Key Research Findings

This analysis was based on the pre-determined criteria listed below:

Section	Description	Measures
Student Demand	Includes an assessment of OCAS (2007 - 2011) enrolment data at other colleges in terms of mean growth rate with a specific focus on Fleming's direct competitors where appropriate (Georgian, Sheridan, Seneca and Durham) Trends in certificate, diploma, degree, apprenticeship and continuing education (where available). **Click Below to Access Full Source Document:** Fall Enrollment Trend	• Strong = Fleming enrolment growth is outpacing system and is equal to or greater than 3% • Moderate = Fleming enrolment growth is equivalent to system demand and is between 1.0 to 2.9% • Weak = Fleming enrolment growth is less than the system demand and is less than 1%
Labour Market	Includes projected employment rate growth based on a consolidation of various Ontario, Canadian, and US sources including HRSDC, Sector Council Reports US Bureau of Labour Statistics, and the MTCU Employment Profile.	• Strong = Between 5-6 positive labour market indicators • Moderate = Between 3-5 positive labour market indicators • Weak = Between 1-2 or no positive labour market indicators
Competitive Analysis	Includes the number of actual colleges offering the program as well as the ratio of applications to acceptances at Fleming compared to other colleges and specific comment about Fleming's direct competitors where appropriate (Georgian, Sheridan, Seneca and Durham) **Click Below to Access Full Source Document:** Fall Conversion Report	• Strong = Fleming conversion ratio is greater than 2 below the system • Moderate = Fleming conversion ratio is 1 above, below or equal to the system • Weak = Fleming conversion ratio is greater than 2 above than the system
Financial Analysis	Includes a review of Contribution to Overhead (CTO) for existing programs (2010-11) **Click Below to Access Full Source Document:** Costing Analysis	• Strong = CTO is greater than 35% • Moderate = CTO is between 30 - 34% • Weak = CTO is between 20 – 30% **No Contribution = 19% or less**

Key Research Findings

Key Performance Indicators	Includes KPI trends from the Key Performance Indicator Summary 5 Year Historical Overview KPI Data from Reporting Years 2008-2012. **Click Below to Access Full Source Document:** Key Performance Indicators	• Strong = Above system average in 6-7 indicators • Moderate = Above system average in 3-5 indicators • Weak = Above system average in 0-2 indicators.
Resource Analysis	Requires school level assessment regarding space, technology, capital equipment and human resources. Recommendations from recent Program Review Reports included here	

Key Research Findings

Wireless Information Networking (75700)

Student Demand[1]	• MODERATE

The following information consists of OCAS yearly student fall registration data as well as a mean growth rate and average student registration for each program under these categories:

Diploma

- Algonquin is the only school to offer this program, which has experienced a mean growth rate of **24%** and an average registration of **26 students**

Graduate Certificate

- Three schools are currently offering this program, including one of Fleming's direct competitors
- Seneca, a key competitor, has experienced a mean growth rate of **0%** and an average registration of **10 students**
- Overall, Humber has the highest mean growth rate **(14%)** and George Brown has the lowest **(3%)**
- Humber also has the highest average registration of **15 students**, while Seneca has the lowest

Diploma

Program: 55700 - ELECTRONICS ENGINEERING TECHNICIAN - COMMUNICATIONS														
	2007	2008	% Change (07-08)	2008	2009	% Change (08-09)	2009	2010	% Change (09-10)	2010	2011	% Change (10-11)	% Mean Growth Rate (07-11)	5 Year Average Reg. Students
ALGONQUIN		20		20	35	75	35	26	-26	26	32	23	24	28
Total		***20***		***20***	***35***	***75***	***35***	***26***	***-26***	***26***	***32***	***23***		

Graduate Certificate

Program: 75700 - WIRELESS TELECOMMUNICATIONS														
	2007	2008	% Change (07-08)	2008	2009	% Change (08-09)	2009	2010	% Change (09-10)	2010	2011	% Change (10-11)	% Mean Growth Rate (07-11)	5 Year Average Reg. Students
GEORGE BROWN	11	13	18	13	21	62	21	7	-67	7	7	0	3	12
HUMBER	11	10	-9	10	22	120	22	20	-9	20	11	-45	14	15
SENECA	9	13	44	13	15	15	15	6	-60	6	6	0	0	10
Total	***31***	***36***	***16***	***36***	***58***	***61***	***58***	***33***	***-43***	***33***	***24***	***-27***		

[1] Registration data obtained from the Program Counts by Applicant Type Report (RPT0050P) in the OCAS Reporting and Analytics Cube December 7, 2011. Some programs/colleges may not be included because they were missing MCU codes in the OCAS dataset Prepared by Fleming Data Research (07-2012)

Key Research Findings

Labour Market	• STRONG

Employment Ontario[2]

Information Systems Analysts and Consultants (NOC - 2171)

- Employment Ontario Rating (2009-2013):
  - **Good**
- Education and Training
  - "A bachelor's degree in computer science, computer systems engineering, software engineering, business administration or a related discipline, or the completion of a college program in computer science is required. Experience as a computer programmer may be required. Knowledge of industry/business matters and practices is an advantage."
  - "While technical skills are crucial, employers are placing more emphasis on written and verbal communication skills, project management skills, leadership and management skills, presentation skills and appropriate business experience. Employers also emphasize the need for industry-specific skills and experience, with an increasing emphasis on ERP applications."
  - "The Ontario government supports programs that can help newcomers get their license or certificate in their profession or trade so that they can work in Ontario. For more information, visit the Ministry of Citizenship and Immigration website at http://www.citizenship.gov.on.ca/english/working/experience/"
- Demand
  - "Opportunities for employment in this occupation are expected to be good over the period from 2009 to 2013. Openings will be created both through expansion and replacement, as workers leave the labour force or move into managerial positions. In an economic downturn, employment in the high-tech sector can fall below the forecasted rate. However, companies across all sectors will continue to invest in information technologies, but at a more measured pace."
  - "As technology becomes more complex, employers will demand a more skilled and educated workforce. New graduates with combined degrees in information and communication technology (ICT) as well as in business studies will have the best employment opportunities. Employers are constantly seeking candidates with strong communication and project management skills with advanced degrees in computer science, computer engineering, information science or an MBA in information systems. Experience in business analysis is often a prerequisite. Consulting and freelance work are areas of growth within this occupation."

[2] "2171 Information Systems Analysts and Consultants." *Employment Ontario*. N.p., n.d. Web. 6 Sept. 2012. <http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/2171_e.pdf>.

Key Research Findings

- "According to a recent study by the Information and Communications Technology Council (ICTC), employers are most in need of workers needs with a combination of technical, business and interpersonal skills, including:"
  - "core technical skills;"
  - "experience with specific applications and platforms;"
  - "experience with specific business processes to which ICT is a solution;"
  - "communications skills; and"
  - "team work skills"

Employment Ontario[3]

Computer Engineers (Except Software Engineers) (NOC - 2147)

- Employment Ontario Rating (2009-2013):
  - **Average**
- Education and Training
  - "A bachelor's degree in computer engineering or an appropriate related engineering discipline is required. Some job positions may require a master's or doctoral degree in a related engineering discipline. Registration as a Professional Engineer (P.Eng.) by a provincial or territorial association of professional engineers is often required for employment and to practise as a computer hardware or telecommunications hardware engineer. Candidates for license must have completed an engineering program accredited by the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers or demonstrate equivalent educational qualifications, as well as have 48 months of satisfactory engineering work experience. At least one year of work experience must be obtained in a Canadian jurisdiction."

  - "Many employers also emphasize the need for written and verbal communication skills, and teamwork and problem solving skills."
- Demand
  - "Opportunities for employment in this occupation are expected to be average over the period from 2009 to 2013. Computer engineers often leave their jobs to pursue opportunities with employers who offer higher wages. This creates more job openings and makes it even easier for qualified graduates to penetrate the job market."

  - "The demand for information technology (IT) workers is affected by the flow of investment in new technologies requiring IT workers and the stock of current IT applications requiring support. Although the use of information technology continues to expand rapidly, the manufacture of computer hardware is expected to be adversely affected by foreign competition. Growth in employment of hardware engineers is expected in the computer systems design and related services industry. Skills in high demand include wireless telecommunication, ASIC (Application Specific Integrated Circuit) design, high speed, analog or digital electronics or optics design and IP and packet switching/routing."

[3] "2147 Computer Engineers (Except Software Engineers) ." *Employment Ontario*. N.p., n.d. Web. 6 Sept. 2012. <http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/2147_e.pdf>.

Key Research Findings

- "This occupation has a relatively young demographic with 80% under the age of 45. The labour force for this occupation contracted over the last few years, while average incomes increased. Experienced computer engineers who keep up-to-date with new and changing technologies will face better prospects in securing employment in this field. Advertised vacancies indicate a demand for system engineers with specialized skills and experience."

- "According to a recent study by the Information and Communications Technology Council (ICTC), employers are most in need of workers needs with a combination of technical, business and interpersonal skills, including:"
  - "core technical skills;"
  - "experience with specific applications and platforms;"
  - "experience with specific business processes to which ICT is a solution;"
  - "communications skills; and"
  - "team work skills"

Employment Ontario[4]

Computer and Network Operators and Web Technicians (NOC - 2281)

- Employment Ontario Rating (2009-2013):
  - **Average**
- Education and Training
  - "Completion of a college or other program in computer science, network administration, web technology or in a related field is usually required. Certification or training provided by software vendors may be required by some employers. Knowledge of industry/business matters and practices is an advantage."

  - "While technical skills are crucial, employers are placing more emphasis on strong problem solving, analytical, and communication skills because troubleshooting and helping others are key parts of the job."
- Demand
  - "Opportunities for employment in this occupation are expected to be average over the period from 2009 to 2013. Most medium and large workplaces have computer network and websites leading to a large number of potential employers. However, information technology is maturing and becoming more standardized allowing businesses to manage their networks and websites more efficiently. Although the demand for information technology will create new opportunities, the supply of new graduates should meet industry needs. Workers in this field are expected to perform a variety of functions not typically covered by a single work description."

  - "Experienced computer and network operators and web technicians, who keep up-to-date with new and changing technologies, will face the best prospects in securing employment in this field. Certification may be required by some employers. Co-op courses and internships can provide the industry and business knowledge and experience that employers want."

[4] "2281 Computer and Network Operators and Web Technicians ." *Employment Ontario*. N.p., n.d. Web. 6 Sept. 2012. <http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/2281_e.pdf>.

Key Research Findings

- "According to a recent study by the Information and Communications Technology Council (ICTC), employers are most in need of workers needs with a combination of technical, business and interpersonal skills, including:"
  - "core technical skills;"
  - "experience with specific applications and platforms;"
  - "experience with specific business processes to which ICT is a solution;"
  - "communications skills; and"
  - "team work skills"

Employment Ontario[5]

Computer and Information Systems Managers(NOC-0213)

- Employment Ontario Rating (2009-2013):
  - **Good**
- Education and Training
  - "Managers require a combination of technical knowledge, education, and experience in systems analysis, database administration, software engineering, network design, or computer programming. A bachelor's or master's degree in computer science, engineering, business administration or commerce may be required. Certification, such as Microsoft Certified Systems Engineer (MCSE) or other designation, may be an asset. Knowledge of the specific industry is an asset."

  - "Managers also require a variety of non-technical skills, such as strong team leadership, good customer relations, good presentations and communications skills, problem-solving ability, and project management skills. Information technology managers and professionals must constantly learn and acquire new skills and knowledge of constantly changing and emerging technology."
- Demand
  - "Opportunities for employment in this occupation are expected to be good over the period from 2009 to 2013. Strong demand is due to the increasing use of technology in the workplace."

  - "Most advertised job positions require skills in e-commerce, network administration, programming languages, database software and computer security. In addition, employers look for individuals with communication and people skills. There are many employment agencies and executive search firms active in this sector. Due to the rapid pace of technological change in this area, managers will be expected to continuously upgrade their knowledge and skills, either through professional development programs or through graduate training. Individuals with strong communication skills and specialized technical knowledgeable will have the best employment prospects."

[5]"0213 Computer and Information Systems Managers." *Employment Ontario*. N.p., n.d. Web. 6 Sept. 2012. <http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/0213_e.pdf>.

Key Research Findings

HRSDC

	Computer and Information Systems Professionals (217)[6]		**Other Engineers (214)[7]**		**Technical Occupations in Computer and Information Systems (228)[8]**		**Managers In Engineering, Architecture, Science And Information Systems (021)[9]**	
	Information Systems Analysts and Consultants (2171) Database Analysts and Data Administrators (2172) Software Engineers (2173) Computer Programmers and Interactive Media Developers (2174) Web Designers and Developers (2175)		Industrial and Manufacturing Engineers (2141),Metallurgical and Materials Engineers (2142),Mining Engineers (2143),Geological Engineers (2144),Petroleum Engineers (2145),Aerospace Engineers (2146),Computer Engineers (2147),Other Professional Engineers, n.e.c. (2148)		Computer and Network Operators and Web Technicians (2281) User Support Technicians (2282) Systems Testing Technicians (2283)		Engineering, Science and Architecture Managers (0210) Engineering Managers 0211) Architecture and Science Managers (0212) Information Systems and Data Processing Managers (0213)	
	Level	**Share**	**Level**	**Share**	**Level**	**Share**	**Level**	**Share**
Expansion Demand:	88,401	58%	16,067	44%	23,562	48%	16,533	42%
Retirements:	46,688	31%	16,208	44%	20,544	42%	18,499	47%
Other Replacement Demand:	8,950	6%	2,512	7%	2,487	5%	2,224	6%
Emigration:	8,797	6%	1,868	5%	2,788	6%	1,812	5%
Projected Job Openings:	152,836	100%	36,655	100%	49,381	100%	39,068	100%

[6]"Computer and Information Systems Professionals (217)." Canadian Occupational Projection System (COPS). N.p., n.d. Web. 6 Sept. 2012. <http://www23.hrsdc.gc.ca/occupationsummarydetail.jsp?&tid=37>.

[7]"Other Engineers (214)." Canadian Occupational Projection System (COPS). N.p., n.d. Web. 6 Sept. 2012. <http://www23.hrsdc.gc.ca/occupationsummarydetail.jsp?&tid=34>.

[8]"Technical Occupations in Computer and Information Systems (228)." Canadian Occupational Projection System (COPS). N.p., n.d. Web. 6 Sept. 2012. <http://www23.hrsdc.gc.ca/occupationsummarydetail.jsp?&tid=45>.

[9]Managers In Engineering, Architecture, Science And Information Systems (021)." Canadian Occupational Projection System (COPS). N.p., n.d. Web. 6 Sept. 2012. <http://www23.hrsdc.gc.ca/occupationsummarydetail.jsp?&tid=5>.

Key Research Findings

	Level	Share	Level	Share	Level	Share	Level	Share
School Leavers:	132,748	63%	25,950	69%	47,162	77%	14,675	39%
Immigration:	45,671	22%	11,049	29%	13,163	22%	5,768	15%
Other	32,242	15%	853	2%	678	1%	16,957	45%
Projected Job Seekers:	210,662	100%	37,852	100%	61,004	100%	37,400	100%

Computer and Information Systems Professionals (217)

"Although labour supply and demand in this occupation were recently balanced, projections indicate that the number of job seekers will be greater than the job openings over the 2011-2020 period. Job openings will mainly result from expansion demand. The majority of workers in this occupation are young so the need to replace workers who are retiring will be very small compared to the average. Although employment growth in this occupation will not reach the level of the 1990s, it will be one of the strongest over the projection period. This is because computer technology is now an integral part of the economy, which in general is increasingly knowledge-based. However, changes in technology that facilitate remote communication will increase competition in this industry since they will make it possible for Canadian companies to outsource information and communications technologies and development services to lower-cost countries. Although labour demand will be high, the number of job seekers is expected to be even higher. In fact, the number of computer science school leavers will continue to be high since this field of study continues to be very popular with young people. Immigration will also be an important source of job seekers since computer-related jobs remain one of the most attractive high-skilled occupations for immigrants, given that skills and knowledge acquired abroad in this field are easily transferable to Canada. Therefore, in spite of very strong growth in employment, the low replacement needs and the increase in the number of computer science graduates and immigrants will mean a surplus of workers in this occupation."

Other Engineers (214)

"Based on projections and considering the recent shortage of workers in this occupation, it is expected that labour demand will be greater than supply over the 2011-2020 period, while the number of job seekers will be insufficient to fill all the job openings. Job openings in this occupation will result from both employment growth and retirements. However, while employment growth will play a major role in creating job openings, the number of jobs it will create will be lower than in recent years mainly as a result of the difficulties faced by certain manufacturing sectors. However, the strength of the mining, oil extraction, aerospace and computer engineering sectors will create employment growth for this occupation that will be higher than average. Although retirements will result in a large number of job openings, the retirement rate for this occupation is not very high compared to the average retirement rate. With regard to labour supply, the number of job seekers will increase over the coming years as a result of an increase in the number of engineering graduates."

Key Research Findings

Technical Occupations in Computer and Information Systems (228) "Based on projections and considering that labour supply and demand in this occupation were balanced, it is expected that the number of job seekers will continue to be sufficient to fill the job openings in this occupation over the 2011-2020 period. Job openings will result from both employment growth and retirements. In fact, growth from expansion demand will be higher than for other occupations over the projection period. However, expansion demand will be clearly weaker than it was over the 2001-2010 period. Despite the significant number of job openings that will arise from retirements, the retirement rate for this occupation will be lower than for other occupations. This is normal given that the workers are generally younger than they are in other occupations. With regard to labour supply, the majority of job seekers will come from the school system given the nature of the occupation. It should also be noted that a significant number of immigrants will work in this occupation."	**Managers In Engineering, Architecture, Science And Information Systems (021)** "Given that labour supply and demand in this occupation were balanced, projections indicate that the number of job seekers will be sufficient to fill the job openings over the 2011-2020 period. Job openings will arise from both employment growth and retirements. The retirement rate for this occupation will be similar to the rate for all occupations. Job openings resulting from economic growth will increase more than the average for all occupations because this occupation will benefit from the strength of investments in private and public infrastructure projects and the strong growth in computer systems design services. In terms of supply, nearly one half of job seekers will come from the school system. However, given that many years of experience are often needed to obtain a management position, a significant number of job seekers will come from other occupations, mainly engineers and computer scientists working in natural and applied sciences."

Key Research Findings

US Bureau of Labour[10]

Computer Support Specialists (SOC –15-1150)

- Employment Growth (2010/2020): **Increase 18%**
    - **607,100**(2010) to **717,100**(2020)

- "Employment of computer support specialists is expected to grow 18 percent from 2010 to 2020, about as fast as the average for all occupations. More support services will be needed as organizations upgrade their computer equipment and software. Computer support staff will be needed to respond to the installation and repair requirements of increasingly complex computer equipment and software."

- "Employment growth should also be strong in healthcare industries. This field is expected to greatly increase its use of information technology (IT), and support services will be crucial to keep everything running properly."

- "Some lower level tech support jobs, commonly found in call centers, may be sent to countries that have lower wage rates. However, a recent trend to move jobs to lower cost regions of the United States may offset some loss of jobs to other countries."

- "Job prospects should be favorable. There are usually clear advancement possibilities for this occupation, creating new job openings. Applicants with a bachelor's degree and a strong technical background should have the best job opportunities."

US Bureau of Labour[11]

Computer, ATM, and Office Machine Repairers (SOC –49-2011)

- Employment Growth (2010/2020): **Increase 7%**
    - **146,200**(2010) to **155,800**(2020)

- "Computer repairers will see a continued demand for their services as computer parts need replacing or organizations need hardware upgrades. As companies modernize and use new technology in their day-to-day operations, computer repairers will continue to see employment opportunities."

- "Office and machine repairers will also continue to see demand for their services as office equipment continues to break down and need preventive maintenance."

- "However, increasing use of electronic banking is causing a decline in the demand for new ATMs, which may result in a decreased need for ATM repairers."

- "Workers with experience, education from a trade school, and some certification often will have the best opportunities. Employers also prefer to hire workers whose military service has provided them with relevant training and experience. ATM repairers with training in the security of ATM networks have the best job prospects."

[10]"Computer Support Specialists." *Occupational Outlook Handbook*. N.p., n.d. Web. 6 Sept. 2012. <http://www.bls.gov/ooh/computer-and-information-technology/computer-support-specialists.htm#tab-6>.

[11]"Computer, ATM, and Office Machine Repairers ." *Occupational Outlook Handbook*. N.p., n.d. Web. 6 Sept. 2012. <http://www.bls.gov/ooh/installation-maintenance-and-repair/computer-atm-and-office-machine-repairers.htm#tab-6>.

Key Research Findings

US Bureau of Labour[12]

Network and Computer Systems Administrators (SOC –15-1142)

- Employment Growth (2010/2020): **Increase 7%**
  - **347,200**(2010) to **443,800**(2020)

- "Employment of network and computer systems administrators is expected to grow 28 percent from 2010 to 2020, faster than the average for all occupations. Demand for these workers is high and should continue to grow as firms invest in newer, faster technology and mobile networks. In addition, information security concerns are increasing for many businesses as managers realize that their current security measures are not enough to combat growing threats. More administrators with proper training will be needed to reinforce network and system security."

- "Growth is expected in healthcare industries as their use of information technology increases. More administrators will be required to manage the growing systems and networks found at hospitals and other healthcare institutions."

- "Job opportunities should be favorable for this occupation. Prospects should be best for applicants who have a bachelor's degree in computer science and who are up to date on the latest technology."

US Bureau of Labour[13]

Electrical and Electronics Installers and Repairers

Occupational Title	SOC Code	Employment, 2010	Projected Employment, 2020	Change, 2010-20	
				Percent	Numeric
Electrical and Electronics Installers and Repairers	—	141,100	144,700	3	3,600
Electric Motor, Power Tool, and Related Repairers	49-2092	19,800	20,800	5	1,000
Electrical and Electronics Installers and Repairers, Transportation Equipment	49-2093	12,700	13,000	2	300
Electrical and Electronics Repairers, Commercial and Industrial Equipment	49-2094	69,100	69,900	1	800
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	49-2095	23,400	24,600	5	1,100
Electronic Equipment Installers and Repairers, Motor Vehicles	49-2096	16,000	16,400	3	400

- "Overall employment of electrical and electronics installers and repairers is expected to grow 3 percent from 2010 to 2020, slower than the average for all occupations."

- "Projected employment change for specific groups of workers within this occupation is as follows:"

[12]"Network and Computer Systems Administrators." *Occupational Outlook Handbook*. N.p., n.d. Web. 6 Sept. 2012. <http://www.bls.gov/ooh/computer-and-information-technology/network-and-computer-systems-administrators.htm#tab-6>.
[13]"Electrical and Electronics Installers and Repairers ." *Occupational Outlook Handbook*. N.p., n.d. Web. 6 Sept. 2012. <http://www.bls.gov/ooh/installation-maintenance-and-repair/electrical-and-electronics-installers-and-repairers.htm#tab-6>.

Key Research Findings

- "Electrical and electronics installers and repairers of commercial and industrial equipment: little or no change. As competition increases, businesses strive to lower costs by increasing and improving automation. This equipment needs service and repair, and generally increases the demand for electrical workers, but improved reliability of equipment is expected to temper employment growth."

- "Motor vehicle electronic equipment installers and repairers: 3 percent growth. As motor vehicle manufacturers install more and better sound, security, entertainment, and navigation systems in new vehicles, and as newer electronic systems require progressively less maintenance, employment growth for aftermarket electronic equipment installers will be limited."

- "Electric motor, power tool, and related repairers: 5 percent growth. Retrofitting electrical generators in public buildings to reduce emissions and energy consumption will spur some employment growth. However, improvements in electrical and electronic equipment design, as well as the increased use of disposable tool parts, should limit employment growth."

- "Electrical and electronic installers and repairers of transportation equipment: little or no change. Declining employment in the rail transportation industry will dampen growth in this occupational specialty even as other transportation systems need additional workers."

- "Powerhouse, substation, and relay electrical and electronics installers and repairers: 5 percent growth. Although privatization in utilities industries should improve productivity and hinder employment growth, the installation of newer, energy-efficient green technologies will spur some demand for employment."

- "Overall job opportunities should be best for applicants who have an associate's degree in electronics, certification, or related experience. In addition to employment growth, the need to replace workers who transfer to other occupations or leave the labor force will result in some job openings."

Sector Councils and Reports

Canadian Technology Accreditation Board
http://www.cctt.ca/landing_4.asp

Ontario Association of Certified Engineering Technicians & Technologists
http://www.oacett.org/

Information and Communications Technology Council
http://www.ictc-ctic.ca/

Key Research Findings

Employment Profile[14]

In 2010-2011, **29.2%** of graduates were employed in a full time position which related to this program of study provincially

Electronics

Total Graduates:	3,237	Total Graduates in Survey:	2,379	Response Rate:	73.6%

594 graduates were reported after the survey window had closed. While program information for these graduates has been included wherever possible, these graduates are not included in survey results, such as response rates.

Programs in Electronics

Programs	Duration	Total Grads	Total in Survey	Total in Labour Force	Colleges
Computer Engineering Technician	2 Years	51	40	30	Boréal, Centennial, Niagara, Northern, Sault, Sheridan, Sir Sandford Fleming
Computer Engineering Technology	3 Years	128	104	88	Algonquin, Boréal, Centennial, Conestoga, Humber, La Cité, Mohawk, Niagara, Sault, Seneca, Sheridan, Sir Sandford Fleming
Computer Foundations	1 Year	3	2	2	Sault
Computer Repair And Maintenance	1 Year	23	18	12	Centennial
Computer Systems Technician	2 Years	391	276	228	Algonquin, Canadore, Centennial, Durham, Fanshawe, George Brown, Georgian, La Cité, Mohawk, Sheridan, St. Clair
Computer Systems Technology	3 Years	337	262	230	Algonquin, Cambrian, Canadore, Centennial, Durham, Fanshawe, George Brown, La Cité, Mohawk, Seneca, Sheridan, St. Clair
Electrical Engineering Technician	2 Years	588	430	296	Algonquin, Boréal, Cambrian, Conestoga, Durham, Fanshawe, Humber, La Cité, Loyalist, Mohawk, Niagara, Northern, Sault, Sir Sandford Fleming, St. Lawrence
Electrical Engineering Technology	3 Years	319	220	188	Algonquin, Boréal, Cambrian, Conestoga, Fanshawe, Georgian, Humber, Mohawk, Niagara, Northern, Sault
Electrical Techniques	1 Year	544	398	222	Boréal, Cambrian, Canadore, Fanshawe, La Cité, Lambton, Loyalist, Sheridan, Sir Sandford Fleming, St. Clair
Electronics Engineering Technician	2 Years	278	203	165	Algonquin, Centennial, Conestoga, Confederation, Durham, Fanshawe, Humber, La Cité, Mohawk, Niagara, Seneca, Sheridan
Electronics Engineering Technology	3 Years	157	114	93	Algonquin, Boréal, Centennial, Conestoga, Durham, Fanshawe, Humber, La Cité, Mohawk, Niagara, Seneca, Sheridan, St. Clair
Electronics Engineering Technology – Communications	3 Years	12	10	9	Humber
Enterprise Database Management	Post Diploma	34	29	29	Seneca, Sheridan
Entertainment Technology	3 Years	9	8	8	St. Clair
Game Programming	3 Years	10	10	9	Humber
Informatics And Security – Bachelor Of Applied Technology	4 Years	9	7	7	Seneca

228 Employment Profile: 2009–2010 Graduates

[14]"Employment Profile." *Ontario*. N.p., 2011. Web. 19 July 2012. <http://www.tcu.gov.on.ca/pepg/audiences/colleges/serials/eprofile09-10/profile10.pdf>.

Key Research Findings

Programs in Electronics (cont.)

Programs	Duration	Total Grads	Total in Survey	Total in Labour Force	Colleges
Information Systems Security – Bachelor Of Applied Information Sciences	4 Years	9	6	6	Sheridan
Integrated Telecommunication And Computer Technologies – Bachelor Of Applied Technology	4 Years	9	7	7	Conestoga
Local Area Network Design And Administration	Post Diploma	5	3	3	Seneca
Powerline Technician	2 Years	43	30	29	Cambrian
Process Automation – Bachelor Of Applied Technology	4 Years	1	1	1	Mohawk
Software Engineering Technician	2 Years	17	14	12	Centennial, Conestoga
Software Engineering Technology	3 Years	21	16	15	Centennial, Conestoga
Software Systems – Design, Development And Management – Bachelor Of Applied Information Sciences	4 Years	7	7	7	Centennial
Telecommunications Technology	3 Years	19	16	16	Sheridan
Wireless Telecommunications	Post Diploma	205	144	121	George Brown, Humber, Seneca
Wireless/Mobility Telecommunications Engineering Technician	2 Years	8	4	–	Algonquin

Summary of Survey Data

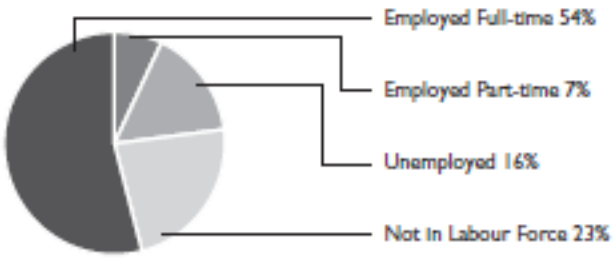
	Program Cluster	All Programs
Survey Population	2,379	50,622
Labour Force Participation	77%	74%
Employment Rate[a]	**80%**	**83%**
Employed Part-time[a]	9%	18%
Employed Full-time[a]	70%	65%
Average Annual Earnings – Total	**$36,651**	**$33,199**
Average Annual Earnings – Female	$35,543	$31,897
Average Annual Earnings – Male	$36,733	$34,607
Graduate Satisfaction	73%	79%
Employer Satisfaction	94%	93%

a. As a percentage of graduates in the labour force.

Key Research Findings

Electronics

Graduate Outcomes for Program Cluster (as a percentage of all respondents)



Top Five Industries of Employment

	#	%
Professional, Scientific and Technical Services	164	11.6%
Specialty Trade Contractors	136	9.7%
Computer and Electronic Product Manufacturing	92	6.5%
Utilities	74	5.3%
Telecommunications	64	4.5%

Top Five Occupational Categories

	#	%
User Support Technicians	104	7.3%
Electrical and Electronics Engineering Technologists and Technicians	94	6.6%
Computer Network Technicians	72	5.1%
Electronic Service Technicians (Household and Business Equipment)	71	5.0%
Retail Salespersons and Sales Clerks	71	5.0%

Key Research Findings

Electronics

Summary of Graduate Outcomes by Program

	Full-time Employed, Program Related		Full-time Employed, Program Unrelated		Part-time Employed, Program Related		Part-time Employed, Program Unrelated		Unemployed		Not in Labour Force	
	#	%	#	%	#	%	#	%	#	%	#	%
Computer Engineering Technician	12	30.0	6	15.0	2	5.0	2	5.0	8	20.0	10	25.0
Computer Engineering Technology	55	52.9	10	9.6	1	1.0	4	3.8	18	17.3	16	15.4
Computer Repair And Maintenance	2	11.1	3	16.7	2	11.1	1	5.6	4	22.2	6	33.3
Computer Systems Technician	107	38.8	45	16.3	7	2.5	14	5.1	55	19.9	48	17.4
Computer Systems Technology	129	49.2	28	10.7	10	3.8	17	6.5	46	17.6	32	12.2
Electrical Engineering Technician	117	27.2	100	23.3	3	0.7	23	5.3	53	12.3	134	31.2
Electrical Engineering Technology	106	48.2	34	15.5	3	1.4	7	3.2	38	17.3	32	14.5
Electrical Techniques	68	17.1	85	21.4	2	0.5	24	6.0	43	10.8	176	44.2
Electronics Engineering Technician	68	33.5	49	24.1	2	1.0	8	3.9	38	18.7	38	18.7
Electronics Engineering Technology	63	55.3	12	10.5	2	1.8	5	4.4	11	9.6	21	18.4
Electronics Engineering Technology – Communications	3	30.0	1	10.0	–	–	1	10.0	4	40.0	1	10.0
Enterprise Database Management	18	62.1	3	10.3	1	3.4	1	3.4	6	20.7	–	–
Entertainment Technology	–	–	2	25.0	2	25.0	2	25.0	2	25.0	–	–
Game Programming	3	30.0	2	20.0	–	–	2	20.0	2	20.0	1	10.0
Informatics And Security – Bachelor Of Applied Technology	2	28.6	3	42.9	–	–	1	14.3	1	14.3	–	–
Information Systems Security – Bachelor Of Applied Information Sciences	3	50.0	2	33.3	–	–	–	–	1	16.7	–	–
Integrated Telecommunication And Computer Technologies – Bachelor Of Applied Technology	5	71.4	1	14.3	–	–	–	–	1	14.3	–	–
Powerline Technician	22	73.3	2	6.7	–	–	1	3.3	4	13.3	1	3.3
Software Engineering Technician	8	57.1	–	–	–	–	2	14.3	2	14.3	2	14.3
Software Engineering Technology	10	62.5	–	–	–	–	3	18.8	2	12.5	1	6.3
Software Systems – Design, Development And Management – Bachelor Of Applied Information Sciences	3	42.9	–	–	1	14.3	–	–	3	42.9	–	–
Telecommunications Technology	12	75.0	1	6.3	–	–	–	–	3	18.8	–	–
Wireless Telecommunications	42	29.2	35	24.3	6	4.2	8	5.6	30	20.8	23	16.0
All Programs in Cluster*	**858**	**36.2**	**424**	**17.9**	**44**	**1.9**	**126**	**5.3**	**375**	**15.8**	**542**	**22.9**

* Does not include 4 programs with fewer than 5 graduates in the labour force.

Key Research Findings

Electronics

Earnings of Full-time Employed Participants

Program	Average – Females	Average – Males	Median – Females	Median – Males	Average for Program	Median for Program
Computer Engineering Technician	–	$34,255	–	$32,100	$32,936	$29,200
Computer Engineering Technology	$41,144	$35,476	$37,164	$34,500	$36,315	$34,500
Computer Repair And Maintenance	–	$33,273	–	$30,000	$33,273	$30,000
Computer Systems Technician	–	$36,325	–	$35,000	$35,927	$34,838
Computer Systems Technology	$36,036	$39,776	$36,076	$40,000	$39,520	$39,866
Electrical Engineering Technician	–	$34,429	–	$31,703	$34,369	$31,494
Electrical Engineering Technology	$32,278	$41,334	$30,000	$40,000	$40,712	$40,000
Electrical Techniques	–	$30,193	–	$28,000	$30,063	$27,532
Electronics Engineering Technician	$40,822	$36,071	$34,000	$36,000	$36,340	$36,000
Electronics Engineering Technology	$39,021	$38,165	$39,554	$35,457	$38,294	$36,250
Electronics Engineering Technology – Communications	–	–	–	–	–	–
Enterprise Database Management	$48,098	$42,170	$48,884	$40,000	$44,763	$43,800
Entertainment Technology	–	–	–	–	–	–
Game Programming	–	–	–	–	–	–
Informatics And Security – Bachelor Of Applied Technology	–	–	–	–	–	–
Information Systems Security – Bachelor Of Applied Information Sciences	–	–	–	–	–	–
Integrated Telecommunication And Computer Technologies – Bachelor Of Applied Technology	–	–	–	–	–	–
Powerline Technician	–	$40,853	–	$39,687	$40,853	$39,687
Software Engineering Technician	–	$43,903	–	$43,193	$43,903	$43,193
Software Engineering Technology	–	$54,420	–	$57,679	$56,036	$58,000
Software Systems – Design, Development And Management – Bachelor Of Applied Information Sciences	–	–	–	–	–	–
Telecommunications Technology	–	$53,586	–	$52,550	$52,351	$51,100
Wireless Telecommunications	$27,093	$32,133	$23,725	$31,286	$31,080	$25,029
All Programs in Cluster*	**$35,543**	**$36,681**	**$35,000**	**$35,197**	**$36,602**	**$35,000**

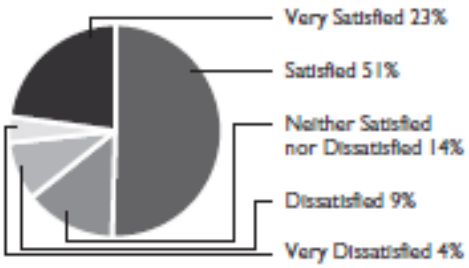
* Does not include 4 programs with fewer than 5 graduates in the labour force.

Key Research Findings

Electronics

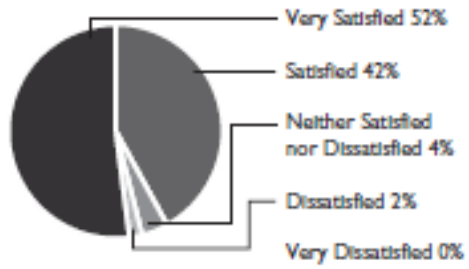
Program Cluster Satisfaction

Graduate Satisfaction with the usefulness of his/her college education in achieving his/her goals after graduation:*



* 2,239 graduates participated in this question.

Employer Satisfaction with employee overall college preparation for the type of work he/she was doing:*



* 278 employers participated in this survey.

Program Cluster Historical Data

	00-01 Grads	01-02 Grads	02-03 Grads	03-04 Grads	04-05 Grads	05-06 Grads	06-07 Grads	07-08 Grads	08-09 Grads	09-10 Grads
Percentage Employed	82.6%	80.5%	79.2%	82.6%	86.4%	87.3%	87.8%	86.2%	81.5%	79.5%
Percentage Employed Full-time	77.2%	73.2%	72.5%	74.1%	79.0%	81.8%	80.8%	80.8%	72.3%	70.3%
Percentage Employed Full-time Related Jobs	61.4%	50.1%	48.1%	49.3%	57.9%	61.2%	63.0%	65.0%	50.9%	47.1%
Average Annual Salary Full-time Related Jobs	$35,105	$33,856	$34,047	$35,007	$35,129	$35,714	$37,856	$39,287	$39,918	$39,829

Key Research Findings

Working in Canada

Information Systems Analysts and Consultants (NOC 2171)[15]				
	Employment Potential	Wage ($/hr)		
		Low	Median	High
Ontario	N/A	19.59	36.06	52.75
Hamilton--Niagara Peninsula Region	N/A	20.00	30.77	52.88
Kingston - Pembroke Region	N/A	N/A	N/A	N/A
Kitchener--Waterloo--Barrie Region	Fair	19.23	33.33	48.08
London Region	N/A	N/A	N/A	N/A
Muskoka-Kawarthas Region	N/A	N/A	N/A	N/A
Northeast Region	N/A	N/A	N/A	N/A
Northwest Region	N/A	N/A	N/A	N/A
Ottawa Region	Fair	23.08	37.95	52.88
Stratford--Bruce Peninsula Region	N/A	N/A	N/A	N/A
Toronto Region	Fair	N/A	N/A	N/A
Windsor-Sarnia Region	N/A	N/A	N/A	N/A

Computer Engineers (Except Software Engineers and Designers)(NOC 2147)[16]				
	Employment Potential	Wage ($/hr)		
		Low	Median	High
Ontario	N/A	22.41	40.00	56.41
Hamilton--Niagara Peninsula Region	N/A	N/A	N/A	N/A
Kingston - Pembroke Region	N/A	N/A	N/A	N/A
Kitchener--Waterloo--Barrie Region	Fair	N/A	N/A	N/A
London Region	N/A	N/A	N/A	N/A
Muskoka-Kawarthas Region	N/A	N/A	N/A	N/A
Northeast Region	N/A	N/A	N/A	N/A
Northwest Region	N/A	N/A	N/A	N/A
Ottawa Region	Fair	20.51	40.51	51.92
Stratford--Bruce Peninsula Region	N/A	N/A	N/A	N/A
Toronto Region	Fair	N/A	N/A	N/A
Windsor-Sarnia Region	N/A	N/A	N/A	N/A

[15]"Information Systems Analysts and Consultants (NOC 2171)." *Working In Canada*. N.p., n.d. Web. 6 Sept. 2012. <http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=2171&area=8792&titleKeyword=systems+auditor®ionKeyword=Peterborough,+Ontario&source=2&action=final>.

[16]"Computer Engineers (Except Software Engineers and Designers) (NOC 2147) ." *Working In Canada*. N.p., n.d. Web. 6 Sept. 2012. <http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=2147&area=8792&titleKeyword=computer+engineer®ionKeyword=Peterborough,+Ontario&source=2&action=final>.

Key Research Findings

Computer Network Technicians (NOC 2281)[17]				
	Employment Potential	Wage ($/hr)		
		Low	Median	High
Ontario	N/A	14.00	27.69	46.15
Hamilton--Niagara Peninsula Region	N/A	15.00	28.21	42.31
Kingston - Pembroke Region	N/A	14.00	27.69	46.15
Kitchener--Waterloo--Barrie Region	N/A	16.00	26.54	47.12
London Region	N/A	14.00	27.69	46.15
Muskoka-Kawarthas Region	N/A	14.00	27.69	46.15
Northeast Region	N/A	14.00	27.69	46.15
Northwest Region	N/A	14.00	27.69	46.15
Ottawa Region	Fair	N/A	N/A	N/A
Stratford--Bruce Peninsula Region	N/A	14.00	27.69	46.15
Toronto Region	Fair	12.69	25.38	50.48
Windsor-Sarnia Region	N/A	14.00	27.69	46.15

Computer and Information Systems Managers (NOC 0213)[18]				
	Employment Potential	Wage ($/hr)		
		Low	Median	High
Ontario	N/A	22.60	40.00	58.65
Hamilton--Niagara Peninsula Region	N/A	22.60	40.00	58.65
Kingston - Pembroke Region	N/A	22.60	40.00	58.65
Kitchener--Waterloo--Barrie Region	Good	23.08	39.66	62.98
London Region	N/A	22.60	40.00	58.65
Muskoka-Kawarthas Region	N/A	22.60	40.00	58.65
Northeast Region	N/A	22.60	40.00	58.65
Northwest Region	N/A	22.60	40.00	58.65
Ottawa Region	Good	23.50	43.59	58.46
Stratford--Bruce Peninsula Region	N/A	22.60	40.00	58.65
Toronto Region	Good	22.60	40.00	58.65
Windsor-Sarnia Region	N/A	22.60	40.00	58.65

[17]"Computer Network Technicians (NOC 2281)." *Working In Canada*. N.p., n.d. Web. 6 Sept. 2012. <http://www.workingincanada.gc.ca/report-eng.do?area=8792&lang=eng&noc=2281&action=final&ln=p®ionKeyword=Peterborough%2C+Ontario&s=2&source=2&titleKeyword=network+administrator#outlook>.

[18]"Information Systems Analysts and Consultants (NOC 2171)." *Working In Canada*. N.p., n.d. Web. 6 Sept. 2012. <http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=2171&area=8792&titleKeyword=systems+auditor®ionKeyword=Peterborough,+Ontario&source=2&action=final>.

Key Research Findings

Competitive Analysis[19]

The following information consists of OCAS yearly fall application and registration data as well as a conversion ratio for each program under this category:

Diploma

- Algonquin had a **4:1** conversion ratio in 2011

Graduate Certificate

- Seneca, the direct competitor, had a **5:1** conversion ratio in 2011, which is higher than the system's ratio **(8:1)**

- George Brown had the lowest ratio in 2011 **(14:1)**

Diploma

Program: 55700 - ELECTRONICS ENGINEERING TECHNICIAN - COMMUNICATIONS

	App. 2007	Reg. 2007	Conversion Ratio	App. 2008	Reg. 2008	Conversion Ratio	App. 2009	Reg. 2009	Conversion Ratio	App. 2010	Reg. 2010	Conversion Ratio	App. 2011	Reg. 2011	Conversion Ratio
ALGONQUIN	0			70	20	4:1	119	35	3:1	104	26	4:1	135	32	4:1
Total	***0***			***70***	***20***	***4:1***	***119***	***35***	***3:1***	***104***	***26***	***4:1***	***135***	***32***	***4:1***

Graduate Certificate

Program: 75700 - WIRELESS TELECOMMUNICATIONS

	App. 2007	Reg. 2007	Conversion Ratio	App. 2008	Reg. 2008	Conversion Ratio	App. 2009	Reg. 2009	Conversion Ratio	App. 2010	Reg. 2010	Conversion Ratio	App. 2011	Reg. 2011	Conversion Ratio
GEORGE BROWN	94	11	9:1	82	13	6:1	129	21	6:1	102	7	15:1	96	7	14:1
HUMBER	57	11	5:1	68	10	7:1	108	22	5:1	80	20	4:1	69	11	6:1
SENECA	42	9	5:1	34	13	3:1	45	15	3:1	36	6	6:1	31	6	5:1
Total	***193***	***31***	***6:1***	***184***	***36***	***5:1***	***282***	***58***	***5:1***	***218***	***33***	***7:1***	***196***	***24***	***8:1***

Financial Analysis

NOT APPLICABLE

Source: Program Costing Analysis 2010/2011

Key Performance Indicators

NOT APPLICABLE

Source: Key Performance Indicator Summary 5 Year Historical Overview KPI Data from Reporting Years 2008-2012

[19] Application data obtained from OCAS College Count Cube October 19, 2011Registration data obtained from the Program Counts by Applicant Type Report (RPT0050P) in the OCAS Reporting and Analytics Cube December 7, 2011.Some programs/colleges may not be included because they were missing MCU codes in the OCAS dataset Prepared by Fleming Data Research (07-2012)

Key Research Findings

Appendix

The following is the original environmental scan conducted by the Library Researchers to form the basis of the previous summary of Key Research Findings Report.

Overview of the Profession:

NOC 2147 Computer Engineers (Except Software Engineers and Designers) ***includes Wireless Communications Network Engineer***
NOC 2171 Computer Systems Analyst
NOC 2281 Computer Network Technician
NOC 0213 Computer Networks Manager

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NOC 2147 Computer Engineers (Except Software Engineers and Designers) ***includes Wireless Communications Network Engineer***

http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=2147&area=8792&titleKeyword=wireless+communications+network+engineer&regionKeyword=Peterborough,+Ontario&source=1&action=final

Description
Computer engineers (except software engineers and designers) research, plan, design, develop, modify, evaluate and integrate computer and telecommunications hardware and related equipment, and information and communication system networks including mainframe systems, local and wide area networks, fibre-optic networks, wireless communication networks, Intranets, the Internet and other data communications systems. They are employed by computer and telecommunication hardware manufacturers, by engineering, manufacturing and telecommunications firms, in information technology consulting firms, by governmental, educational and research institutions and in information technology units throughout the private and public sectors.

Job Duties
Computer and telecommunications hardware engineers perform some or all of the following duties:

- Analyze user's requirements, and design and develop system architecture and specifications
- Research, design, develop and integrate computer and telecommunications hardware such as microprocessors, integrated circuit boards and semiconductor lasers
- Develop and conduct design verification simulations and prototype bench tests of components
- Supervise, inspect and provide design support during the manufacturing, installation and implementation of computer and telecommunications hardware
- Establish and maintain relationships with suppliers and clients
- May lead and co-ordinate teams of engineers, technologists, technicians and drafters in the design and development of computer and telecommunications hardware.

Network system and data communication engineers perform some or all of the following duties:

- Research, design and develop information and communication system network architecture
- Research, evaluate and integrate network system and data communication hardware and software

Key Research Findings

- Assess, document and optimize the capacity and performance of information and communication system networks
- May lead and co-ordinate teams of design professionals in the development and integration of information and communication system architecture, hardware and software.

Computer engineers may specialize in a number of areas including analog and digital signal processing, fibre optics, integrated circuits, lasers, microprocessors, microwaves and radio astronomy.

Included Job Titles

application specific integrated circuit (ASIC) design engineer, computer engineer, computer hardware engineer, engineer, computer hardware, engineer, telecommunications hardware, fibre-optic network designer, hardware circuit board designer, hardware design engineer, hardware development engineer, hardware engineer, network systems engineer, network test engineer, systems designer – hardware, technical architect – hardware, wireless communications network engineer.

NOC 2171 – Information Systems Analysts and Consultants
(***Computer Systems Analyst)***

http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=2171&area=8792&titleKeyword=computer+systems+analyst&regionKeyword=Peterborough,+Ontario&source=0&action=final

Description

Information systems analysts and consultants conduct research, develop and implement information systems development plans, policies and procedures, and provide advice on a wide range of information systems issues. They are employed in information technology consulting firms and in information technology units throughout the private and public sectors, or they may be self-employed.

Job Duties

The following is a summary of the main duties for some occupations in this unit group:

- Information systems business analysts and consultants confer with clients to identify and document requirements, conduct business and technical studies, design, develop, integrate and implement information systems business solutions, and provide advice on information systems strategy, policy, management, security and service delivery.
- Systems security analysts confer with clients to identify and document requirements, assess physical and technical security risks to data, software and hardware, and develop policies, procedures and contingency plans to minimize the effects of security breaches.
- Information systems quality assurance analysts develop and implement policies and procedures throughout the software development life cycle to maximize the efficiency, effectiveness and overall quality of software products and information systems.
- Systems auditors conduct independent third-party reviews to assess quality assurance practices, software products and information systems.

Included Job Titles

- IT (information technology) consultant, computer consultant, computer systems analyst, informatics consultant, informatics security analyst, information systems business analyst, information systems quality assurance analyst, management information systems (MIS) analyst, systems auditor, systems consultant, systems security analyst.

NOC 2281 Computer Network Technicians

http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=2281&area=8792&titleKeyword=computer+network+technician&regionKeyword

Key Research Findings

=Peterborough,+Ontario&source=1&action=final

Description

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 Web sites and Web-server hardware and software, and monitor and optimize network connectivity and performance. They are employed in information technology units throughout the private and public sectors. Supervisors of computer network technicians are included in this group.

Job Duties

Computer network technicians perform some or all of the following duties:

- Maintain, troubleshoot and administer the use of local area networks (LANs), wide area networks (WANs), mainframe networks, computer workstations, connections to the Internet and peripheral equipment
- Evaluate and install computer hardware, networking software, operating system software and software applications
- Operate master consoles to monitor the performance of computer systems and networks and to co-ordinate access and use of computer networks
- Provide problem-solving services to network users
- Install, maintain, troubleshoot and upgrade Web-server hardware and software
- Implement network traffic and security monitoring software, and optimize server performance
- Perform routine network start up and close down and maintain control records
- Perform data backups and disaster recovery operations
- Conduct tests and perform security and quality controls
- Control and monitor e-mail use, Web navigation, and installed softwares
- Perform shell scripting or other basic scripting tasks
- May supervise other workers in this group.

Included Job Titles

- Internet Web site technician, LAN (local area network) administrator, LAN (local area network) technician, Web technician, computer network technician, computer network technician supervisor, data centre operator, network administrator, network support technician, supervisor, computer network technician, system administrator.

From Employment Ontario

Common Job Titles

- Computer Operator
- Computer Tape Librarian
- Data Centre Operator
- Internet Web Site Technician
- LAN (Local Area Network) Administrator
- LAN (Local Area Network) Technician
- Network Administrator
- Network Operator
- Network Support Technician
- Computer Operators Supervisor
- System Administrator
- Web Technician

Key Research Findings

Typical Employers

- computer systems design and related services
- information services
- finance and insurance
- public administration
- wholesale trade
- educational services
- large corporations and establishments

http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/2281_e.pdf

NOC 0213 – Computer & Information Systems Manager

http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=0213&area=8792&titleKeyword=computer+networks+manager&regionKeyword=Peterborough,Ontario&source=0&action=final

Description

Computer and information systems managers plan, organize, direct, control and evaluate the activities of organizations that analyze, design, develop, implement, operate and administer computer and telecommunications software, networks and information systems. They are employed throughout the public and private sectors.

Job Duties

Computer and information systems managers perform some or all of the following duties:

- Plan, organize, direct, control and evaluate the operations of information systems and electronic data processing (EDP) departments and companies
- Develop and implement policies and procedures for electronic data processing and computer systems operations and development
- Meet with clients to discuss system requirements, specifications, costs and timelines
- Assemble and manage teams of information systems personnel to design, develop, implement, operate and administer computer and telecommunications software, networks and information systems
- Control the budget and expenditures of the department, company or project
- Recruit and supervise computer analysts, engineers, programmers, technicians and other personnel and oversee their professional development and training.

Included Job Titles

- EDP (electronic data processing) manager, computer systems manager, data centre manager, data processing director, information systems manager, manager, data processing and systems analysis, manager, management information system (MIS), manager, software engineering, software development manager, systems development manager.

From Employment Ontario

Common Job Titles

Computer Operator

Computer Tape Librarian

Key Research Findings

Data Centre Operator
Internet Web Site Technician
LAN (Local Area Network) Administrator
LAN (Local Area Network) Technician
Network Administrator
Network Operator
Network Support Technician
Computer Operators Supervisor
System Administrator
Web Technician

Typical Employers
computer systems design and related services
information services
finance and insurance
public administration
wholesale trade
educational services
large corporations and establishments

http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/0213_e.pdf

Labour Market
Working in Canada
1. Employment potential for the Muskoka - Kawartha Region

NOC 2147	**NA**
NOC 2171	**NA**
NOC 2281	**NA**
NOC 0213	**NA**

HRDSC
National Outlook – 10-Year Projection (2011-2020)

This occupation **(Wireless Communications Network Engineer)** is part of a larger occupational group called Other Engineers (**NOC 214**).

http://www23.hrsdc.gc.ca/occupationsummarydetail.jsp?&tid=34

Occupations in this group	Industrial and Manufacturing Engineers (2141),Metallurgical and Materials Engineers (2142),Mining Engineers (2143),Geological Engineers (2144),Petroleum Engineers (2145),Aerospace Engineers (2146),Computer Engineers (2147),Other Professional Engineers, n.e.c. (2148)
Employment (non-student) in 2010	81,229
Median Age of workers in 2010	41.7 years old
Average Retirement Age in 2010	61 years old

Key Research Findings

For **Other Engineers**, over the 2011-2020 period, job openings (arising from expansion demand and replacement demand) are expected to total **36,655** and **37,852** job seekers (arising from school leavers 69%, immigration29% and other 2%) are expected to be available to fill the job openings.
Over the 2008-2010 period, employment and wage growth in this occupation were strong and the unemployment rate remained virtually unchanged. The unemployment rate was very low in 2010 at 3.8%. The average hourly wage was among the highest for all occupations. This suggests that there were fewer job seekers than job openings. In other words, there was a labour shortage in this occupation. It is also important to note that this occupational group encompasses many types of engineers, including industrial and manufacturing, mining, aerospace and computer engineers, and that these different types of engineering are not necessarily interchangeable. Thus, many unemployed engineers who are specialized in a certain area (e.g. industrial and manufacturing engineering) cannot easily work in other specialized engineering occupations (e.g. computer engineering).
According to Employment Ontario (Estimates 2006), 8% of workers in this group were self-employed, and 96% Full-Time
http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/2147_e.pdf

Local wage for Peterborough/Kawartha Region 2010: NA
http://www.workingincanada.gc.ca/report-eng.do?area=8792&lang=eng&noc=2147&action=final&regionKeyword=Peterborough%2C+Ontario&s=2&source=3&titleKeyword=wireless+communications+network+engineer#report_tabs_container2

HRDSC
National Outlook – 10-Year Projection (2011-2020)

This occupation (**Computer Systems Analyst)** is part of a larger occupational group called Computer & Information Systems Professionals (**NOC 217**).

http://www23.hrsdc.gc.ca/occupationsummarydetail.jsp?&tid=37

Occupations in this group	Information Systems Analysts and Consultants (2171),Database Analysts and Data Administrators (2172),Software Engineers (2173),Computer Programmers and Interactive Media Developers (2174),Web Designers and Developers (2175)
Employment (non-student) in 2010	372,786
Median Age of workers in 2010	39.5 years old
Average Retirement Age in 2010	61 years old

2. Estimated that there will be more job seekers in this field than job openings for the 2011-2020 periods (job openings are expected to total **152,836**. It is expected that **210,662** job seekers will be available to fill these job openings). Nearly all job seekers will come from the school system (63%) with 22% from immigration and 15% from “other”

Key Research Findings

4 Over the 2008-2010 period, employment growth in this occupation was strong. The unemployment rate increased more quickly than for all occupations but still remained below 5% in 2010. According to key labour market indicators, the number of job seekers was sufficient to fill all job openings in this occupation.

5. According to Employment Ontario (Estimates 2006), 12% of workers in this group were self-employed, and 92% Full-Time

6. Local wage for Peterborough/Kawartha Region 2010: NA

http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=2171&area=8792&titleKeyword=computer+systems+analyst&regionKeyword=Peterborough,+Ontario&source=0&action=final

HRDSC

National Outlook – 10-Year Projection (2011-2020)

This occupation (**Computer Network Technician**) is part of a larger occupational group called **Technical Occupations in Computer and Information Systems** (228)

http://www23.hrsdc.gc.ca/occupationsummarydetail.jsp?&tid=45

Occupations in this group	Computer and Network Operators and Web Technicians (2281) User Support Technicians (2282) Systems Testing Technicians (2283)
Employment (non-student) in 2010	119,034
Median Age of workers in 2010	37.4 years old
Average Retirement Age in 2010	59 years old

For **Technical Occupations in Computer and Information Systems**, over the 2011-2020 period, job openings (arising from expansion demand and replacement demand) are expected to total **49,381** and **61,004** job seekers (arising from school leavers 77%, immigration22% and mobility) are expected to be available to fill the job openings

Over the 2008-2010 period, this occupation experienced a significant drop in employment. The unemployment rate increased more quickly than for other occupations and was higher than the average. The average hourly wage increased at a rate similar to that for all occupations over this period. According to key labour market indicators, the number of job seekers was sufficient to fill the job openings in this occupation.

According to Employment Ontario the Opportunities for employment in this occupation are expected to be average over the period from 2009 to 2013.

According to Employment Ontario (Estimates 2006), 5% of workers in this group were self-employed, and 91% Full-Time

Local wage for Peterborough/Kawartha Region 2010:

Low $14.00 Median $22.69 High $46.15

http://www.workingincanada.gc.ca/report-eng.do?lang=eng&noc=2281&area=8792&titleKeyword=computer+network+technician&regionKeyword=Peterborough,+Ontario&source=1&action=final

Key Research Findings

http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/2281_e.pdf

HRDSC

National Outlook – 10-Year Projection (2011-2020)

This occupation (Computer Networks Manager) is part of a larger occupational group called Mangers In Engineering, Architecture, Science & Information Systems (021)

Occupations in this group	Engineering, Science and Architecture Managers (0210),Engineering Managers (0211),Architecture and Science Managers (0212),Information Systems and Data Processing Managers (0213)
Employment (non-student) in 2010	77,670
Median Age of workers in 2010	43.5 years old
Average Retirement Age in 2010	59 years old

For **Managers In Engineering, Architecture, Science And Information Systems**, over the 2011-2020 period, job openings (arising from expansion demand and replacement demand) are expected to total **39,068** and **37,400** job seekers (arising from school leavers 39%, immigration 15% and other 45%) are expected to be available to fill the job openings.

Over the 2008-2010 period, employment growth in this occupation was above the average for all occupations. However, the unemployment rate also increased. The average hourly wage increased at a lower rate than the average for all occupations; however, it is one of the highest among all the occupations. According to key labour market indicators, the number of job seekers was sufficient to fill the job openings in this occupation.

According to Employment Ontario the Opportunities for employment in this occupation are expected to be good over the period from 2009 to 2013.

According to Employment Ontario (Estimates 2006), 5% of workers in this group were self-employed, and 97% Full-Time

http://www.tcu.gov.on.ca/eng/labourmarket/ojf/pdf/0213_e.pdf

Local wage for Peterborough/Kawartha Region 2010:

Low $22.60 Median $40.00 High $58.65

http://www.workingincanada.gc.ca/report-eng.do?area=8792&lang=eng&noc=0213&action=final&regionKeyword=Peterborough%2COntario&s=1&source=3&titleKeyword=computer+networks+manager#wages

US Bureau of Labour

Computer Support Specialists

http://www.bls.gov/ooh/computer-and-information-technology/computer-support-specialists.htm#tab-6

Employment of computer support specialists is expected to grow 18 percent from 2010 to 2020, about as fast as the average for all occupations. More support services will be needed as organizations upgrade their computer equipment and software. Computer support staff will be needed to respond to the installation and repair requirements of increasingly complex computer equipment and software.

Key Research Findings

Employment growth should also be strong in healthcare industries. This field is expected to greatly increase its use of information technology (IT), and support services will be crucial to keep everything running properly.

Some lower level tech support jobs, commonly found in call centers, may be sent to countries that have lower wage rates. However, a recent trend to move jobs to lower cost regions of the United States may offset some loss of jobs to other countries.

Job Prospects
Job prospects should be favorable. There are usually clear advancement possibilities for this occupation, creating new job openings. Applicants with a bachelor's degree and a strong technical background should have the best job opportunities.

Computer, ATM and Office Machine Repairers

http://www.bls.gov/ooh/installation-maintenance-and-repair/computer-atm-and-office-machine-repairers.htm

Employment of computer, ATM, and office machine repairers is expected to grow 7 percent from 2010 to 2020, slower than the average for all occupations.
Computer repairers will see a continued demand for their services as computer parts need replacing or organizations need hardware upgrades. As companies modernize and use new technology in their day-to-day operations, computer repairers will continue to see employment opportunities.
Office and machine repairers will also continue to see demand for their services as office equipment continues to break down and need preventive maintenance.
However, increasing use of electronic banking is causing a decline in the demand for new ATMs, which may result in a decreased need for ATM repairers.

Job Prospects
Workers with experience, education from a trade school, and some certification often will have the best opportunities. Employers also prefer to hire workers whose military service has provided them with relevant training and experience. ATM repairers with training in the security of ATM networks have the best job prospects.

Network & Computer Systems Administrators

http://www.bls.gov/ooh/computer-and-information-technology/network-and-computer-systems-administrators.htm

Employment of network and computer systems administrators is expected to grow 28 percent from 2010 to 2020, faster than the average for all occupations. Demand for these workers is high and should continue to grow as firms invest in newer, faster technology and mobile networks. In addition, information security concerns are increasing for many businesses as managers realize that their current security measures are not enough to combat growing threats. More administrators with proper training will be needed to reinforce network and system security.
Growth is expected in healthcare industries as their use of information technology increases. More administrators will be required to manage the growing systems and networks found at hospitals and other healthcare institutions.

Key Research Findings

Job Prospects
Job opportunities should be favorable for this occupation. Prospects should be best for applicants who have a bachelor's degree in computer science and who are up to date on the latest technology.

Electrical & Electronics Installers & Repairers

http://www.bls.gov/ooh/installation-maintenance-and-repair/electrical-and-electronics-installers-and-repairers.htm

Overall employment of electrical and electronics installers and repairers is expected to grow 3 percent from 2010 to 2020, slower than the average for all occupations.
Projected employment change for specific groups of workers within this occupation is as follows:

- Electrical and electronics installers and repairers of commercial and industrial equipment: little or no change. As competition increases, businesses strive to lower costs by increasing and improving automation. This equipment needs service and repair, and generally increases the demand for electrical workers, but improved reliability of equipment is expected to temper employment growth.
- Motor vehicle electronic equipment installers and repairers: 3 percent growth. As motor vehicle manufacturers install more and better sound, security, entertainment, and navigation systems in new vehicles, and as newer electronic systems require progressively less maintenance, employment growth for aftermarket electronic equipment installers will be limited.
- Electric motor, power tool, and related repairers: 5 percent growth. Retrofitting electrical generators in public buildings to reduce emissions and energy consumption will spur some employment growth. However, improvements in electrical and electronic equipment design, as well as the increased use of disposable tool parts, should limit employment growth.
- Electrical and electronic installers and repairers of transportation equipment: little or no change. Declining employment in the rail transportation industry will dampen growth in this occupational specialty even as other transportation systems need additional workers.
- Powerhouse, substation, and relay electrical and electronics installers and repairers: 5 percent growth. Although privatization in utilities industries should improve productivity and hinder employment growth, the installation of newer, energy-efficient green technologies will spur some demand for employment.

Job Prospects
Overall job opportunities should be best for applicants who have an associate's degree in electronics, certification, or related experience. In addition to employment growth, the need to replace workers who transfer to other occupations or leave the labor force will result in some job openings.

Professional Associations:

Canadian Technology Accreditation Board
http://www.cctt.ca/landing_4.asp

Ontario Association of Certified Engineering Technicians & Technologists
http://www.oacett.org/

Employment Requirements

Key Research Findings

http://www5.hrsdc.gc.ca/NOC/English/NOC/2011/Welcome.aspx

NOC 2147	**Employment Requirements** Employment requirements are prerequisites generally needed to enter an occupation. • Computer engineers require a bachelor's degree in computer engineering, electrical or electronics engineering, engineering physics or computer science. • A master's or doctoral degree in a related engineering discipline may be required. • Licensing by a provincial or territorial association of professional engineers is required to approve engineering drawings and reports and to practise as a Professional Engineer (P.Eng.). • Engineers are eligible for registration following graduation from an accredited educational program, three or four years of supervised work experience in engineering and passing a professional practice examination. • Supervisory and senior positions in this unit group require experience. [Source: National Occupational Classification 2006 - HRSDC] http://www.workingincanada.gc.ca/report-eng.do?area=8792&l ang=eng&noc=2147&action=final&region Keyword=Peterborough%2C+Ontario&s=5&source =3&titleKeyword=wireless+communications+network+ engineer#report_tabs_container2
NOC2171	**Education Programs** Programs in the order in which they are most likely to supply graduates to this occupation (Information Systems Analysts and Consultants): • Computer Science • Computer and Information Sciences and Support Services, General • Business Administration, Management and Operations • Computer Engineering Technologies/Technicians • Business/Commerce, General **Employment Requirements** Employment requirements are prerequisites generally needed to enter an occupation. • A bachelor's degree in computer science, computer systems engineering, software engineering, business administration or a related discipline *or* Completion of a college program in computer science is usually required. • Experience as a computer programmer is usually required. • Certification or training provided by software vendors may be required by some employers. [Source: National Occupational Classification 2006 - HRSDC]
NOC 2281	**Education Programs** Programs in the order in which they are most likely to supply graduates to this occupation (Computer Network Technicians): • Computer Science

Key Research Findings

	• Computer and Information Sciences and Support Services, General • Computer Engineering Technologies/Technicians • Electrical and Electronic Engineering Technologies/Technicians • Computer/Information Technology Administration and Management [Source: 2006 Census - Statistics Canada] **Local Training** Most universities and colleges in Ontario offer educational programs in the field of computer science and information technology. For more information on training opportunities at Ontario universities and colleges, please refer to the following websites: http://www.electronicinfo.ca www.ontariocolleges.ca. Private career colleges in Ontario may also have programs related to this occupation. More information can be found on the Ministry of Training, Colleges and Universities web site at: http://www.tcu.gov.on.ca/, when searched under Ontario Private Career College Search Service.' **Employment Requirements** Employment requirements are prerequisites generally needed to enter an occupation. • Completion of a college or other program in computer science, network administration, Web technology or a related field is usually required. • Certification or training provided by software vendors may be required by some employers. [Source: National Occupational Classification 2006 - HRSDC] **Skills Requirements** There are often specific abilities, aptitudes and knowledge that are prerequisites to obtain employment in an occupation. Most employers who advertise are looking for workers who have the following experience and skills: Experience: 1-5 years Specific Skills: Provide problem-solving services to network users. Maintain, troubleshoot and administer the use of local area networks (LANs), wide area networks (WANs). Perform routine network start up and close down and maintain control records. Evaluate and install computer hardware, networking software and operating system software. Computer and Technology Knowledge: Windows, networking hardware and software, servers and network security. Essential Skills: Oral communication, working with others, computer use, problem solving, job task planning and organizing, writing, reading text, document use, finding information, critical thinking, decision making, continuous learning and numeracy.

Key Research Findings

	[Source: Labour Market Information - HRSDC] http://www.workingincanada.gc.ca/report-eng.do?area= 8792&lang=eng&noc=2281&action= final&regionKeyword=Peterborough%2C+Ontario&s =5&source=1&titleKeyword=computer+network+technician#report_tabs_container2
NOC 0213	**Education Programs** Programs in the order in which they are most likely to supply graduates to this occupation (Computer and Information Systems Managers): • Computer Science • Business Administration, Management and Operations • Computer and Information Sciences and Support Services, General • Business/Commerce, General • Electrical, Electronics and Communications Engineering [Source: 2006 Census - Statistics Canada] **Local Training** Most universities and colleges in Ontario offer educational programs in the field of computer science and information technology and business administration. For more information on training opportunities at Ontario universities and colleges, please refer to the following websites: http://www.electronicinfo.ca www.ontariocolleges.ca Private career colleges in Ontario may also have programs related to this occupation. More information can be found on the Ministry of Training, Colleges and Universities web site at: http://www.tcu.gov.on.ca/, when searched under Ontario Private Career College Search Service.' **Employment Requirements** Employment requirements are prerequisites generally needed to enter an occupation. • A bachelor's or master's degree in computer science, business administration, commerce or engineering is usually required. • Several years of experience in systems analysis, data administration, software engineering, network design or computer programming, including supervisory experience, are required. [Source: National Occupational Classification 2006 - HRSDC] **Skills Requirements** There are often specific abilities, aptitudes and knowledge that are prerequisites to obtain employment in an occupation. Most employers who advertise are looking for workers who have the following experience and skills: Experience: 3-9 years Specific Skills: Plan, organize and direct daily operations. Assign, co-ordinate and review projects and programs. Oversee the analysis of data and information.

Key Research Findings

	Additional Skills: Plan and control budget and expenditures. Hire, train, direct and motivate staff. Essential Skills: Oral communication, working with others, computer use, problem solving, job task planning and organizing, writing, reading text, document use, finding information, critical thinking, decision making, continuous learning, numeracy and significant use of memory. http://www.workingincanada.gc.ca/report-eng.do?area=8792&lang=eng&noc=0213&action=final&regionKeyword=Peterborough%2COntario&s=5&source=3&titleKeyword=computer+networks+manager#report_tabs_container2