

Vanier College



Faculty of Applied Technologies **Computerized Systems Technology**

(Formerly Computer and Digital Systems Technology)

Program Revision Interim Report

Proposed Implementation Fall 2009

May 13th 2009



243.A0 Computerized Systems Technology

Type of Certification:	Diploma of College Studies DEC
Year of approval:	2005
Number of Credits:	91 2/3 credits
Program Specific Component:	2130 hours of instruction
General Education Component:	660 hours of instruction
Total Duration:	2790 hours of instruction
Conditions for Admission:	To be admitted to the program, students must meet the general conditions for admission set out in section 2 of the College Education Regulations, as well as the following requirements, if applicable. - Mathematics 436 - Physical Science 436



243.A0 Computerized Systems Technology

Introduction

The Computer and Digital Systems Technology Program, currently Computerized Systems Technology, was introduced at Vanier College in the Fall of 1986, as the only English program in the Province of Quebec. It was initially an option in the Electro Technology Program. In 1989 the Electro Technology Program was split into two Programs: Computer and Digital Systems and Industrial Electronics. In 1996 a complete program revision took place, and this current revision is scheduled to begin in the Fall of 2009.

Computerized Systems Technology (CST), prepares students to work as technologists in Digital, Microprocessor, Microcontroller, and Computer based systems. Graduates are knowledgeable in both Hardware and Software of such systems and work in companies involved in technical support, repair and maintenance, and research in the domain of Computer and Digital Systems. They are also employed in manufacturing plants, consulting firms, in aerospace industries and in Robotics.

The prime tasks of graduates working in the field are Hardware and Software problem solving, participating in the conception and realization of Computer and Digital Systems Projects, Hardware and Software troubleshooting and repair of Computer and Digital Systems and Networks, Programming such Systems, and technical support.

Professionally Computerized Systems technologists work with Microcomputers, Digital, Microprocessor and Microcontroller based systems, Computer Networks, Printed Circuit Boards, Hardware Oriented Software, Computer Peripherals, various Electronic Components, Testing and Troubleshooting equipment and Technical Documentation. They most likely work in teams, regularly interfacing with Engineers, other Technologists and Technicians, various System Operators, Assembly line workers, Customers, Administrative and Marketing personnel.

It is evident that such a work environment is constantly changing and this new program will help CST ensure that the training given to its students meets the requirement of the industries that hire them as well as giving them the necessary theoretical background to expand their knowledge after they enter the workplace. This new competency based revision will involve a greater emphasis on Hardware oriented software, Microprocessor and Microcontroller courses, and more practice in troubleshooting of such systems. It will include an unpaid stage of 10 hours per week in the 6th semester.

In addition to CST concentration courses students' general knowledge is developed through courses in Mathematics, English, French, Humanities, Physical Education and complementary courses. The department emphasizes the importance of these courses as

an integral and essential package for achieving life long educational objectives in the professional field and as a basis for personal enrichment.

Presentation of the Program of Study

The *Computerized Systems Technology* program is in accordance with the technical education aims and orientations underlying the initiatives of the Ministry of Education; in accordance with the regulatory framework, the program is defined by a set of competencies and formulated via objectives and standards.

The *Computerized Systems Technology* program includes a general education component common to all programs of study (16 2/3 units), a program-specific general education component (6 units), a general education component that is complementary to the other components (4 units) and a specific training component of 65 units.

The specific training component of this program was devised in compliance with the framework for technical instruction programs. The approach involves the participation of partners from the work and education sectors and takes into account such factors as training needs, the work situation and the overall goals of technical training. The objectives and standards serve to define the learning activities and how they are evaluated. Evaluation falls within the purview of the colleges. Successful completion of the program of study will qualify students to practice their profession based on the skills expected upon entering the job market and the curriculum of study helps ensure their versatility.

Specific Training Objectives

The *Computerized Systems Technology* program aims to train individuals to practice the profession of computer and digital systems technologist.

Computerized systems technologists work with companies engaged in production, technical support and research linked to computer and digital systems; these are for the most part manufacturing companies, however computer and digital systems technologists can also be employed by counselling services firms or research laboratories. Primary duties involve participating in problem and situation analysis, participating in the elaboration of development projects, carrying out projects, writing technical literature, programming and coding systems, performing tests and providing technical support.

In practising their profession, computerized systems technologists work mainly with microcomputers and computers, software, computer networks, interfaces and peripherals, electronic components, printed circuits, motherboards, mechanical products and components, electronic equipment, computer/digital systems and technical literature.

Computerized Systems Technology

In carrying out their duties, computerized systems technologists may work in collaboration with engineers, other technicians, operators, system integrators, clients or other individuals performing administrative or marketing tasks.

In keeping with the overall training goals, the specific training component of the Computerized Systems Technology program aims to:

- Train individuals to be effective in the practice of a profession by:
 - enabling them to fulfil the roles, carry out the functions and perform the duties and activities associated with a given profession as soon as they enter the job market;
 - enabling them to flourish in the work environment (this involves possessing technical/technological knowledge and skills with respect to communication, solving problems, making decisions, ethics, health, safety, etc.).
- Promote the integration of individuals into professional life by:
 - giving them an understanding of the job market in general and of the specific context of their chosen profession;
 - giving them an understanding of their rights and responsibilities as workers.
- Promote the personal growth of individuals and their acquisition of more extensive professional knowledge by:
 - enabling them to develop their autonomy and ability to learn as well as to adopt work methods;
 - enabling them to comprehend the underlying principles of the techniques and technologies used;
 - enabling them to develop their expressive skills, creativity, sense of initiative and entrepreneurship;
 - enabling them to adopt attitudes that are essential for professional success, develop a sense of responsibility and strive for excellence.
- Promote the professional mobility of individuals by:
 - enabling them to adopt a positive attitude toward change;
 - enabling them to develop the means to manage their career, particularly through entrepreneurship awareness.

The *Computerized Systems Technology* program also makes it possible to achieve the common, specific and complementary general educational goals.

Educational Objectives of Specific Training

Educational objectives of specific training are based on important values and concerns that serve as a guide to interaction with students. These objectives generally deal with significant aspects of professional and personal development that have not been explicitly formulated in the training goals or in the objectives and standards. They may relate to important attitudes, work habits, intellectual abilities, etc.



Computerized Systems Technology

The *Computerized Systems Technology* program makes it possible to combine two of the training requirements, namely versatility and the acquisition of the expertise necessary to carry out tasks that characterise the profession at the entry level on the job market. Versatility is fostered through the acquisition of general competencies that enable individuals to adapt to a variety of technologies, carry out information research using documentation in French and English and process the information, diagnose and solve problems, communicate in a work environment, create diagrams and design circuits. Acquiring the expertise necessary to carry out these tasks is accomplished primarily through the competencies specific to the program of study.

In addition, the specific training component seeks to encourage individuals to focus first and foremost on quality in their dealings with clientele and to take into account a variety of needs in performing work-related activities that can have an impact on the computer and digital system as a whole, as well as on certain systems components and subsets.

Matrix of Competencies

The matrix of competencies provides an overview of the technical studies program. It groups together all the program's components and defines the place of each of the specific training competencies.

The matrix of competencies is comprised of:

- general competencies of specific training that deal with work activities common to various tasks and situations;
- special competencies necessary for tasks directly related to practising the profession.

The matrix of competencies illustrates the links that exist between general competencies, placed horizontally, and special competencies, placed vertically. The symbol (o) indicates a link between a special competency and a general competency in the practice of the profession.

The order in which the specific training competencies are presented reflects the program of study's design, but does not infer the way they will be applied. The matrix of competencies is provided as a guide.

New Program Direction

The new program and grid is reflective of the new set of competencies of the new 243.A0 Computerized Systems Technology Program and recommendations and feedback that the Department received in the 2003 program evaluation as well as feedback from firms that employ our graduates.

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The new program differs from its predecessor in three important areas:

- Harmonization with Industrial Electronics Program
- Increased Focus on Networks
- Inclusion of a stage of ten hours per week in the final semester

Although the new competencies forwarded by MELS move the CST program further away from its former twin Industrial Electronics, they both remain programs within the field of Electrical Engineering. The college felt strongly that for this reason, effort should be expended in trying to make the first year as common as possible without sacrificing the integral content of each program. The fundamental material covered in the first year of both programs is equivalent if not identical so it was possible to offer the incoming student a common first semester; the second semester differs by two courses. This permits a student to switch programs without penalty at the end of the first semester. Students wishing to switch after two semesters will have to make up two courses. This significantly increases the flexibility for the student. It also permits the college to economize on resources by eliminating the situation where essentially the same material is being taught to small numbers of students in separate classes.

Increasingly the role of the CST graduate is working with engineers to design computerized networks in business and manufacturing. On their own technicians are responsible for the installation and troubleshooting of such networks. The new grid ensures that the student receives a thorough grounding and experience in these areas.

The teachers in the CST program must remain always fully aware of what is the current state of technology in the workplace. The stage, where students work for several weeks in industry in the final semester of their studies, is the most effective way to maintain awareness of new developments in technology and to receive feedback on what is current in the workplace. Students bring back problems they encounter in their stages to their professors and often introduce them to new aspects of the technology not yet sufficiently utilized to be of widespread knowledge. It is also a critical first step to the establishment of an Industry Advisory Committee whose members can be relied upon for advice on improving the content of the program.

The New Grid

In the first year the students are introduced to Analog and Digital Electronics and are also introduced to Hardware oriented programming in the form of C and Assembly Language programming.

The New Grid includes three Math courses totaling twelve hours per week. The first two are common with Industrial Electronics and the third one unique to CST. Presently the Department offers two Math courses ten hours in total.

In the second year of their studies the students are extensively introduced to C Language Programming, Microprocessor and Microcontroller circuits and Troubleshooting as well as Computer Networks, and Printed Circuits.

In the third year the students learn Advanced Assembly and CPP Hardware Programming Advanced Microprocessor and Microcontroller concepts, applications and projects.

They are also instructed in Advanced Computer Networking and Troubleshooting, in Programmable Logic Devices (PLDs), and must complete a 150 hour stage in companies related to the field of Computer engineering.

The following new courses have been incorporated based on the new competencies:

- Two Networking courses.
- A Network Troubleshooting course.
- Microcontroller Applications course.
- PC Troubleshooting.
- Integrated Circuits PLDs.
- New Developments in Digital Technology.
- A 150 hour stage course.
- The PCB Course has been expanded.
- Three new Math courses.



**Computerized
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Harmonization with Industrial Electronics

The two Departments have over the last year worked on being able to provide students equivalencies of courses during the first two semesters of the programs.. This would allow students in the first year of study in either program to be able to switch programs while being able to bring some of their first year course credits with them.

The following courses will be equivalent between the programs:

Computerized Systems		Industrial Electronics	
Intro to Applied Math	201-206-VA	Intro to Applied Math	201-206-VA
Applied Math	201-305-VA	Applied Math	201-305-VA
Digital Circuits	243-234-VA	Digital Circuits	243-234-VA
Electrical Technology	243-133-VA	Electrical Technology	243-133-VA
The Profession	243-123-VA	The Profession	243-123-VA
Logic of Programming for Engineers	247-103-VA	Intro to Computers	420-708-VA
Analog Circuits	243-233-VA	Analog Circuits	243-233-VA



Program Specific Component (65 Credits)

- 037B To process information about working in the field of computerized systems technology.
- 037C To process technical information.
- 037D To solve mathematical problems associated with computerized systems technology.
- 037E To diagnose an analog electronics problem.
- 037F To diagnose a digital electronics problem.
- 037G To diagnose a problem affecting a circuit containing a microprocessor.
- 037H To diagnose a problem affecting a computerized systems network.
- 037J To troubleshoot a computerized system.
- 037K To communicate in the workplace
- 037L To draw electronic schematic diagrams.
- 037M To plan a computerized system project.
- 037N To design printed circuits.
- 037P To produce a computerized system prototype.
- 037Q To integrate and install computerized system components.
- 037R To write computerized system procedures.
- 037S To program computerized systems.
- 037T To modify computerized system programming.
- 037U To perform activities related to optimizing a computerized system.
- 037V To perform activities related to designing a computerized system.



Common General Education Component (16 2/3 Credits)

0004 To analyze and produce various forms of discourse.

0005 To apply a critical approach to literary genres.

0006 To apply a critical approach to a literary theme.

00B2 To apply a logical analytical process to how knowledge is organized and used.

000G To apply a critical thought process to world-views.

0017 Appliquer les notions de base de la communication en français courant.

or

000A Communiquer en français avec une certaine aisance.

or

000B Communiquer avec aisance en français.

or

000C Traiter d'un sujet culturel et littéraire.

0064 To establish the role that being physically active plays amongst the lifestyle behaviours which promote health.

0065 To improve one's effectiveness when practising a physical activity.

0066 To demonstrate one's responsibility for being physically active in a manner which promotes health.

**General Education Component adapted to the Computerized Systems Program
(6 Credits)**

000K To produce various types of oral and written speeches.

000T To apply a critical thought process to ethical issues of contemporary society.

0016 Communiquer en français de façon simple en utilisant des formes d'expression d'usage courant liées à son champ d'études.

or

000M Communiquer en français avec une certaine aisance en utilisant des formes d'expression d'usage courant liées à son champ d'études.

or

000N Communiquer avec aisance en français en utilisant des formes d'expression d'usage courant liées à son champ d'études.

or

000P Communiquer de façon nuancée en français dans différentes formes de discours.

**Complementary General Education Component
(4 Credits)**



000V To estimate the contribution of the social sciences to an understanding of contemporary issues.

000W To analyze one of the major problems of our time using one or more social scientific approaches.

000X To explain the general nature of science and technology and some of the major contemporary scientific or technological issues

000Y To resolve a simple problem by applying the basic scientific method.

000Z To communicate with limited skill in a modern language.

0010 To communicate on familiar topics in a modern language.

0067 To communicate with relative ease in a modern language.

0011 To recognize the role of mathematics or informatics in contemporary society.

0012 To use various mathematical or computer concepts, procedures and tools for common tasks.

0013 To consider various forms of art produced by aesthetic practices.

0014 To produce a work of art.



Course Competencies

037B To process information about working in the field of computerized systems technology.

243-123-VA The Profession
247-602-VA Stage

037C To process technical information.

247-103-VA Logic of Programming for Engineers
247-602-VA Stage

037D To solve mathematical problems associated with computerized systems technology.

201-206-VA Intro to Applied Math
201-305-VA Applied Math
201-375-VA Math3

037E To diagnose an analog electronics problem.

243-133-VA Electrical Technology
243-233-VA Analog Circuits
247-303-VA Analog and Digital Electronics

037F To diagnose a digital electronics problem .

243-234-VA Digital Circuits
247-201-VA Digital Systems
247-304-VA PC Hardware Troubleshooting
247-303-VA Analog and Digital Electronics
247-403-VA Networking 1

037G To diagnose a problem affecting a circuit containing a microprocessor..

247-302-VA Intro to Microprocessors
247-304-VA PC Hardware Troubleshooting
247-502-VA Advanced Microprocessor Concepts

037H To diagnose a problem affecting a computerized systems network.

247-403-VA Networking 1
247-505-VA Networking 2
247-605-VA Network Troubleshooting

037J To troubleshoot a computerized system.

247-304-VA PC Hardware Troubleshooting
247-605-VA Network Troubleshooting

037K To communicate in the work place

243-123-VA The Profession
247-602-VA Stage

037L To draw electronic schematic diagrams.

243-234-VA Digital Circuits
243-133-VA Electrical Technology
247-201-VA Digital Systems
243-233-VA Analog Circuits
247-302-VA Intro to Microprocessors



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247-303-VA	Analog and Digital Electronics
247-401-VA	Printed Circuit Board Design
247-402-VA	Microcontroller Hardware Design
247-502-VA	Advanced Microprocessor Concepts
247-503-VA	Integrated Circuits PLDs
247-603-VA	MicroController Applications
247-604-VA	Telecommunications

037M To plan a computerized system project.

247-502-VA	Advanced Microprocessor Concepts
247-602-VA	Stage
247-604-VA	Telecommunications

037N To design printed circuits.

247-401-VA	Printed Circuit Board Design
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037P To produce a computerized system prototype.

247-402-VA	Microcontroller Hardware Design
247-502-VA	Advanced Microprocessor Concepts
247-503-VA	Integrated Circuits PLDs
247-602-VA	Stage

037Q To integrate and install computerized system components.

247-401-VA	Printed Circuit Board Design
247-402-VA	MicroController Hardware Design
247-502-VA	Advanced MicroProcessor Concepts
247-503-VA	Integrated Circuits PLDs
247-602-VA	Stage
247-603-VA	MicroController Applications
247-605-VA	Network Troubleshooting

037R To write computerized system procedures.

247-402-VA	MicroController Hardware Design
247-602-VA	Stage
247-603-VA	MicroController Applications
247-605-VA	Network Troubleshooting

037S To program computerized systems.

247-103-VA	Logic of Programming for Engineers
247-203-VA	Assembly Language Programming
247-301-VA	C Language Programming
247-302-VA	Intro to MicroProcessors
247-402-VA	MicroController Hardware Design
247-403-VA	Networking 1
247-404-VA	Advanced Programming in C Language
247-501-VA	Advanced Programming in Microprocessors
247-502-VA	Advanced MicroProcessor Concepts
247-505-VA	Networking2
247-601-VA	Real Time Systems
247-602-VA	Stage
247-603-VA	MicroController Applications



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037T To modify computerized system programming.

247-404-VA	Advanced Programming in C Language
247-501-VA	Advanced Programming in Microprocessors
247-601-VA	Real Time Systems
247-602-VA	Stage
247-603-VA	MicroController Applications
247-604-VA	Telecommunications

037U To perform activities related to optimizing a computerized system.

247-504-VA	New Developments in Digital Technology
247-602-VA	Stage
247-603-VA	MicroController Applications
247-604-VA	Telecommunications
247-605-VA	Network Troubleshooting

037V To perform activities related to designing a computerized system.

247-402-VA	Microcontroller Hardware Design
247-603-VA	Microcontroller Applications
247-604-VA	Telecommunications



**Computerized
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Semester 1, Fall		Ponderation				
Course Num	Title	Lec	Lab	Homework	Credits	
243-234-VA	Digital Circuits	2	2	1	1,67	
243-133-VA	Electrical Technology	3	2	1	2,00	
247-103-VA	Logic of Programming for Engineers	1	3	2	2,00	
243-123-VA	The Profession	1	2	1	1,33	
201-206-VA	Intro to Applied Math	2	2	2	2,00	
Program Specific Total		10	10	7	9,00	
Contact Hours		20				
603-101	English 1	2	2	4	2,67	
345-102 / 103	Humanities 1	4	0	3	2,33	
109-103	Physical Education 1	1	1	1	1,00	
General Education Total		7	3	8	6,00	
Contact Hours		10				
8 Courses Total		17	13	14	14,67	
Total Contact Hours		30				

Semester 2, Winter		Ponderation				
Course Num	Title	Lec	Lab	Homework	Credits	
247-201-VA	Digital Systems	3	2	1	2,00	
243-233-VA	Analog Circuits	2	2	1	1,67	
247-203-VA	Assembly Language Programming	3	3	2	2,67	
201-305-VA	Applied Math	2	2	2	2,00	
Program Specific Total		10	9	6	8,33	
Contact Hours		19				
603-102	English 2	2	2	3	2,33	
345-103 / 102	Humanities 2	3	0	3	2,00	
109-104	Physical Education 2	0	2	1	1,00	
	Complementary 1	3	0	3	2,00	
General Education Total		8	4	10	7,33	
Contact Hours		12				
7 Courses Total		18	13	17	16,00	
Total Contact Hours		31				



**Computerized
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Semester 3, Fall					
Course Num	Title	Ponderation			Credits
		Lec	Lab	Homework	
247-301-VA	C Language Programming	3	3	2	2,67
247-302-VA	Intro to MicroProcessors	2	3	2	2,33
247-303-VA	Analog and Digital Electronics	2	2	1	1,67
247-304-VA	PC Hardware Troubleshooting	1	2	1	1,33
201-375-VA	Math3	2	2	1	1,67
Program Specific Total		10	12	7	9,67
Contact Hours		22			
603-HSD	English B	2	2	3	2,33
602-10x	French 1	2	1	3	2,00
109-105	Physical Education 3	1	1	1	1,00
General Education Total		5	4	7	5,33
Contact Hours		9			
7 Courses Total		16	15	14	15,00
Total Contact Hours		31			

Semester 4, Winter					
Course Num	Title	Ponderation			Credits
		Lec	Lab	Homework	
247-401-VA	PCB Design	0	4	2	2,00
247-402-VA	MicroController Hardware Design	2	4	3	3,00
247-403-VA	Networking 1	3	3	2	2,67
247-404-VA	Advanced Programming in C Language	3	3	2	2,67
Program Specific Total		8	14	9	10,33
Contact Hours		22			
603-103	English 3	2	2	2	2,00
602-HSD	French B	2	1	3	2,00
345-HAS	Humanities B	3	0	3	2,00
General Education Total		7	3	8	6,00
Contact Hours		10			
7 Courses Total		15	17	17	16,33
Total Contact Hours		32			



**Computerized
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Semester 5, Fall					
Course Num	Title	Ponderation			Credits
		Lec	Lab	Homework	
247-501-VA	Advanced Programming in Microprocessors	3	4	2	3,00
247-502-VA	Advanced MicroProcessor Concepts	2	4	2	2,67
247-503-VA	Integrated Circuits PLDs	3	4	3	3,33
247-504-VA	New Developments in Digital Technology	2	2	2	2,00
247-505-VA	Networking 2	2	3	2	2,33
Program Specific Total		12	17	11	13,33
Contact Hours		29			
	Complementary 2	3	0	3	2,00
General Education Total		3	0	3	2,00
Contact Hours		3			
6 Courses Total		15	17	14	15,33
Total Contact Hours		32			

Semester 6, Winter					
Course Num	Title	Ponderation			Credits
		Lec	Lab	Homework	
247-601-VA	Real Time Systems	2	2	2	2,00
247-602-VA	Stage	1	10	4	5,00
247-603-VA	MicroController Applications	2	4	3	3,00
247-604-VA	Telecommunications	2	3	2	2,33
247-605-VA	Network Troubleshooting	1	3	2	2,00
Program Specific Total		8	22	13	14,33
Contact Hours		30			
5 Courses Total		8	22	13	14,33
Total Contact Hours		30			



Computerized Systems Technology

	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Program
Program Specific							
Total Credits	9,00	8,33	9,67	10,33	13,33	14,33	65,00
Total Hours	20	19	22	22	29	30	2130
General Education							
Total Credits	6,00	7,33	5,33	6,00	2,00	0	26,67
Total Hours	10	12	9	10	3	0	660
Program							
Total Credits	15,00	15,66	15,00	16,33	15,33	14,33	91,67
Total Hours	30	31	31	32	32	30	2790