CAREER ZONE:
INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

Helping High School Students Prepare for a Career in the ICT Sector

BRITISH COLUMBIA | Ministry of Education

CONTENTS

THIS GUIDE

This guide provides general background on the Canadian information and communications technology- (ICT) sector, followed by more specific information on a range of job possibilities within three ICT sub-sectors.

It also includes sample bundles of high school and post-secondary courses and training to illustrate how high schools, post-secondary institutions and industry partners/employers may work together to develop paths for individual students to follow to help them qualify for a career in ICT.

This guide is only an *introduction* only to the job and career possibilities within this sector. More detailed information is available from a variety of general and sector-specific sources mentioned throughout this guide.

WHAT IS A CAREER ZONE?

A Career Zone is a group of courses, certifications and work opportunities that BC high schools can develop to help Grade 11 and 12 students get ready to pursue a career in a particular industry while meeting provincial graduation requirements.

By working within a Career Zone in high school, students have the opportunity to:

- select the courses that match their specific skills, interests and career goals.
- complete the pre-requisites of the post-secondary certificate, diploma or degree program of their choice.
- take dual credit courses for a career head start and gain valuable post-secondary experience.
- obtain industry-recognized career-preparation certifications.
- acquire work experience relevant to their career goals.

WHAT'S INCLUDED IN A CAREER ZONE?

A Career Zone includes a broad range of core courses and career-specific electives, industry-recognized certifications and work experience intended to prepare students for the careers they want while they are still in high school.

Individual BC School Districts are encouraged to develop their own Career Zones based on local labour market needs, student interests, industry and post-secondary partnerships, and local work experience opportunities.

Career Zones should include:

- mathematics, language arts and science courses at the Grade 11 or Grade 12 level.
- an applied skills elective at the Grade 11 or Grade 12 level.
- where available, a variety of transition opportunities, including:
    - dual credit courses
    - Board/Authority Authorized (BAA) courses
    - Independent Directed Studies
    - Advanced Placement courses, and
    - Work Experience 12A and 12B, as well as other workplace training opportunities, including co-op placements and summer internships.
- industry-recognized career-preparation certifications, such as CPR, First Aid or Workplace Hazardous Materials Information System (WHMIS).

IS THERE ONLY ONE ROUTE WITHIN A CAREER ZONE?

Depending on their specific career goals, graduating students have a choice of four basic routes:

- The apprenticeship route
- The certificate or diploma route
- The degree route
- The direct-to-work route

Apprenticeship Route

This route helps prepare students to apprentice in a trade as soon as they graduate.

An apprenticeship is a combination of:

- work-based training:
    - 20% in school
    - 80% on a work site, with an employer sponsor.
- classroom learning at a college, institute, university or private trades training institution

All apprenticeship training is delivered by skilled, certified trades people with experience in the field.

In BC, successful apprenticeship training leads to a Certificate of Qualification (CoQ) awarded by the **INDUSTRY TRAINING AUTHORITY**, which is recognized across the province. About 50 trades also offer the Interprovincial (IP) Red Seal certificate, which is recognized across Canada.

Certificate or Diploma Route

The certificate or diploma route helps prepare students who have decided to pursue a career that requires fairly extensive additional training after high school graduation. This training requires a minimum of 13 weeks and usually one to two years, depending on the structure of the program and the institution.

Many certificate or diploma programs in BC allow students to move into an advanced-level degree program in the same subject area.

INDUSTRY TRAINING AUTHORITY PROGRAMS

Train in trades (TRN) allows high school students to take first level (classroom) technical training in a trade and receive credit for both high school and the apprenticeship. Technical training classes are most often taught at post-secondary institutions but can also be offered at school district facilities.

Work in trades (WRK) lets students begin the work-based training component of an apprenticeship program while still in high school. Students "earn while they learn," earning credits toward both their high school diploma and apprenticeship on-the-job training. WRK students complete up to 480 hours of work experience that counts toward their apprenticeship.

Degree Route

The degree route helps prepare students for a career that requires a four or five year degree from a post-secondary institution.

Some degree programs begin in one institution and are completed at another.

Direct-to-Work Route

Graduates who have the right preparation in high school have many direct-to-work job opportunities in ICT. These jobs require only on-the-job training and the appropriate industry-recognized career-preparation certifications. Students may be able to acquire these certifications while still in school or within a very short time after graduation.

Some jobs may require additional certificates that take a little longer to complete.

The direct-to-work route includes an option to enter the workforce immediately upon graduation or after a short certificate program taking 12 weeks or less.

IS IT POSSIBLE TO CHANGE A ROUTE?

It is always possible to change a route.

A Career Zone provides students with a solid foundation of core courses, electives, career-preparation certificates and work experience relevant to a particular industry – in this case, the information and communication sector – that can be adapted to different routes as required.

For example, a student may start on the apprenticeship route, then realize, as he or she learns and experiences more, that the post-secondary certificate or degree route would be better. The student can then add the additional courses, career-preparation certificates or work experience needed for that route.

A Career Zone helps enable students to make changes later, when they are already in a training program or the workforce. With the broad based, career-focused foundation they receive in high school, they will find it easier to upgrade their qualifications later.

Students and their parents should be open to the possibility that an inspiring course or a stimulating work experience may lead them to change their original career path.

USEFUL CAREER PLANNING

- WORKBC provides profiles of more than 500 different occupations, with details on job duties, education and training required, employment outlook and average salaries or wages. The site also offers a comprehensive database of BC job postings and a blog featuring trends, job-search tips and employment programs.
- FOCUS ON INFORMATION TECHNOLOGY (FIT) provides profiles on a range of ICT jobs, with information on what the job involves, the impact the job has on society, the working lifestyle, and the skills required.
- EDUCATION PLANNER allows users to compare BC post-secondary programs.
- TRADES TRAINING BC helps students and employers find trades programs offered at 14 post-secondary institutions throughout BC.
- ITABC works with employers, employees, industry, labour, training providers and government to issue credentials, manage apprenticeships, set program standards and increase opportunities in the trades.
- DISCOVERSKILLSBC includes information about apprenticeships and careers in technology and resources to help students discover which trades are a good match for them.

CAREER ZONE MAP

Like a transit map, the chart on the next page shows four possible routes from high school to a range of the most in-demand careers in the ICT industry.

Career Zone Map: **ICT**

This map shows the various routes high school students can take to achieve high-demand jobs in the ICT sector.

Routes start from the core high school courses in the centre, followed by options that help prepare students for the next stops along the route of their choice.

At any point, students may decide to switch their direction of travel and try a different route.

Certification Examples

- Focus on Information Technology (FIT) Certificate
- Cisco Certified Entry-Level Network Technician
- CompTIA A+ Fundamentals
- Microsoft Office Specialist

Legend

FIT — Focus on Information Technology
STX — Explore Skills
TRN — Train in Trades
WRK — Work in Trades
WTC — Workforce Training Certificates
CP — Computer Programming 11/12
CIS — Computer Information Systems 11/12

ICT CAREERS

The information and communications technology (ICT) sector has an influence on virtually every aspect of life today. It influences the state of our economy, environment and health. It affects the ways we use the Internet safely and securely to work and play.

In essence, ICT is the processing of information using electronic systems. Processing includes accessing, storing, transmitting, and manipulating information.

While ICT workers are employed in virtually every field and type of industry, their core work tends to involve:

- communications systems (e.g. telecommunications, cable/broadband, broadcasting, and other program distribution systems)
- computer networks and 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)

Growing ICT fields today include clean technology, biotechnology, health information technology, medical diagnostics and cyber security.

The Digital Adoption Compass estimates that:

- About 812,000 ICT professionals are currently employed in Canada.
- Canada will need about 182,000 more ICT professionals by 2019.
- British Columbia will need to fill about 21,000 ICT jobs over the next five years.

ICTC YOUTH PROGRAMS

The Information and Communication Technology Council offers a number of programs that enable students to explore career possibilities within Canada's ICT sector.

These include:

- Focus on Information Technology (FIT)
- CyberTitan

MORE FACTS:

BC Stats reports that, in 2014:

- BC's high tech sector produced around $25.8 billion in revenue, a rise of 4.8% from 2013.
- The number of high tech jobs in BC climbed to 92,700, the highest level ever recorded.
- The high tech sector employed around 4.6% of BC's workforce, more than the mining, oil and gas, and forestry sectors combined.

FOR MORE INFORMATION:

Information and Communications Technology Council

TRADE AND INVEST British Columbia

ICT and My Future

RECOMMENDED CORE COURSES AND ELECTIVES FOR CAREERS IN THE ICT SECTOR

It is vital that students investigate the core courses and electives that will help them take the most direct route to the career they want in the ICT sector.

Core Courses

All BC high school students are required to take core courses in language arts, mathematics and science for graduation. But, in each core subject area there are options that make it easier to go directly to work or to enter the post-secondary training program of their choice.

For example, students are required to complete English 12 to graduate, but they do not have to take a Mathematics 12 course. This means they need to pick their Mathematics 11 course (or courses) carefully to fulfill the pre-requisites of any post-secondary training they want to pursue. For instance, an apprenticeship might require Workplace Mathematics 11 or Foundations of Mathematics 11. Some post-secondary programs might require Pre-Calculus 11, while others also ask for Pre-Calculus 12.

GRADUATION PLANNING RESOURCES:

Graduation Planner

Graduation Requirements

DUAL CREDIT OPTIONS

Dual credit courses (counted as elective credits) give BC high school students the opportunity to earn both high school and post-secondary credits at the same time.

Several BC School districts, in collaboration with a local post-secondary institute, offer dual credit options beneficial to students interested in ICT.

Electives

Choosing the right electives is as important as choosing the core courses. For example, students wanting to apprentice as electricians need Physics 11.

All students, including those who intend to go direct-to-work without any additional training, will benefit significantly from gaining skills and work experience directly applicable to jobs in the ICT sector.

A number of courses available as electives would be valuable for students interested in ICT careers.

- For all students interested in ICT, the Information Communications Technology curriculum includes:
    - Computer Information Systems 11 and 12
    - Computer Programming 11 and 12
    - Digital Communications 11
    - Digital Media Development 12
- For students interested in starting their own ICT businesses or working freelance, the Applied Design, Skills and Technologies curriculum includes:
    - Entrepreneurship 11
    - Marketing and Promotion 11
    - Accounting 11 and 12
    - E-Commerce 12
    - Financial Accounting 12

WORK EXPERIENCE 12A AND 12B

In Work Experience 12A and 12B are each 100 to 120 hours long, the community is the classroom. Work site placements help prepare students for the transition from high school to the world of work by providing opportunities to gain valuable workplace knowledge, determine (or change) career goals, and develop job skills.

To find out more, see the **PROGRAM GUIDE FOR MINISTRY AUTHORIZED WORK EXPERIENCE COURSES.**

- For students interested specifically in interactive media and communications systems, the Media Arts curricula include:
    - Media Arts 11 and 12
- For students interested specifically in electronics and robotics, the Technology Education curriculum includes:
    - Electronics 11 and 12
    - Robotics 11 and 12
    - Mechatronics 12

Every student should also consider:

- Relevant dual credit courses, where available
- Relevant locally developed Board/Authority Authorized (BAA) courses, such as SD#43's Information Technology Management 11 or 3D Game Design 12
- Work Experience 12A and 12B

Students considering an apprenticeship should consider:

- Train in Trades (TRN), and
- Work in Trades (WRK)

RECOMMENDED CAREER PREPARATION CERTIFICATES FOR CAREERS IN THE ICT SECTOR

Most ICT companies require applicants to have at least a high school diploma. Acquiring relevant career-specific certificates can also ensure that students have a better chance of employment – or perhaps a higher level of employment – directly out of high school, college or university.

Safety certificates recommended by the ICT sector include:

- First Aid Levels 1, 2 & 3
- CPR
- Occupational Health and Safety

Depending on the area of ICT a student is interested in, industry-specific certificates might include:

- Cisco Certified Entry-Level Network Technician (CCENT)
- CISCO Certified Network Associate (CCNA)
- CompTIA A+, Net+, Linux+ and Strata IT Fundamentals
- Microsoft Office Specialist and Certified Systems Administrator (MCSA)

These industry certificates may be obtained in several ways:

- as part of a **FOCUS ON INFORMATION TECHNOLOGY (FIT) CERTIFICATE** (*see Sample Bundle 4 for more information*).
- as dual-credit options in collaboration with local post-secondary institutions (check with your school district).
- through online vendors (e.g., the Cisco Networking Academy) or a private training institution. (Always verify the quality and reputation of the vendor or institution before enrolling.)

NON-TRADITIONAL PATHS TO A CAREER IN ICT

The ICT sector is full of people who have taken non-traditional paths into the world of high technology, such as:

- a young girl who discovered a passion for computer programming in elementary school, then taught herself how to program at the highest levels without going past high school.
- an honours graduate of a university degree program in fine arts who later realized he was very talented at doing web design.

Many ICT employers are open to the idea of hiring people who may not have formal ICT education or credentials but can demonstrate the skills and experience required to do a certain job.

At the same time, a relevant certificate, diploma or degree may help open doors, too.

BOOT CAMP OPPORTUNITIES

The ICT world moves quickly. Employers often find that students fresh out of a diploma or degree program, or those currently working in the field could use some pre-employment training or updating on the latest technology.

There are a number of six to twelve week "boot camps" designed to help anyone with an interest in ICT upgrade their skills and become familiar with what is new and innovative.

For example, Lighthouse Labs, which has an academy in Vancouver's Gastown, describes itself this way:

"*Lighthouse Labs was created as an experiment in 2013 by a group of software developers with a passion for code, mentorship, and education. Our mission: to continuously find the best ways to train the next generation of developers and to transform the way tech education is delivered. Over two years later, we are still chasing that same mission. We aim to empower students to master the craft of software development, launch careers, and contribute to the incredible growth of Canada's tech industry. With over 80 mentors and 350 graduates who have joined the ride, we're still just a bunch of developers developing developers.*"

Lighthouse Labs does not require students to have any previous coding education or experience.

THE SKILLS SPECTRUM IN THE DIGITAL ECONOMY

Source: ICTC (2016) Skills in the Digital Economy: Where Canada Stands and the Way Forward

ICT SUB-SECTORS

The ICT sector is changing all the time as new technologies, devices and services are developed, launched and adopted. Current ICT sub-sectors include:

- cyber security.
- financial technology (FinTech).
- web e-commerce.
- The Internet of Things, (IoT), which essentially means the inter-networking of physical devices, vehicles, buildings, etc.
- Software as a Service (SaaS), which is a method of providing software applications to users over the Internet.
- Big Data. This is usually defined as data sets so large or complex that traditional data processing applications cannot deal with them. Businesses need ways to analyze, capture, curate, search, share, store and transfer this big data, while ensuring protection of information and privacy.

Within these sub-sectors are a number of job clusters that are identified in this guide as:

- **Network Systems and Operations**, which includes the design, development and maintenance of network infrastructure for cyber security, FinTech, web e-commerce and IoT.
- **Software Design and Development**, which includes interactive media and SaaS, as well as the design and development of software for cyber security, web e-commerce and FinTech.
- **Business and Information Analysis**, which includes Big Data as well as virtually every other ICT subject area, including cyber security.

Virtually every type of business or industry in every field requires people with ICT knowledge and experience.

ICT JOB CLUSTER #1: NETWORK SYSTEMS AND OPERATIONS

Networks of computer devices, wired or wireless, that originate, route, share, and terminate data are widely used in all aspects of modern life.

- More than 7,000 British Columbia companies are involved in the design, manufacturing and engineering of wired and wireless communications.
- British Columbia is home to world-class research facilities and top-ranked universities, as well as such organizations as Wavefront, a Canadian Centre of Excellence for Commercialization and Research (CECR); the BC Tech Association; Launch Academy; and Vancouver Enterprise Forum.
- Industry giants such as IBM and Microsoft, and British Columbia leaders like Hootsuite, Sierra Wireless, and Telus, have created one of the world's leading ICT and wireless industry clusters in our province.

HIGHLIGHT: Cyber Security

Cyber security, also known as *information technology security*, is a crucial component of the ICT sector.

Cybercrime is growing every day. It is usually defined as a criminal offence involving a computer as the object of the crime (hacking, phishing, spamming, installing malware), or as the tool used to commit a material component of the offence (child pornography, hate crimes, computer fraud/bank fraud).

Cyber security includes the technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. Cyber security is used by individuals, businesses and governments. Cyber security will only become more important as more devices, "the Internet of Things," become connected to the Internet.

CYBER SECURITY TRAINING

Many certificate, diploma and degree programs, such as the Computer Network Technician program outlined in Sample Bundle 2 include education and training on cyber security.

Those who have acquired ICT work experience, either formally in school or on their own, have other options to learn more about cyber security.

For example, BCIT offers a one-year Network Administration and Security Professional (NASP) certificate. It is designed for people who want to acquire and improve their knowledge and credentials for career enhancement. The program covers both conventional infrastructure and cloud-based alternatives. It includes ten months of full -time lab learning and a two-month industry work term.

NETWORK SYSTEMS AND OPERATIONS POSSIBILITIES

Route:	Job Possibilities:	Possible Credentials:
Apprenticeship	*High demand*: • Electrician • Security systems technician (see Sample Bundle 1)	• ITA Certificate of Qualification • Interprovincial Red Seal Certificate

Certificate or Diploma	*High demand*:
	• Computer network technician
	• User support technician
	• Help desk technician
	• Remote support technician
	Lower demand:
	• Cable installer
	• Computer systems administrator
	• Depot technician
	• Desktop support
	• IT technician analyst
	• LAN administrator
	• Network administrator
		• Industry certificates such as:
		  • Cisco Certified Network Associate
		  • Cisco Certified Network Professional
		• Network Administration and Security Professional Certificate
		• Computer Network Electronics Technician Certificate
		• Computer Support Technician Certificate
		• Technology Support Technician Certificate
		• Computer Service Technician Certificate
		• Computer Systems Technology Certificate or Diploma
		• Computer Science Diploma or Associate Degree
		• Computer Information Systems Diploma
		• Networking Technology Certificate
		• Applied Network Administration Certificate
		• Diploma in Information Technology and Management

Route:	Job Possibilities:	Possible Credentials:
Degree	*High demand*: • Computer engineer • Computer and information systems manager • Computer programmer • IT identity manager/security analyst *Lower demand*: • Computer applications manager • Electronic systems engineer • Internet systems administrator • IT development manager • IT coordinator • Network administrator engineer • Network analyst • Network designer • Network operations engineer • Network support engineer • Systems or applications engineer/ architect	• Bachelor of Technology Management • Bachelor of Applied Science in Computer Systems • Bachelor of Computer Science • Bachelor of Computer Engineering • Bachelor of Applied Information Systems Technology
Direct-to-Work	*High demand*: • User support technician • Help desk technician • Repair technician *Lower demand*: • Computer retail sales • Small business entrepreneur	Focus on Information Technology (FIT) Certificate – (*see Sample Bundle 1 for more information*) Industry certificates, such as: • Cisco Certified Entry-Level Network Technician (CCENT) • CompTIA A+ • CompTIA Net+ • CompTIA Linux+ • Microsoft Certified Systems Administrator (MCSA)

ICT JOB CLUSTER #2:
SOFTWARE ENGINEER AND DESIGNER

All computer programs require computer software – in essence, the instructions that enable computers to operate and perform the tasks for which they were designed.

Computer software designers/developers create, document and test software applications for a variety of purposes, from games to spreadsheets, on a variety of platforms: web, mobile, tablet, etc.

Software design and development also includes interactive media. Social networking websites and video games are two common types of interactive media in which the user interacts with the site or game in some way. Social networking sites use graphics and text to allow users to share images and information about themselves, as well as send messages to others. In video games, players use controllers to respond to on-screen videos, animations and graphics, as well as sound cues, generated by a computer program.

Essential activities in interactive media include writing, testing and maintaining computer code for Internet applications, computer-based training software, computer games, film, video and other interactive media. Projects may also involve the design, production, programming and editing of audio and video materials for computer applications and new media.

FASTEST GROWTH IN INTERACTIVE MEDIA

BC experienced a growth of over 1,700 multimedia/graphic designer/illustrator jobs in 2013, and demand is expected to increase.

The Information and Communications Technology Council indicates that demand for ICT skills is robust in British Columbia. The most in-demand ICT jobs in the province right now are all related to software design and development, including:

- multimedia designers and graphic illustrators
- data analysts, database architects and administrators
- technical support analysts and technicians
- software testers and systems technicians
- web developers

SOFTWARE DESIGN AND DEVELOPMENT POSSIBILITIES

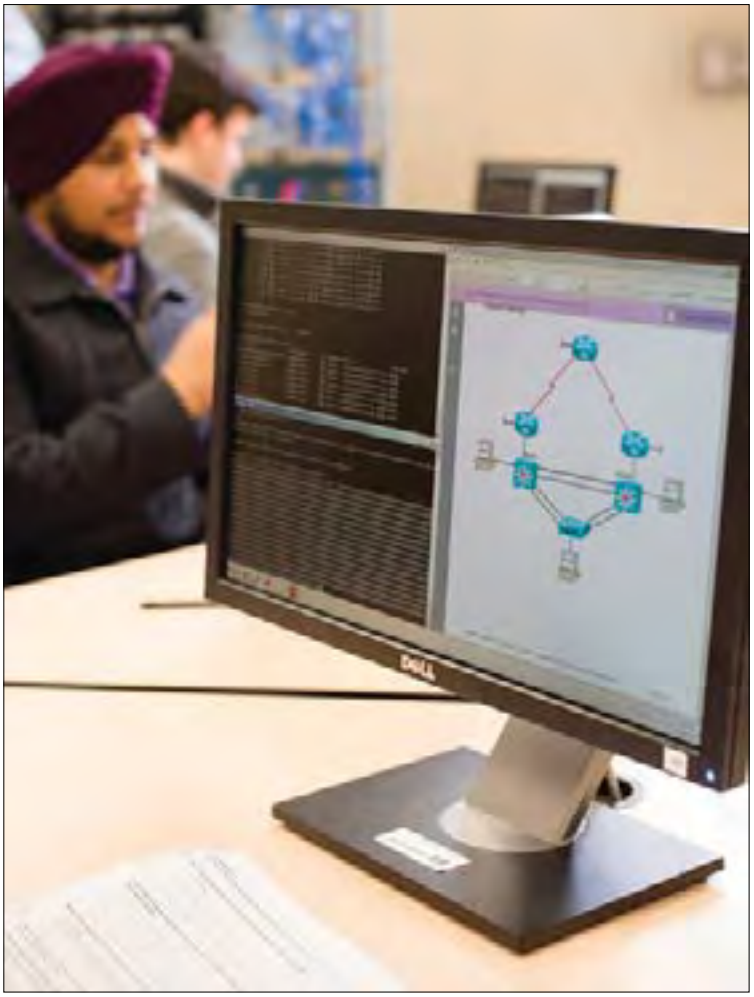
Route:	Job Possibilities:	Possible Credentials:
Certificate or Diploma	*High demand*: • Computer programmer • Interactive media developer • Software developer • System analyst • Web developer *Lower demand*: • Application support analyst • Content strategist • Database developer • Drafting and design technician • Game developer • Graphic artist • Graphic designer new media – multi- media • Graphic media programmer • Information architect • Product validation engineer • Production assistant	• Applied Software Developer Certificate • Software Systems Developer Certificate • Web Programmer Option • Computer Systems Technology Certificate or Diploma • Website Development and Design Certificate • Computing Science Diploma • Computing Information Systems Diploma • Web and Mobile Application Diploma • Interactive Design Diploma • Publishing Diploma • Advanced Communication and Interactive Design Diploma • Interactive Media Certificate • Digital Arts and New Media Diploma • Digital Graphic Design • Web and Graphic Design • Digital Graphic Design Certificate • New Media Design and Web Development Certificate • Technical Web Designer Certificate

Route:	Job Possibilities:	Possible Credentials:
Degree	*High demand*: • Applications engineer or architect • Computer engineer • Computer programmer • Interactive media developer • Software engineer and designer (see Sample bundle 3) • Web designer and developer • Computer engineer • Software developer or designer *Lower demand*: • Embedded systems designer • Firmware developer • Graphic programmer or designer • Interactive media specialist/ developer • Manager or programmer • Senior programmer analyst • Software architect • Software quality assurance engineer • Technical architect – software • Technical leader – testing and integration • Technical project manager	• Bachelor of Technology in Computer Systems • Bachelor of Arts in Computer Systems • Bachelor of Science in Software Systems • Bachelor of Science - Major in Computer Science • Bachelor of Science in Computer Science • Bachelor of Design • Bachelor of Media Arts • Bachelor of Technology • Bachelor of Arts or Science in Interactive Arts and Technology • Bachelor of Arts in Digital Media Studies
Direct-to-Work	*High demand*: • Graphic designer and illustrator *Lower demand*: • Business development specialist • Game tester • Home-based consultant • Mobile application developer • Quality assurance tester • Sales representative • Software tester • Web page developer • Web page editor • Webmaster/forum moderator	Focus on Information Technology (FIT) Certificate – (*see Sample Bundle 4 for more information*) Industry certificates, such as: • CompTIA

ICT JOB CLUSTER #3:
BUSINESS AND INFORMATION ANALYSIS

Business and information analysis has gained an increasingly prominent role throughout many sectors, including government, finance, healthcare, and telecommunications.

The Information and Communications Technology Council's **OUTLOOK 2011–2016** report states that "*It is no longer enough to be a technical expert: the industry now needs workers with multidisciplinary skills. ICT professionals are increasingly required to understand the business of their companies – the marketing, operations and HR management aspects for example. Employers are on the hunt for personnel who have specific combinations of ICT experience as well as expertise in domains such as e-health,insurance and digital media.*"



BUSINESS AND INFORMATION ANALYSIS POSSIBILITIES

Route:	Job Possibilities:	Possible Credentials:
Certificate or Diploma	*High demand*: • Web technician or analyst *Lower demand*: • Business analyst • Database analyst and database administrator • Mapping and related technologist or technician	• Technical Web Designer Certificate • Office Administrator with Technology Certificate • Applied Database and Administration Design Certificate • Business Information Technology Management Diploma • Computer Systems Technology Certificate or Diploma • Computer Information Systems Certificate • Database Developer Certificate • Business Administration Diploma • Business Management Certificate or Diploma • Information Technology and Applied Systems Certificate or Diploma
Degree	*High demand*: • Information systems analyst or consultant *Lower demand*: • Business analyst/ management information architect • Business systems analyst • Computer and information system manager • Information systems specialist or manager • Quality control analyst • Software quality assurance auditor	• Bachelor of Technology • Bachelor of Arts or Science in Interactive Arts and Technology • Bachelor of Arts or Science in Computer Science • Bachelor of Computing Science • Bachelor of Commerce in Business Technology Management
Direct-to-Work	*High demand*: • Microsoft Office specialist • Word processing specialist *Lower demand*: • Data entry clerk • Data migration specialist • Database technician • Microsoft Office specialist	Focus on Information Technology (FIT) Certificate – (*see Sample Bundle 4 for more information*) Industry certificates, such as: • CompTIA Strata IT Fundamentals • Microsoft Office Specialist

ICT SECTOR CAREER ROUTES – SAMPLE BUNDLES

The four sample bundles of high school and post-secondary courses and training that follow illustrate how high schools, post-secondary institutions and industry partners and employers may work together to develop a particular path for students to follow.

SAMPLE BUNDLE 1: APPRENTICESHIP – SECURITY SYSTEMS TECHNICIAN

MORE INFORMATION ON A CAREER AS A SECURITY SYSTEMS TECHNICIAN:

- Career profile: WorkBC
- Training providers: EducationPlannerBC or Trades Training BC
- Apprenticeships: Industry Training Authority

FOUNDATION PROGRAMS

An employer sponsor is not required for Foundation (or pre-apprenticeship) programs. These programs are opportunities for high school students to gain experience and familiarity with a trade and make it easier to find an employer to sponsor an apprenticeship later.

Foundation programs are available across BC (see Trades Training BC).

A security systems technician (SST) installs, maintains and repairs systems designed to protect people and property. In addition to home alarm systems, security systems technicians work with hand or fingerprint scanners, intelligent cameras, card access systems, and much more.

SSTs work mostly with low-voltage 12 volt wiring, but sometimes also with 120 volt alternating current, standard telephone lines, and Internet systems for communication. SSTs use a number of specialized tools for installing cables, programming systems, and testing communications.

Students interested in becoming an apprentice SST start by taking a Foundation (pre-apprenticeship) program at a post-secondary institution.

BCIT offers a 28-week SECURITY SYSTEMS TECHNICIAN PROGRAM that requires a combination of work experience and classroom instruction.

The classroom technical training includes two levels. Level 1 deals with basic installation techniques and the theories and codes that govern the security industry. Level 2 involves installing and troubleshooting complete alarm systems and advanced security equipment. This level includes a mandatory four-week work experience practicum with a licensed alarm company.

APPRENTICESHIP ROUTE – SECURITY SYSTEMS TECHNICIAN

Core High School Courses and Electives:	Career-Preparation Certificates:	BCIT's SST Program:	Credential:
Required: • English 12 • Foundations of Math 11, Workplace Math 11 or Pre-Calculus 11 *Recommended electives*: • Relevant locally developed Board/ Authority Authorized (BAA) courses, where available • Work Experience 12A and 12B • Secondary School Apprenticeship Program	*Required*: • Security Worker Licence (application available online	*Technical training includes*: • Introduction to Security Installations • Fundamentals of Electricity and Electronics • Wiring Methods • Intrusion Alarm Systems • CCTV and Access Control Systems • Four-week practicum	• ITA Certificate of Qualification

SAMPLE BUNDLE 2:

CERTIFICATE OR DIPLOMA – COMPUTER NETWORK TECHNICIAN

Computer network technicians establish, operate, maintain and co-ordinate the use of local and wide area networks (LANs and WANs), mainframe networks, hardware, software and related computer equipment. They set up and maintain Internet and intranet websites and web-server hardware and software, and monitor and optimize network connectivity and performance. Potential employers include any businesses or offices that use networked computers.

Many colleges offer programs that provide the skills necessary to work in this field. One example is **CAMOSUN COLLEGE'S COMPUTER NETWORK ELECTRONIC TECHNICIAN** program, which offers two options.

Graduates of the basic, eight-month **Computer Network Electronics Support Technician** option will be ready to work in a number of roles in either the IT or electronics industries. They will have the skills to:

- install and maintain computer networking systems.
- maintain and repair personal computers.
- maintain and repair server systems.
- assemble, install, repair and maintain analog and digital circuits.
- install, repair, and maintain microprocessor-based equipment.
- provide technical sales support.

MORE INFORMATION ON A CAREER AS A COMPUTER NETWORK TECHNICIAN:

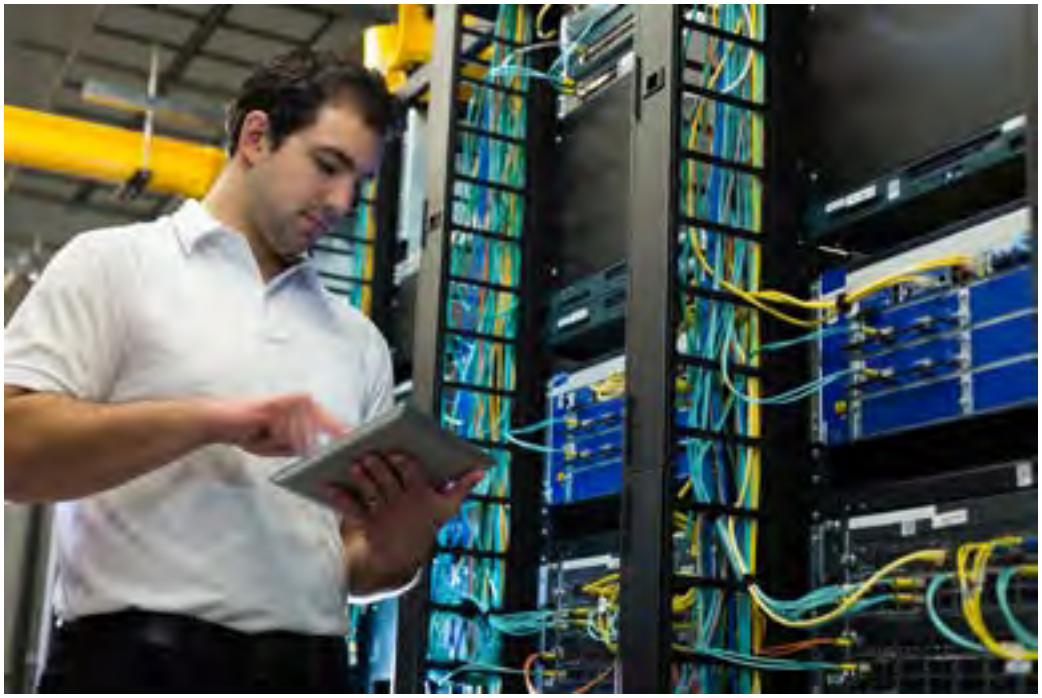
- Career profile: WorkBC
- Training providers: EducationPlannerBC

While at Camosun college, students in this program will also have the option to take such vendor exams as:

- CCENT
- CompTIA A+
- Microsoft Server 410

In addition to the above skills, graduates of the advanced, 12-month **Computer Network Electronics Technician** option will be able to implement workstation security; install and maintain home automation systems; and configure and set up advanced servers. They will also have the option of taking:

- Cisco Certified Network Associate (CCNA)
- CompTIA Security +
- Microsoft Server 411
- LPI
- Certified Fiber Optic Technician (CFOT)
- CPCT



CERTIFICATE OR DIPLOMA – COMPUTER NETWORK TECHNICIAN

Core High School Courses and Electives:	Career Preparation Certificates:	Camosun College's Program:	Credential:

Required:
• English 12 (minimum C grade)
• Foundations of Math 11 or Pre-Calculus 11 (minimum C grade
Recommended:
• Relevant locally developed Board/Authority Authorized (BAA) courses, where available
• Work Experience 12A and 12B
	A number of industry-recognized certificates, such as CCNA and CompTIA A+, may be completed during high school, through Focus on Information Technology (FIT)	**Term 1**:
		• Fundamentals of:
		  • network systems
		  • PC systems
		  • DC circuit analysis
		  • digital circuits
		  • microprocessors
		Term 2:
		• Fundamentals of:
		  • network systems
		  • AC circuit analysis data transmission
		  • PC server systems
		  • technical writing skills
		Term 3:
		• Fundamentals of:
		  • network systems
		  • AC circuit analysis data transmission
		  • PC server systems
		  • technical writing skills
			Computer Network Electronics Technician Certificate

SAMPLE BUNDLE 3:

DEGREE – SOFTWARE ENGINEER

Software engineers research, design, evaluate, integrate and maintain software applications, technical environments, operating systems, embedded software, information warehouses, and telecommunications software. They are employed in information technology consulting firms, information technology research and development firms, and information technology units throughout the private and public sectors. They may be self-employed.

Software engineers:

- collect and document user's requirements and develop logical and physical specifications.
- research, evaluate and synthesize technical information to design, develop and test computer-based systems.
- develop data, process and network models to optimize architecture and to evaluate the performance and reliability of designs.
- plan, design and co-ordinate the development, installation, integration and operation of computer-based systems.
- assess, test, troubleshoot, document, upgrade and develop maintenance procedures for operating systems, communications environments and applications software.
- lead and co-ordinate teams of information systems professionals in the development of software and integrated information systems; process control software; and other embedded software control systems.

MORE INFORMATION ON A CAREER AS A COMPUTER NETWORK TECHNICIAN:

- Career profile: WorkBC
- Training providers: EducationPlannerBC

Many post-secondary universities offer bachelor and advanced degrees in computer science with a focus on software engineering, design and development. The University of Victoria offers a four-year Bachelor of Software Engineering.

THE UVIC SOFTWARE ENGINEERING PROGRAM gives students a thorough exposure to software development, architecture and design; security engineering; computer programming; and computer science. Program options include specializing in such topics as biomedical software engineering; communication and networks; security; management; mechatronics and embedded systems; and technology policy.

Software Engineering students at UVic participate in the Co-operative Education program. The co-op program helps students sample different job prospects, gain critical work experience and apply the knowledge and skills acquired at school. The software engineering program requires four terms of co-op paid work.

DEGREE – SOFTWARE ENGINEER

Core High School Courses and Electives:	Career-Preparation Certificates:	UVic's Software Engineering Program:	Credential:
Required: **Grade 11** • English 11 • Pre-calculus 11 • Chemistry 11 • Physics 11 • Social Studies 11 **Grade 12** • English 12 • Physics 12 • Pre-calculus 12 (73%) • an additional approved academic Grade 12 course (Chemistry 12 is recommended) *Recommended*: • Relevant locally developed Board/ Authority Authorized (BAA) courses, where available • Relevant dual credit courses, where available • Work Experience 12A and 12B	A number of industry-recognized certificates, such as CCNA and CompTIA A+, may be completed during high school through Focus on Information Technology (FIT)	The first year of study is common to all UVic Engineering programs and features an introduction to the role of software in the context of physical systems and real-world applications. It also emphasizes fundamental skills such as communication, programming, engineering design, and basic science. The second- and third-year courses constitute the core of the BSEng program and develop engineering, software engineering, and computer science knowledge and skills. The fourth academic year provides an opportunity to specialize in technical electives and culminates with a significant design experience project based on the knowledge and skills acquired throughout the program. Students also learn about legal, social and professional issues that arise in engineering practice.	Bachelor of Software Engineering

SAMPLE BUNDLE 4:
DIRECT-TO-WORK – ICT WORKER

Although suitable (and recommended) for any student interested in pursuing ICT at the post-secondary level, those especially interested in moving from high school directly to work might want to consider becoming a FIT student.

FOCUS ON INFORMATION TECHNOLOGY (FIT) is a nationally recognized certificate program designed for Canadian students who want to gain real-world ICT and business skills during high school. Created by the Information and Communications Technology Council (ICTC), FIT is currently available through a number of secondary schools and distance education programs in and around Vancouver and Victoria.

Students must commit to anywhere from two to three years with the FIT program. They may choose to complete a general FIT certificate or to specialize in one of four FIT concentrations:

- Network Systems and Operations
- Software Design and Development
- Interactive Media
- Business and Information Analysis

Some concentrations include completing industry certifications such as Cisco Certified Network Associate (CCNA), CompTIA A+, and Microsoft Office Specialist, that can help lead to a variety of jobs including repair, help desk or user support technicians.

All FIT students are encouraged to participate in co-ops and internships.

DIRECT-TO-WORK – ICT WORKER

Core High School Courses and Electives:	Credential
Recommended: • Electives relevant to your FIT concentration • Relevant locally developed Board/Authority Authorized (BAA) courses, where available • Relevant dual credit courses, where available • Work Experience 12A and 12B	Focus on Information Technology Certificate, plus industry-recognized certificates (dependent on FIT concentration), such as: • Network Associate (CCNA) • CompTIA A+ • Microsoft Office Specialist • Microsoft Technology Associate • Adobe After Effects • Adobe Dreamweaver • Linux Essentials

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