Information and Communications Technology

1. A bundle of nine Grade 11 and Grade 12 credits that comprises:
   - four information and communications technology major credits
   - three other required credits from the Ontario curriculum, in English, mathematics, and a choice of business studies, science, or the arts
   - two cooperative education credits tied to the sector
2. Six sector-recognized certifications and/or training courses/programs (three 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 Information and Communications Technology Sector

Information and communications technology (ICT) is the sector that processes information (which includes capturing, transmitting, and displaying information) using electronic systems.[1] The ICT sector continues to transform our economy and everyday life. Core industries in this sector include:

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

- communications systems (e.g., telecommunications, cable/broadband, broadcasting, and other program distribution systems)
- computer systems (e.g., computer engineering, technical support, electronics, robotics, network engineering)
- software and digital media (e.g., computer programming, computer and video games, simulations, computer animation, data management, web design, web portals, Internet security).

Any of the above areas may include a range of activities dealing with design and development, sales and marketing, security, training, and maintenance and repair.

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1 Organisation for Economic Co-operation and Development, cited in *Introduction to Information and Communications Technology (ICT)* (Ottawa: Information and Communications Technology Council, March 2008), p. 2.

According to Industry Canada, the total number of ICT workers in Canada rose from 578,613 to 572,107 between 2002 and 2008, an increase of 10.7 per cent. Employees in the ICT sector are well compensated. On average, an ICT worker earned $58,618 in 2007 – 46 per cent more than the economy-wide average of $40,083.[2]

Students enrolled in the SHSM–Information and Communications Technology will be involved in today's rapid and exciting changes in technology and will contribute to new and emerging media and technologies in the years to come.

The SHSM–Information and Communications Technology 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 – for example, on communication systems, computer systems, or software and digital media. Where a choice of focus areas is offered, students may select one.

Occupations in the Information and Communications Technology Sector

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

FIND IT!

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

Apprenticeship Training	College
• Computer Network Technician 2281 • Help Desk Technology Support Analyst 2282 • Telecommunications Installation and Repair/ Network Cabling Specialist 7246 • Telecommunications Line and Cable Worker 7245	• Audio and Video Recording Technician 5225 • Broadcast Technician 5224 • Electrical and Electronics Engineering Technologist and Technician 2241 • Electronic Service Technician 2242 • Film and Video Camera Operator 5222 • Graphic Designer, Illustrator, Animator 5241 • Systems Testing Technician 2283 • User Support Technician 2282 • Web Designer and Developer 2175
University	**Workplace**
• Computer Engineer 2147 • Computer Programmer and Interactive Media Developer 2174 • Information Systems Analyst 2171 • Software Engineer and Designer 2173 • Technical Sales Specialists 6221	• Desktop Publishing Operator 1423 • Residential and Commercial Installer and Servicer – Satellite Dish Installer 7441 • Retail Salesperson and Sales Cl erk 6421 • Telecommunications Cable Installer Helper and Splicer Helper 7612

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.

2 Industry Canada, Canadian ICT Sector Profile, www.ic.gc.ca/eic/site/ICT-tic.nsf/eng/h_it05840.html.

Postsecondary Programs and Training in the Information and Communications Technology Sector

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

Apprenticeship Training

Hardware Technician	Certificate of apprenticeship/ certificate of qualification
Information Technology Contact Centre	
• Customer Care Agent	Certificate of apprenticeship/ certificate of qualification
• Inside Sales Agent	Certificate of apprenticeship/ certificate of qualification
• Technical Support Agent	Certificate of apprenticeship/ certificate of qualification
Network Cabling Specialist	Certificate of apprenticeship/ certificate of qualification
Network Technician	Certificate of apprenticeship/ certificate of qualification

College

Advertising	Diploma
Animation	Bachelor's degree /diploma
Audio Production, Recording, and Engineering Technology	Diploma
Communication, Culture and Information Technology	Bachelor's degree
Computer/Digital Animation	Diploma
Computer Engineering Technology	Diploma/advanced diploma
Computer Networking and Technical Support	Diploma
Computer Programming	Diploma
Computer Science Technology	Advanced diploma
Computer Security Investigations	Advanced diploma
Computer Systems Technology	Diploma
Corporate Media Production	Diploma
Digital Media Arts	Diploma
Digital Video Production	Diploma

Electronics Engineering Technology	Diploma/advanced diploma
Film and Television Technician	Diploma
Game Development/Multimedia Development	Diploma
Graphic Design	Diploma
Graphic Design – Advertising and Package Design	Diploma
Information Systems Security	Bachelor's degree
Information Technology Support Services	Diploma
Internet Applications	Diploma
Internet Graphic Design	Diploma
Linux/Unix System Administration	Diploma
Radio Broadcasting	Diploma
Software Development	Bachelor's degree
Telecommunications Technology	Diploma/advanced diploma
Television Broadcasting	Diploma
Visual Creative Design, Digital and Media Arts	Diploma

University

Animation	Bachelor's degree
Computer Engineering	Bachelor's degree
Computer Science	Bachelor's degree
Computer Security	Bachelor's degree
Digital Media	Bachelor's degree
Electrical Engineering	Bachelor's degree
Graphic Communications Management	Bachelor's degree
Graphic Design	Bachelor's degree
Illustration	Bachelor's degree
Image Arts	Bachelor's degree
Information Technology	Bachelor's degree
Radio and Television Broadcasting	Bachelor's degree
Software Engineering	Bachelor's degree

Training for the Workplace

Adobe Certified Expert	Certificate
Animation and Rendering	Certificate
Apple Pro Applications Certification	Certificate
Art and Design Foundation	Certificate
Cisco Certifications CCNA, CCDA	Certificate
CompTIA A+ (IT Technician, Bench Technician, Remote Technician)	Certificate
CompTIA Security Plus	Certificate
CompTIA Server Plus	Certificate
Computer/Digital Animation	Certificate
Computer/Graphic Design/Image Arts	Certificate
Desktop Publishing	Certificate
Microsoft Certifications (e.g., Microsoft Office Specialist)	Certificate

Required Components for the SHSM–Information and Communications Technology

The SHSM–Information and Communications Technology has the following five required components:

1. A bundle of nine Grade 11 and Grade 12 credits
These credits make up the bundle:

- four ICT major credits that provide sector-specific knowledge and skills

- three other required credits from the Ontario curriculum, in English, mathematics, and a choice of business studies, science, or the arts, in which some expectations are met through learning activities contextualized to the ICT 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

FIND IT!

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
Information and Communications Technology 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	
	The Arts or Business 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. Six sector-recognized certifications and/or training courses/programs

The SHSM in ICT requires students to complete six sector-recognized certifications and/or training courses/programs. Of these, three 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.

FIND IT!

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

Three compulsory		
Cardiopulmonary Resuscitation (CPR) Level A	generic (i.e., not site-specific) instruction about the Workplace Hazardous Materials Information System (WHMIS)	Standard First Aid
Three electives from the list below		
computer hardware	counterfeit detection	customer service	digital lighting
electrical safety	electronics – basic	elevated work platforms	equipment interfacing
ergonomics	fall protection	health and safety – basic	intellectual property
Internet security	lighting and sound equipment maintenance	network cabling	network configuration
photography	recording equipment	software	technical support

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 ICT sector (example of job twinning)

- a day-long observation of an ICT sector worker (e.g., telecommunications technician) (example of job shadowing)

- a one- or two-week work experience with a member of an industry association or a professional in the ICT sector (e.g., a computer game developer) (example of work experience)

- attendance at a sector or trade show, conference, symposium, or job fair

- participation in a local, provincial, or national contest or competition with a focus on ICT

- a tour of a local television/film studio or network monitoring centre.

> **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:

FIND IT!

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

- 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

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–Information and Communications Technology

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.

TOOLS AND RESOURCES

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

- sample bundles of credits specific to this SHSM

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

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 ICT, by engaging in activities related to them.

- Career Studies (compulsory) and 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.

- Communications Technology (TGJ2O), Introduction to Computer Studies (ICS2O), or Computer Technology (TEJ20): These courses are recommended for any Grade 10 student who is considering enrolling in an SHSM–Information and Communications Technology program. They provide students with opportunities to explore the ICT sector, identify personal interests and aptitudes, and gain a better understanding of the program.

Specialization (Grades 11 and 12)

Students acquire the sector-specific knowledge and technical skills required to earn their OSSD with an SHSM–Information and Communications Technology 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 have the option of choosing an arts, a science, or a business studies course, depending on their SHSM focus and postsecondary plans, as shown in the following examples.

- Students focusing on communications systems who have an interest in telecommunications might take a science course, whereas students interested in broadcast technology might take a science or visual arts course, or a business studies course in ICT.

- Students focusing on computer systems and who are planning to go to university to pursue a career in computer engineering, or to enter an apprenticeship or college program to become a hardware or network technician, might take a course in physics. Students planning to enter the workplace in a sales capacity directly after graduation might take a business studies course in marketing.

- Students focusing on software and digital media (e.g., developing video or computer games, 3-D modelling, or simulations) might consider taking a physics or visual arts course, whereas students interested in web page design might take visual arts or a business studies course in marketing or entrepreneurship.

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–Information and Communications Technology

• Shaded boxes – required credits in the bundle for the SHSM–Information and Communications Technology   • (C) – compulsory credit for the OSSD

Grade 9: *Exploration*	Grade 10: *Exploration*	Apprenticeship Training Pathway: *Specialization*		College Pathway: *Specialization*		University Pathway: *Specialization*		Workplace Pathway: *Specialization*	
		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* Business Studies *or* Arts *in either Gr. 11 or Gr. 12*		Science *or* Business Studies *or* Arts *in either Gr. 11 or Gr. 12*		Science *or* Business Studies *or* Arts *in either Gr. 11 or Gr. 12*		Science *or* Business Studies *or* Arts *in either Gr. 11 or Gr. 12*	
(C) Geography of Canada	(C) Canadian History	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**
(C) Core French	(C) Career Studies/ Civics *or* Discovering the Workplace	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology Major**	**Information and Communications Technology 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*	
Exploring Technologies	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