credit	An optional or a compulsory credit	An optional or a compulsory credit	An optional or a compulsory credit
(C) English	(C) English	(C) English	(C) English	(C) English	(C) English	(C) English	(C) English	(C) English	(C) English
(C) Mathematics	(C) Mathematics	(C) Mathematics	Mathematics	(C) Mathematics	Mathematics	(C) Mathematics	Mathematics	(C) Mathematics	Mathematics
(C) Science	(C) Science	Science or Canadian and World Studies in either Gr. 11 or Gr. 12	Science or Canadian and World Studies in either Gr. 11 or Gr. 12	Science or Canadian and World Studies in either Gr. 11 or Gr. 12	Science or Canadian and World Studies in either Gr. 11 or Gr. 12	Science or Canadian and World Studies in either Gr. 11 or Gr. 12	Science or Canadian and World Studies in either Gr. 11 or Gr. 12	Science or Canadian and World Studies in either Gr. 11 or Gr. 12	Science or Canadian and World Studies in either Gr. 11 or Gr. 12
(C) Geography of Canada	(C) Canadian History	Mining Major	Mining Major	Mining Major	Mining Major	Mining Major	Mining Major	Mining Major	Mining Major
(C) Core French	(C) Career Studies/ Civics	Mining Major	Mining Major	Mining Major	Mining Major	Mining Major	Mining Major	Mining Major	Mining Major
(C) Healthy Active Living Education	(C) The Arts	May be used as a (C) Cooperative education (2 credits) related to the sector, in either Gr. 11 or Gr. 12	May be used as a (C) Cooperative education (2 credits) related to the sector, in either Gr. 11 or Gr. 12	May be used as a (C) Cooperative education (2 credits) related to the sector, in either Gr. 11 or Gr. 12	May be used as a (C) Cooperative education (2 credits) related to the sector, in either Gr. 11 or Gr. 12	May be used as a (C) Cooperative education (2 credits) related to the sector, in either Gr. 11 or Gr. 12	May be used as a (C) Cooperative education (2 credits) related to the sector, in either Gr. 11 or Gr. 12	May be used as a (C) Cooperative education (2 credits) related to the sector, in either Gr. 11 or Gr. 12	May be used as a (C) Cooperative education (2 credits) related to the sector, in either Gr. 11 or Gr. 12
Exploring Technologies	Transportation Technology or Technological Design	An optional or a compulsory credit	Cooperative Education or an optional or a compulsory credit	An optional or a compulsory credit	Cooperative Education or an optional or a compulsory credit	Science	Mathematics	Cooperative Education or an optional or a compulsory credit	Cooperative Education or an optional or a compulsory credit