PROGRAM REVIEW REPORT

on the

ELECTRONICS PROGRAM

MAY , 1995

SUMMARY

On the positive side, the Review Committee found much to applaud in the Electronics Program:

- **the high employment rate of its graduates (81%) in relation to the provincial occupational programs' average (70%);**
- **the continued demand for Electronics graduates, especially TCOM and CTEC specialists;**
- **the exciting possibilities for program development in Secondary Wood Processing and technologist-level Electronics;**
- **the success of the Co-operative Education option in the Electronics program.**

However, despite these successes, the Electronics Program is beset with ongoing and as yet unresolved problems. Eight years ago, in 1987, the first Electronics program review made 21 recommendations. Of these, 14 have been implemented and some have been overtaken by events. Seven remain unactioned, and these seven are identified once again by the Electronics Program Review Committee in this program review report. They concern:

- **the perennial capital equipment starvation of the program;**
- **the need for properly constructed learning objectives and course outlines within the program;**
- **the need for validation of these objectives by the Program Advisory Committee;**
- **continued revitalization of that Advisory Committee;**
- **the requirement that faculty in a "cutting-edge" program such as this maintain technical currency;**
- **the need to teach literacy and communication skills;**
- **the desirability of increasing female enrolments.**

To these the 1995 Electronics Review Committee adds three further concerns:

- **the need for more explit strategic planning in the program;**
- **funding formula problems attendant on the 1990 shift from a 12-month to a 16-month format;**
- **the deterioration in cleanliness in the Electronics Laboratories.**

All in all, the Review Committee makes a total of 23 new recommendations to address these areas of concern.

The Electronics program can position itself to capitalize on its previous success and current strengths only if it does the following:

- **engages in appropriate strategic planning and clarification of its program objectives and curriculum;**
- **persuades its Advisory Committee to give it firm direction and leadership;**
- **maintains its faculty's currency in a planned and systematic manner;**
- **finds ways to prevent equipment obsolescence from draining the credibility of the program.**

ELECTRONICS
PROGRAM REVIEW

TABLE OF CONTENTS

ELECTRONICS EVALUATION COMMITTEE MEMBERS

CHAIR	**John Bratton** Chairperson, Management and Marketing
ASSISTANT CHAIR	**Dennis Morin** Instructor, Carpentry
EXTERNAL REP.	**John Dobson** Manager, Electrical Plant, Newnes Machine Salmon Arm
EXTERNAL REP.	**Pat Mulldoon** Chief Instructor, Electronics Technician Program British Columbia Institute of Technology
RESOURCE PERSON	**Don Graham** Chairperson, Electrical & Electronics
RESOURCE PERSON	**Kathie Bryenton** Coordinator, Co-operative Education
DIVISIONAL DEAN	**Earl Bloor** Dean, Applied Industrial Technology
ASSIST. DEAN	**Howard Mayer** Assistant Dean, Applied Industrial Technology
REVIEW CO-ORDINATOR	**Alastair Watt,** Associate Director, Institutional Research & Planning
GRAPHICS & ANALYSIS	**Larry Xiong** Research Analyst
DATA ENTRY	**Liv Andrew** Institutional Research Clerk

1994-95 ELECTRONICS PROGRAM REVIEW CHRONOLOGY

The Electronics Program Review was initiated on August 23, 1994, with requests for historical and contextual data from Earl Bloor, Dean, Applied Industrial Technology, and Don Graham, Chairperson, Electronics and Electrical Trades. Three days later, on August 26, a similar request was sent to Carole Hebden, Manager, Co-operative Education, as the intent was to evaluate both the conventional and the co-op options of the Electronics program simultaneously.

Meetings on background information and questionnaire design were held with Don Graham on September 6 and 30, with Earl Bloor on September 9, and with both on October 18. Carole Hebden was consulted on September 1, October 5, 13 and 21, and November 17 and 24.

On November 1 the decision was made to delay the mail-out survey questionnaires until January, 1995, as employer and former student lists had not been forthcoming from the Electronics faculty. In the meantime, the internal survey work proceeded: current CAST and CTEC students (2nd year) were surveyed on November 28, 1994, as were the Electronics faculty. Co-operative Education staff were surveyed on December 1 and focus-grouped on December 5.

To expedite the updating of former student lists, further meetings were held with Don Graham on December 12 and with the members of the Electronics faculty (D. Graham, A. Green, H. Reiser, R. Opp, J.S. Bourget) on December 19, 1994. Former Electronics students (1989-94) were surveyed by mail on January 6, 1995. Follow-up by mail on this group was done on January 27.

Assistance to the Office of Institutional Research on employer lists was provided by H. Reiser (January 11), J.S. Bourget (January 13), and R. Opp (January 16). Finally, employers were surveyed by mail: CAST employers on January 16, and CTEC and TCOM on January 18. The Electronics Advisory Committee was surveyed on January 20, and the remaining current students--TCOM (2nd year) and CORE (1st year)--on January 23 and 24 respectively. Mail follow-up on employers and the Advisory Committee was done on February 10, and telephone follow-up on former students, employers and the Advisory Committee between February 21 and 28. The cut-off date for responses was March 21. The Electronics Program Review Evaluation Committee (PEC) met to analyze the collected data on April 26 and 27, 1995.

PROGRAM BACKGROUND AND CONTEXT

The Electronics Program has been in place at the University College of the Cariboo (formerly Cariboo College) since 1972. Initially a 10-month general electronics program, it split into a Home Entertainment Products Servicing (HEPS) and Telecommunications (TCOM) in 1974 and added Electronic Business Machines (EBUM) in 1979. In 1980 it moved to a 12-month format and eliminated the HEPS option. Computer Maintenance Technician (CTEC) superceded EBUM in 1982, and Computer Automated Systems Technician (CAST) was started in 1985. The program was first reviewed in 1987.

In the last eight years the following changes have taken place:

- the program has been extended from 12 to 16 months' duration;
- co-operative education options have been introduced in all streams: CAST and CTEC (1990) and TCOM (1992); this route provides for two four-month workterms, which effectively extends the program to 24 months;

- one intake per year has been eliminated: up to 1990, students could start CAST or CTEC, on an alternating basis, in May; that intake is gone, and now CAST and CTEC students start in September, TCOM in January;

- each specialty (CAST, CTEC and TCOM) is preceded by an eight-month CORE Electronics program; students may exit, though few do, after this section;

- the Computer Maintenance Technician option was renamed the Computer Systems Technician option in 1992.

Electronics Technician programs are also offered at BCIT, VCC (12-month program), and Malaspina and North Island College (CORE electronics only). Selkirk College is preparing distance delivery of CORE electronics. In addition (and perhaps an indication of the future), the University-College of the Fraser Valley is offering CORE electronics in partnership with the Abbotsford School District and consulted UCC on the implementation of this progam. Of the specialties, VCC offers options similar to CTEC, TCOM is offered at BCIT and VCC, and CAST is unique (although BCIT does offer robotics as a technology program).

The Ministry of Skills, Training, and Labour has recently expended great effort in articulating the electronics curriculum on a provincial, national and international basis. The CORE electronics blueprint has been accepted across Canada; TCOM curriculum is accepted as the BC standard, and CTEC is under development. As a result, students across Canada and the U.S. will be able to access electronics training on a building block basis.

ADMISSIONS DATA AND PERFORMANCE STATISTICS

Admissions Requirements:

a) Educational Requirements

1) B.C. Grade 12 or equivalent.
2) B.C. Math 11 or equivalent.
3) B.C. Physics 11 or equivalent.
4) B.C. Math 12 or Physics 12, Chemistry 11 or Electronics 12 strongly recommended.
5) All applicants will be required to write a CAT 19 test.
6. Adults with appropriate related experience may present this in lieu of regular admission requirements.

b) General Requirements

1) Instructor interview.

Program Capacity:

Program capacity has oscillated between 84 FTE in 1988, 98 FTE from 1989 to 1992, and back to 84 in 1993 and 1994. The first year (CORE) intake is usually 60, with the second-year options accommodating up to 16 students each.

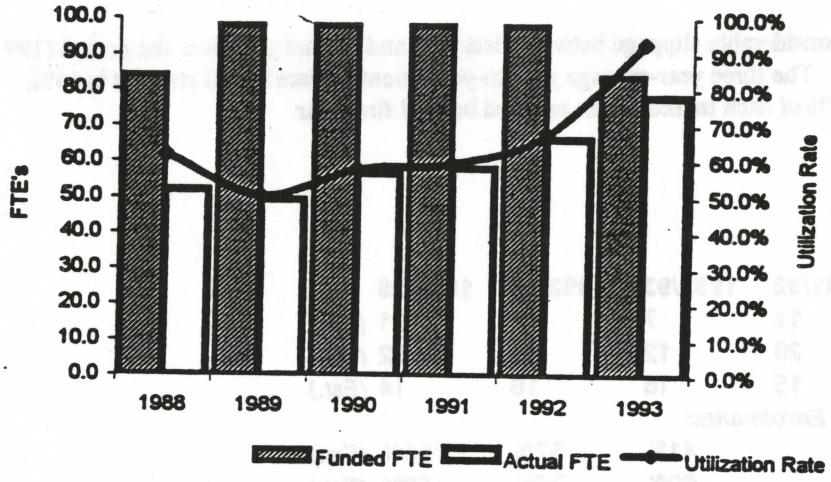
Program Demand:

		# Admitted	Enrolled	Wait listed	Incomplete/Denied	Total Appl's
1994						
CAST	YR 1	20	14	0	12	32
	YR 2	15	15	0	0	15
CTEC	YR 1	19	18	0	20	39
	YR 2	15	15	0	0	15
TCOM	YR 1	20	14	6	1	27
	YR 2	21	n/a	5	0	26
1993						
CAST	YR 1	20	14	2	4	26
	YR 2	12	12	0	0	12
CTEC	YR 1	25	25	0	2	27
	YR 2	14	14	0	0	14
TCOM	YR 1	n/a	n/a			
	YR 2	n/a	n/a			
1992						
CAST	YR 1	21	21	0	4	25
	YR 2	5	5	0	3	8
CTEC	YR 1	19	17	0	7	26
	YR 2	17	17	0	0	17
TCOM	YR 1	n/a	n/a	-	-	13
	YR 2	n/a	n/a	-	-	13

Program demand, measured as the total number of applications in relation to the program capacity, has been in excess of or equal to the number of seats available for the last two to three years. "N/A" means that the data has been deleted from the Student Record System, and is therefore not available.

Electronics Program Utilization Rates: 1989-94

	1988	1989	1990	1991	1992	1993	1994
Funded FTE	84.0	98.0	98.0	98.0	98.0	84.0	84 (Est.)
Actual FTE	52.0	49.2	56.6	58.1	66.2	78.1	74 (Est.)
Utilization Rate	61.9%	50.2%	57.8%	59.3%	67.6%	93.0%	88.1% (Est.)



"Program utilization rate" is the number of actual registrations divided by the number of funded seats. For Electronics, this is calculated by adding the number of first and second year students and dividing that figure by the number of funded "full-time equivalents" (FTE's). The Ministry of Skills, Training and Labour and those responsible for program management at institutional level set great store in utilization rates as measures of efficiency.

As can be seen, Electronics program utilization rates have been a source of concern for the past six years, and in spite of some improvement in 1993 and 1994, continue to be so. Electronics' utilization rates of 62%, 50%, 58%, 59% and 68% for the years 1988, 1989, 1990, 1991 and 1992 were the worst in the Applied Industrial Technology Division for three years out of the five cited, outdone only by Commercial Transport (44%) in 1990 and Heavy Duty Mechanics in 1992. In the last two years, 1993 and 1994, utilization rates of 93% and 88% (est.) indicate a revival of efficiency, but the Electronics program has a ten year record (1984-1994) of never having surpassed 93% utilization. Though funded to deliver 84 FTE's annually, the very best the program can do, even with full enrolments of 60 at first year level and 48 at second year level is 81.5 FTE's or 97% utilization (60 students x 154 training days at first year level yields 45.3 FTE's; 48 x 154 training days at second year gives 36.2 FTE's: total 81.5 FTE's). The last two years (1993-94 and 1994-95) have reasonable utilization rates because of increased program demand, better prepared incoming students, and the factoring of Co-op work terms into the FTE utilization calculation.

Electronics Program Retention Rates (Year 1 to Year 2):

	Head Count				Retention Rate		
	1991/92	1992/93	1993/94	1994/95	1992	1993	1994
CORE/CAST	17	21	20				
CORE/CTEC	20	20	24		% Continued from Year 1 to Year 2		
CORE/TCOM*	20	24	22				
CAST		7	13	12	41.2%	61.9%	60.0%
CTEC		14	15	13	70.0%	75.0%	54.2%
TCOM*		16	16	15	80.0%	66.7%	68.2%

It should be noted that there is considerable slippage between first year and second year over the period (1991-94) for which data are available. The three year-average year-to-year retention rate for all streams is 64%, which means that on average 36% of each intake do not proceed beyond first year.

Electronics Completion Rates:

Graduation	1990/91	1991/92	1992/93	1993/94	1994/95
CAST	9	14	7	12	11 *(Est.)*
CTEC	14	20	12	14	12 *(Est.)*
TCOM	12	15	16	16	14 *(Est.)*
Graduation Rate as % of 1st Year Enrolments:					
CAST			41%	57%	55% *(Est.)*
CTEC			60%	70%	50% *(Est.)*
TCOM			80%	73%	64% *(Est.)*
Graduation Rate as % of 2nd Year Enrolments:					
CAST	90%	93%	100%	92%	92% *(Est.)*
CTEC	88%	95%	86%	93%	92% *(Est.)*
TCOM	86%	94%	100%	100%	92% *(Est.)*

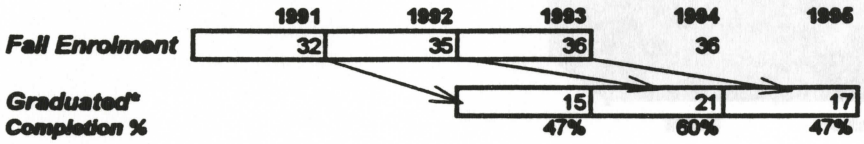
Completion rates are calculated by dividing actual graduates in each specialty by the number of students who declared that specialty their intended goal at enrolment. Thus of the 17 students who declared for the CAST option, 7 graduated in 1993, yielding 41% completion rate.

Measured as cohort survival, i.e. from Year 1 to completion, Electronics graduation rates are low: CAST has a 51% average over the three-year period 1992-95, CTEC a 60% average and TCOM a 72% average. Measured as a percentage of those who start Year 2, these figures improve to 95% (CAST), 90% (CTEC) and 90% (TCOM), respectively. Higher than average attrition in the range of 36% and above occurs at CORE level, and prompts the question whether this is too high (it is certainly significantly above career-technical and vocational averages) and why, with only 48 places available at second year level, the program appears to be setting up a third of each intake for failure.

As a footnote, in comparison with Electronics programs at other insititutions (nationally) UCC completion rates are quite favourable (other institutions have 50% completion).

Questions may also be raised about the Electronics program's completion rates in the context of other career/technical and vocational programs. Its three year average completion rate (1993-95) of 61% (1993 = 61%; 1994 = 65%; 1995 = 56%) compares unfavourably with that of other vocational programs, which falls in the 85% - 100% range. But Electronics sees itself as a career-technical program similar to CSOM (Computer Systems: Operations and Management) and CADD (Computer Aided Design and Drafting). Beside their three year average completion rates of 51% (CSOM) and 55% (CADD), Electronics' 61% appears in a better light.

Completion Rates of CSOM Program



* Counts at Convocations.

CADD Program Enrolments & Completion Rates

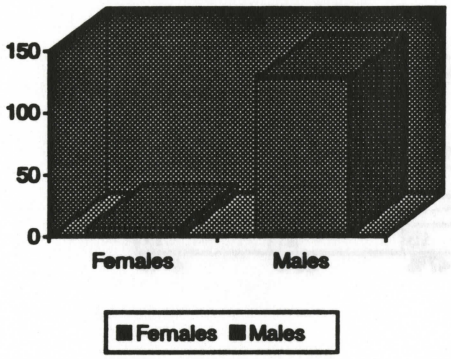
Year 1 Intake				
1990	1991	1992	1993	
36	30	39	40	

	Completed			
	1992	1993	1994	1995
	14	16	23	21
Completion Rate	38.9%	53.3%	59.0%	52.5%

Gender Ratio:

The gender ratio of students who took the Electronics program between 1989 and 1994 is roughly 16:1 in favour of males: of 137 students graduating from the program during this period, 8 were female and 129 male.

1989-1994 ELECTRONICS GENDER RATIO



The Review Committee recorded some concern that over the period under review, and despite initiatives such as Women in Trades and Technology (WITT), the number of females attracted to the program continues to remain low. The gender ratio of students who took the Electronics program during this period is 16:1 in favour of males with only eight female enrolees. In contrast, in the Computer Systems: Operations and Management (CSOM) Program, the gender ratio of students is approximately 7:3 in favour of males: of 110 students during a similar period, 34 were female and 76 male. The admissions data indicates that greater efforts must be made to increase the participation of women in the program.

Research has identified a number of classifications of barriers to post-secondary institutions for women including economic barriers, social barriers, psychological barriers and institutional barriers. A study by Moore (1985)[1] cited general institutional barriers more frequently than other types of barriers; however, when respondents were asked to identify one *major* barrier, social barriers (65%) predominated over institutional barriers. The Electronics faculty should endeavour to make the program and the career of Electronics more attractive to females. Appropriate recruitment material, for example, and the identification and the removal of barriers, real or perceived, can help increase the attractiveness of the program for women. Given the heavy teaching assignment of the Electronics faculty, it is also recognized by the Review Committee that resources and expertise from the Counselling Department and interest groups are needed to achieve this goal.

---

[1]Moore, W. *Barriers Non-traditional Age Freshmen Women Encounter as they Seek Entrance to Four Year Colleges and Universities.* 1985

EMPLOYMENT PROSPECTS

Types of Employment:

The CORE Electronics program prepares students for low-end manufacturing assembly work. For graduates of the three specialty options, there is considerable overlap of potential jobs for graduates, but all generally enter technician-level jobs in installation, operation, maintenance and repair. CTEC graduates focus primarily on computer systems and work for employers such as computer retailers, school districts and colleges. CAST graduates focus on industrial automation and process control, and work in mills and for companies which design and manufacture automated systems. TCOM graduates generally enter the communications industry and work with satellites, LANs, telephone systems, and radio communications. Graduates of all three specialties can work on security systems.

Nature of Work:

Electronic equipment installers and repairers work on a variety of electronic equipment, including computers and peripherals, industrial computer controls, security systems, radio and television transmitters, and electronic recording equipment. Repairers test electronic components and circuits to locate defects and then replace faulty components and wiring. Work is usually indoors; many electronics technicians do on-going maintenance for factories and other organizations.

B.C. Job Prospects:

This occupational group is a fairly large job group with approximately 2,650 persons employed, but each separate occupation within this group is generally quite small. Employment is projected to grow much faster than average for this group, following extremely rapid growth in the previous few years as computer technology was widely introduced. Ongoing expansion of computer and electronics systems in all resource, manufacturing, and trade industries as well as most offices means that electronics technicians are now employed in many sectors of the economy, but predominant employment areas are electronics products manufacturing, construction, communications sectors, business services and government. There are always some added job openings when current workers retire or leave the field but, since this occupational field has a young workforce, these replacement needs will be limited. Total job openings, from growth and replacement, are estimated to total 1,470 from 1992 to 2001.

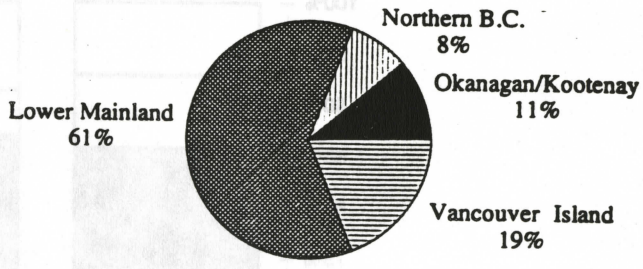
B.C. Employment Trends & Projections

	1986	1992	2001
Number Employed	1,730	2,650	3,790
Annual Growth 1992-2001:		4.0%	
Main Industries of Employment			
Business Services		14%	
Government		12%	
Electronics Products Manuf.		10%	

Estimated Job Openings in B.C. 1992-2001

Growth (Net)	Attrition	Total
1,130	340	1,470

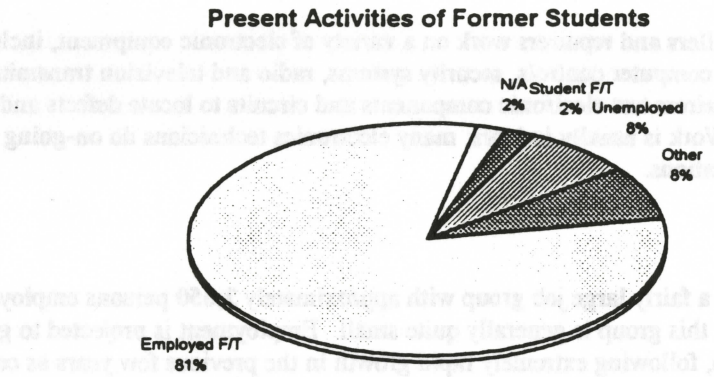
Employment by Region

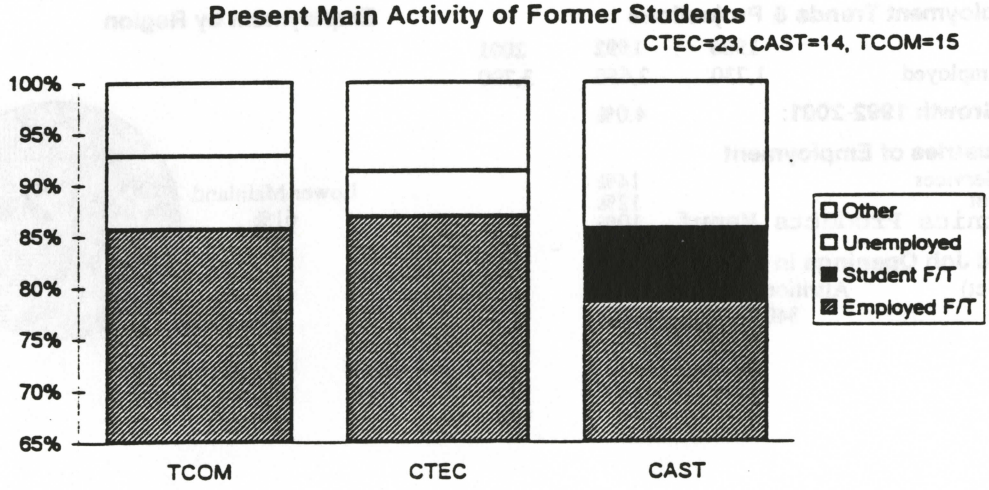


Further Education Opportunities:

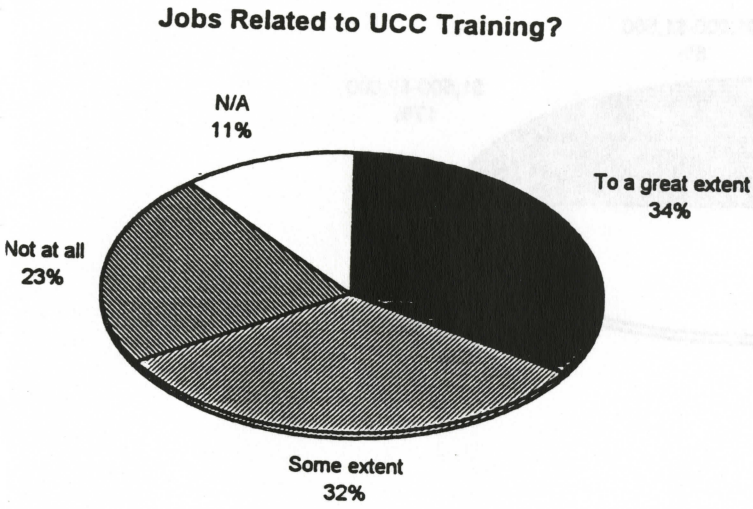
No formal pathways currently exist for Electronics technicians to upgrade their qualifications to technologist or engineer standard, although UCC is exploring the possibilities for bridging and add-on curriculum components that would eventually lead to technologist diploma and degree levels. At present update training may be available to technicians through their employers. As well, some employers offer apprenticeships in instrumentation mechanics or electrical work to their electronics technicians.

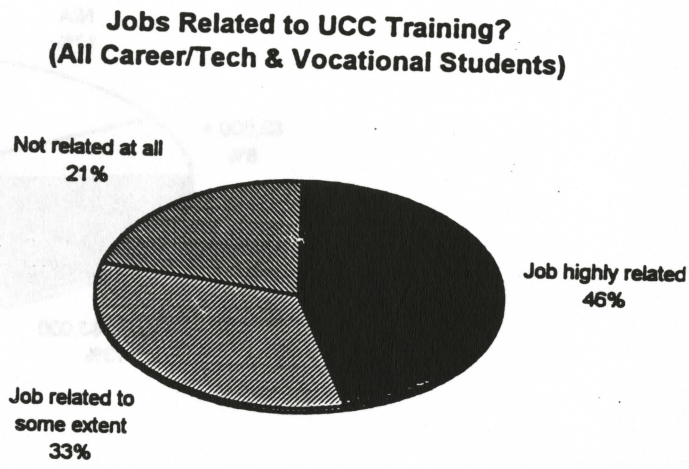
Employment Rates of Former Students:

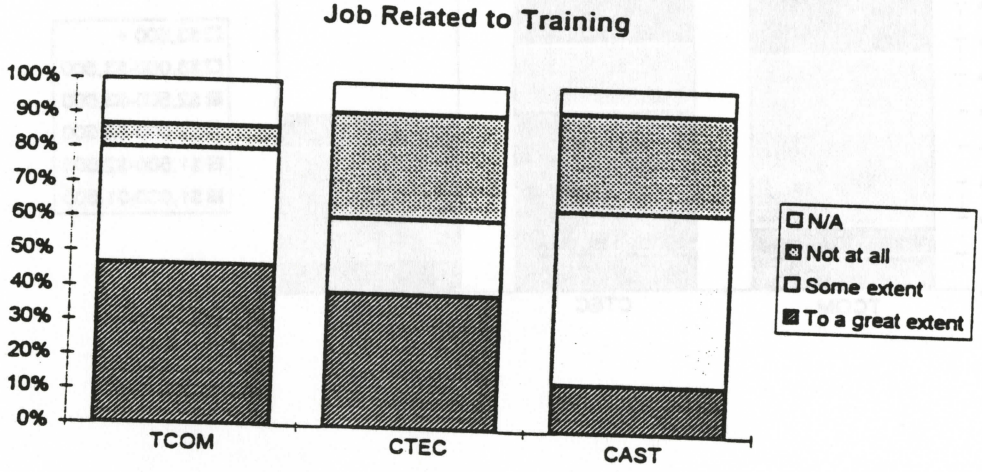




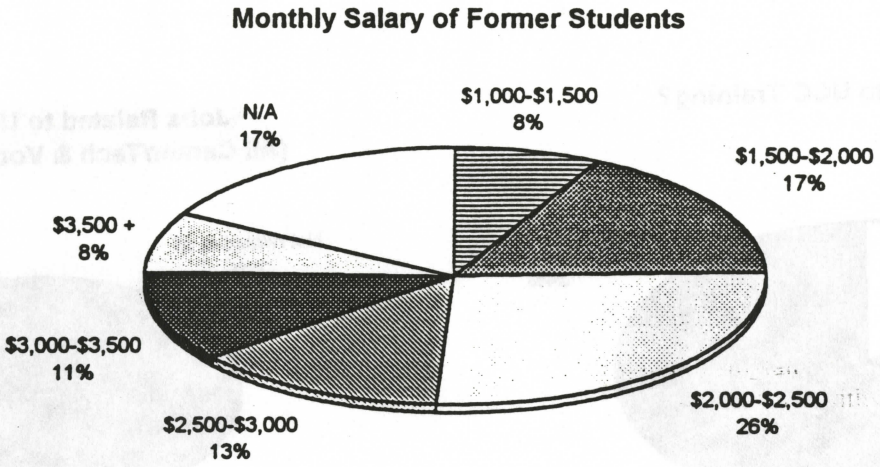
Relationship of Training to Employment:

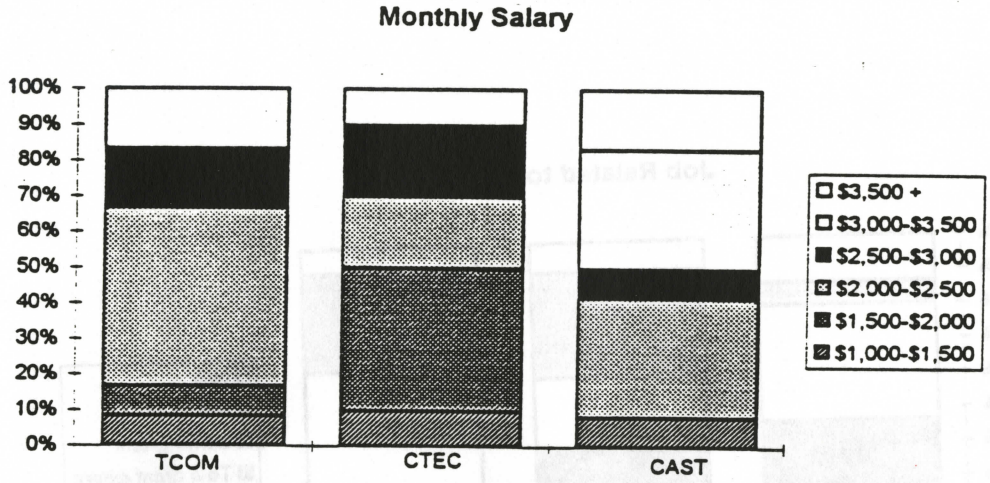






Current Salaries:





TABULAR SUMMARY OF QUESTIONNAIRE RESPONSES
ELECTRONICS PROGRAM REVIEW

The categories and quantities of responses are tabled below:

Recipient		# Sent	# Completed & Returned	% Returned
EMPLOYERS:	CAST	32 (16)	17	53%
	CTEC	33 (14)	16	48%
	TCOM	43 (15)	15	35%
		108 (45)	48	44%
ADVISORY:		15	10	67%
FACULTY:		8	8	100%
STUDENTS:				
- Current (CTEC & CAST)	2nd yr.	42	34	81%
- Current TCOM	2nd yr.	15	15	100%
- Current CORE		30	29	97%
FORMER STUDENTS:				
	CAST	42	17	40%
	CTEC	54	23	43%
	TCOM	39	12	31%
	CORE	02	01	50%
		137	53	39%
TOTAL		**355**	**199**	**56%**

Former Students:

Returned by Post Office:	20
Non-Respondents:	64

revised Mar. 22/95

c:/ELEC94/tablsumm.doc

SUMMARY OF QUESTIONNAIRE RESPONSES

1. Advisory Committee

Only ten out of 15 (67 %) Electronics Program Advisory Committee (EPAC) members responded to the survey. Following the recommendation of the 1987 Review Committee, the Advisory Committee was reconstituted in September, 1988 with new members representing most areas of the Electronics industry in the province. However, since 1989 the Committee has been moribund and was reconstituted for a second time in the fall, 1994. Copies of the minutes of two Committee meetings--September 27, 1994 and March 30, 1995--were made available to members of the Review Committee.

The Review Committee reaffirmed the importance of the Advisory Committee. It is viewed as the critical linkage between the institution and employers, advising the Electronics faculty on, among other things, curriculum changes and on the degree to which the three programs fulfill the needs of employers. Rapid technological change necessitates regular articulation between Advisory Committee members and the Electronics faculty if the programs are to serve the needs of both students and employers.

The data indicate that the Advisory Committee members are dissatisfied with their input into curriculum design. The recorded rating for curriculum input was 3.14 on a 5-point scale (where 5 is "very satisfied and 1 is "very dissatisfied"), and the frequency of meetings scored 2.88. The subjective comments also suggest a need to clarify the role of Committee members.

Regarding the program itself, of ten items, half scored below a mean of 3.50. In particular, the inadequacy of the program in developing written communication skills was an area of concern registered by the respondents. It was noted that written communication skills were perceived to be a problem and requiring attention in the 1987 review as well.

The Advisory Committee registered its concern that obsolete test and training equipment and poor facilities--a recurring theme throughout all the survey responses--are impeding the quality of instruction. At the March 1995 Advisory Committee meeting it was decided to establish three subcommittees to pursue acquisition of new equipment for the three Electronics programs.

As far as program outcomes are concerned, the respondents were generally satisfied with the quality of UCC graduates. The ratings given by the Advisory Committee all scored above a 3.50 mean for this area.

There were several complimentary comments on the enthusiasm and the quality of instruction.

2. Employers:

Questionnaires were sent to 108 employers, of whom 48 responded, giving a response rate of 44 %.

In general, employers are reasonably satisfied with the training of both co-op and non-co-op graduates. Of the 28 outcomes that employers were asked to evaluate for co-op graduates, only two were rated below 3.50. The exceptions were employers' preference for UCC co-op students in relation to those of other institutions (rated 3.30) and preparation for employment (rated 3.44).

For non-co-op graduates, employers rated 17 outcomes above 3.50. Concern over writing skills was recorded, receiving a rating of 3.43. A number of the respondents indicated that they were unable to suggest improvements to the programs because they had insufficient knowledge about the curriculum (12 mentions). Among the areas where additions were requested were fibre optics, diagnostic and trouble-shooting, PBX and writing skills.

2. **Employers (Continued):**

Employers' perceptions and feedback from the UCC Co-op Coordinator indicate that non-technical skills--interpersonal, work ethic, attitudes and written and oral communications--need to be given greater emphasis. The Review Committee noted that such so-called "soft" skills can continue to be developed through student team projects, and by faculty emphasizing punctuality, time management skills and appropriate behaviour, without undermining the quality of instruction in the technical area of the curriculum.

The Review Committee discussed the advertising brochures for the three Electronic options and suggested that the material, as formatted, might be misinterpreted by employers. This can result in unrealistic expectations of UCC students' level of expertise and readiness for the work term.

3. **Former Students:**

Between 1989 and 1994, 137 students graduated from the Electronics programs. Of 137 questionnaires sent out, 53 respondents replied giving a response rate of 39%. This compares with a 44% response rate from former CSOM students in the 1995 CSOM review.

Data indicated that 55% of the respondents were over 30 years of age. Of the 53 respondents, only one was female. A large proportion of the respondents, 81%, reported they were in full-time employment, which suggests that graduates are leaving the programs with employable skills. Seventy-two percent of respondents indicated an interest in upgrading their qualifications to technologist. Twenty-three percent evinced interest in studying for a baccalaureate degree in Applied Science.

The effectiveness of the programs in promoting practical/technical skills was ranked highly by former graduates (4.21 on a 5-point scale, where 5 is "very satisfied" and 1 is "very dissatisfied"). The principal concerns were lack of career information (2.90); the effectiveness of the program in promoting verbal communication skills (3.37); and adequacy of supplies and equipment (3.21).

The degree of satisfaction varied between individual Electronic programs. Computer Automated Systems Technician (CAST) graduates rated eight of the 24 items below 3.50. The principal concerns were information on career opportunities (2.85); adequacy of supplies and equipment 3.21) and development of verbal communication skills (3.15).

The Computer Maintenance Technician (CTEC) graduates appeared to be satisfied with the program. Of 24 outcomes, 6 were rated below 3.50. The main concerns matched those of the CAST graduates, with additional concerns about written communication skills (3.39) and facilities for instruction (3.39).

The Telecommunications Technician (TCOM) graduates evinced a relatively high level of satisfaction with the program. Eight of the 13 program specific outcomes were rated 4.0 or above. Graduates felt they should be given more career guidance (3.13) and employment preparation (3.2). However, the Review Committee, while acknowledging these concerns, feels that some onus should fall on students themselves to find out about career opportunities.

Suggestions for additions to the current CAST program included PLC5 (4 mentions); greater practical experience (4 mentions); and programming skills (5 mentions).

Suggestions for additions to the CTEC program were Networking (8 mentions); computers/PCs (6 mentions); and Novell Engineer (3 mentions).

Respondents suggested the following improvements to TCOM: practical training on computers (4 mentions); fibre optics (2 mentions); networking (2 mentions); and business skills (2 mentions).

3. **Former Students (Continued):**

Some of the suggestions have already been implemented as part of the process of continual up-dating of the programs, for example, networking, fibre optics and the reduced time spent on TV and satellite repair in TCOM. However, the Electronics faculty felt strongly that the programs were designed to provide students with transferable skills, not specific Electronic skills. Faculty considered that many of the graduates' requests were for specific skills.

There were a number of very complimentary comments on the quality of instruction (8 mentions).

4. **Current Students--First Year**

Of 30 current students in the basic Electronics (CORE) program surveyed, in January 1995, 29 responded for a response rate of 97%. Fifty-two percent of respondents were over 25, with 7% (2) female students.

The data indicate that respondents currently are generally satisfied with the program. Of 42 generic services or outcomes that students were asked to evaluate, 7 were rated below 3.5. Of 11 outcomes reviewed in the area of program effectiveness, three were a matter of concern: career guidance (3.00); employment preparation (3.44); and written communication skills (3.41). Of 11 outcomes reviewed for program content, procedures and resources, eight were rated over 4.0. Respondents registered concern over the adequacy of supplies and equipment (2.83), however.

The subjective comments revealed a wide range of ability; some respondents found the course very challenging, while others found it "much too easy," because they had Math 12 and Physics 12. Respondents suggested curriculum changes including more computer software (eg. DOS and Windows) (8 mentions) and trouble-shooting skills (4 mentions). Outdated library books, the high prices charged for books in UCC bookstore, and extra "hidden" costs for kits were cited as areas of concerns. The Review Committee noted, however, that costs were clearly articulated in the orientation handout.

5. **Current Students--Second Year:**

Of 57 second year students, 49 responded for a response rate of 86%. Forty-five percent of respondents were over 25, with 8% (4) female students. Seventy-one percent of respondents indicated an interest in upgrading their qualifications to technologists. Twenty-two percent evinced interest in studying for a baccalaureate degree in Applied Science.

Generally, second year students were considerably more critical than first year students of the Electronics program. Of 42 generic services or outcomes that students were asked to evaluate, 21 were rated below 3.5 (where 1 is "very dissatisfied" and 5 is "very satisfied"). No service or outcome received a rating of 4.0 or more. The data indicate the longer the students are in the program, the greater the level of dissatisfaction. For all second year students, adequacy of supplies and equipment received a rating of less than 3.0. Adequacy of facilities (3.18), bookstore (3.21), career resource centre (3.22), study, time management and stress workshops (3.29), career information (3.26), and the general level of instruction (3.29), all received ratings of less than 3.50.

Among CAST students, seven items were rated below 3.0: career counselling (2.67); career resource centre (2.00); recreation services (2.75); bookstore (2.78); workload (2.9); career information (2.9); and adequacy of supplies and equipment (1.9).

5. **Current Students–Second Year (Continued):**

The subjective comments of CAST students identified a number of concerns including the uneven workload (2 mentions); and more digital electronics (2 mentions). The Review Committee noted that these concerns related to first year rather than second year curriculum.

Current CTEC students rated five items below 3.00: education advising (2.8); study skills (2.00); financial assistance (2.8); and promoting professional conduct (2.91). Of 24 program outcomes, eight were rated below 3.50.

Suggestions for additions to or greater emphasis in the CTEC program included the promotion of professionalism, extra time on digital and microprocessor concepts, and a more structured practical program. The need for newer technology was mentioned by several CTEC respondents (6 mentions).

Current TCOM students rated two of the 24 program outcomes below 3.0: availability of instructors for consultation (2.56) and adequacy of supplies and equipment (1.93).

The subjective comments of current TCOM student evinced concerns in one particular area: dissatisfaction with the instruction (9 mentions). Some instructors, for example, were criticized for not knowing their discipline, for disorganization, and for lack of preparation. The microprocessor course was identified as the hardest course by the respondents (7 mentions).

The suggestions made for additions to or greater emphasis in the TCOM option included more fibre optics (2 mentions) and more opportunity to work on newer technology (7 mentions).

7. **Faculty:**

Eight Electronics faculty and staff completed the questionnaire for a 100 % response rate.

In general, faculty expressed satisfaction with the current program. Of 12 outcomes that faculty were asked to evaluate for the program, only two were rated below 3.50: development of oral communication skills (3.14) and written skills (3.29).

Articulation and internal communications about the program were perceived to be areas that can be improved: external and internal communications scored (3.43) and (3.29) respectively.

Faculty perceive the outcomes for co-op graduates to be satisfactory. Of 17 outcomes pertaining to co-op graduates, 10 scored 4.0 or greater. One outcome, math and computational skills, was less than satisfactory (2.71). The development of writing skills (3.29), and oral communication skills (3.43) were also perceived as needing attention.

In general, faculty perceive the outcomes for non-co-op graduates to be less satisfactory. Of 17 outcomes measuring the performance of non-co-op graduates, only two scored more than 4.0: practical/technical skills (4.00) and quality of work (4.00).

The sequence of co-op work term and the relevance of co-op placements were perceived as a problem by some faculty.

The Program Advisory Committee (PAC) was not perceived to be performing its role and assuming its responsibilities. Information on market analyses and job projections and the frequency of Committee meetings were items needing attention (both areas were rated below 3.50).

7. **Faculty (Continued):**

Faculty responses indicated that the substantial areas of concern were the lack of time available for curriculum development, and a perceived inadequacy of equipment to teach the program. Of six questions relating to resources, five scored below 3.00 (on a 5-point scale, where 5 is "very satisfied" and 1 is "very dissatisfied"). Underlying both of these concerns is the complaint among Electronics faculty that 180 day instructional year with 25 days for professional development is excessive and does not allow adequate time for rigorous curriculum development.

Faculty ratings of some questionnaire items should be seen in the context of a perceived lack of support for the Electronics programs by the Divisional management. The deterioration of employee relations in the Division has eroded the morale of the Electronics faculty and has periodically made the Department dysfunctional.

The Review Committee has no mandate to examine the reasons why the AIT Division should be suffering from internal tensions. It was noted, however, that the timing of the survey coincided with the end of a long spell of teaching, when morale in the Electronics Department was particularly low.

The stresses and tensions attendant on adversarial human relations in the AIT Division explain, to some extent, the absence of a rigorous critical evaluation of the program by the Dean and Electronics faculty, and their general lack of preparation for the whole review process. It is clear, too, from the highly critical ratings accorded to the Electronics program by its second-year students in November 1994, that this atmosphere was noted by students and affected their perception of the program.

STRENGTHS OF THE PROGRAM

The review documentation did not include a critical appraisal of the existing program by the Divisional management team, Electronics faculty and the Program Advisory Committee. In identifying the strengths of the program, the Review Committee has not had the benefit of the Advisory Committee's and the faculty's own reflections on the program in the light of technological change, survey data and faculty's broader teaching experience. The Review Committee accordingly elicited feedback from survey data to identify the following strengths in the Electronics program:

1. **Employment Rates**

   The employment rate of 81% of former students (1989-94) is above the provincial average of 70% for all occupational programs and indicates that UCC graduates entering the labour market have employable skills. There are also examples of graduates becoming leaders in their field.

2. **Demand for the Program**

   Demand for the program is likely to continue since employment opportunities in Electronics are projected to grow faster than average, with an annual growth of 4% between 1992 and 2001.

3. **Laddering into Programs**

   The program structure offers multiple entry and exit points, and scope for laddering and development opportunities with new programs, such as cross-over between the Secondary Wood Processes and the CAST program. A high proportion of both former and current students expressed an interest in continuing their education beyond the diploma to technologist and degree level.

4. **Innovativeness**

   Insufficient capital equipment has compelled faculty and students to be versatile and innovative. Old equipment is modified for new applications. In response to these conditions, instructors have had to develop flexibility, problem-solving skills and adaptability to ensure their program's survival.

5. **Experiential Learning**

   Generally, in the CORE course and the three specialty options, the balance between theory and practice is perceived to be appropriate. Faculty have shown innovativeness and initiative in integrating theory and practice in recent years. In particular, the CAST program solicits projects from industry to further develop students' Electronic skills.

6. **Co-operative Education**

   Co-operative Education component provides a valuable period of work experience and training that develops within the student the confidence and ability to apply technical knowledge productively in an industrial environment. It also helps to foster and strengthen links between faculty and industry, and to introduce students to prospective employers.

7. **Curriculum Design**

   Along with BCIT, UCC Electronics instructors in the last few years have provided leadership in the re-writing and standardization of the BC Provincial Electronics curriculum (see p. 2). UCC Electronics instructors can take pride in the fact that the CORE curriculum has been accepted across Canada, and that of TCOM as the BC standard.

AREAS OF ELECTRONICS PROGRAM WHICH CAN BE IMPROVED (WITH RECOMMENDATIONS)

The purpose of this section of the report is to encourage continuous appraisal of management and faculty's activities in pursuit of excellence. It therefore highlights aspects of the Electronics program which the data and interviews suggest can be improved. The top five are priority items.

1. Capital Acquisition

Since the 1987 review, some old equipment, such as oscilloscopes, has been replaced. Nevertheless, obsolete equipment continues to impede the quality of instruction in all three Electronics options.

High quality Electronics programs cannot be sustained without adequate increases in the capital and operating budgets. The Review Committee recognizes that UCC is dependent on the Ministry as to adequate funding, but feels that greater priority should be given to replacing outdated equipment. With EPF transfer payments of $371 million set to be cut in 1996, the Review Committee feels that only well-equipped, high quality programs will survive in their current form, and that the UCC administration must find ways to obtain up-to-date equipment. The Review Committee noted that with the upcoming new AIT building the prospects for corporate donations to acquire new technology are very favourable. Charitable donations, however, should be in addition to an enlarged capital budget, and must not negate the need for greater capital expenditures.

Recommendation #1

That given the constant underfunding of capital equipment needs, the Vice-President, Dean, and Assistant Dean develop and implement a plan to attract corporate donations, sponsorships and additional funding for the new AIT building.

ACTION: Vice-President; Dean; Assistant Dean

2. Funding Formula

Concerns regarding the Electronics program utilization rates are related to the current funding fomula for the program (see p.4). The Review Committee feels that resolution of these concerns should be pursued.

Recommendation #2

That the Electronics Department develop a written proposal outlining the rationale and benefits of changing to the career-technical funding formula with a view of seeking support from the UCC Education Council.

ACTION: Electronics Chairperson; Electronics Faculty

3. Strategic Planning

A strategy is a plan for interacting with the external environment to achieve institutional goals. Strategic management is important for several reasons. The process provides a sense of direction so that the Divisional Management Team (DMG) and faculty know where to prioritize their resources and efforts. Further, it can help to highlight the need for innovation and change in response to regional and provincial education needs. It can also be used to involve faculty in planning, thus making it more likely that they will be active and supportive of change.

The Review Committee noted that the DMG had not undertaken a critical study to analyze AIT programs in view of changing regional educational needs and the 1993 university-college mandate statement.

Recommendation #3

That the Dean, Assistant Dean, DMG and the Electronics faculty analyze the Division's and the Electronics Program's priorities and competitive situation in preparation for the upcoming Three-Year Institutional Planning process, and in view of the upcoming withdrawal of EPF payments and their projected impact on post-secondary operating funding. This process will involve assessing Divisional and programmatic strengths and weaknesses, as well as provincial educational opportunities and regional threats: in other words, a SWOT analysis.

ACTION: AIT Dean; Assistant Dean; DMG; Electronics Faculty

4. **Facilities**

The Review Committee considered the existing levels of cleanliness and the storage of non-instructional items in the Electronics labs to be unacceptable. That a program that should be the flagship of "clean" technology and whose labs should be showcases for visiting employers should countenance the levels of cleanliness that the Review Committee saw is lamentable. The Director of Facilities, John Feller, was interviewed by members of the Review Committee and made aware of the shortfall in levels of janitorial service.

Recommendation #4

That the Assistant Dean and the Director of Facilities jointly develop and implement a plan to bring the janitorial services up to an acceptable standard.

ACTION: Assistant Dean; Director of Facilities

Recommendation #5

That the Electronics faculty and students maintain the aesthetics of the Electronics labs in a professional manner.

ACTION: Electronics Faculty

5. **Program Objectives**

The importance of clearly defined program and instructional objectives cannot be over emphasized. A statement of learning objectives presupposes a planned series of instructional steps. They provide the instructor and student with an overall view of the structure of the program and/or course. Also, they present the instructor with basis of a suitable assessment procedure.

Moreover, objectives assist the Review Committee to address two pertinent questions. First, are the program objectives currently being achieved, and second, in the light of contextual change, do these objectives remain appropriate?

The Electronics faculty are to be complimented on their efforts to develop detailed learning objectives for the CORE program that are recognized throughout the province. Nevertheless, the Review Committee noted the negative comments on program structure and organization from some students. For the three Electronics options, clearly enumerated learning objectives were absent. This report draws attention to the unacceptable idiosyncratic format of the course outlines presented for scrutiny; they did not comply with UCC guidelines.

Recommendation #6

That Electronics faculty undertake a curriculum review of the Electronics programs, with particular attention to:

(a) establishing behavioural objectives defined and stated in terms of learning outcomes, i.e. student attainment, for the CORE and the three options;
(b) translating these outcomes into course objectives, and enumerating them on the course outlines;
(c) ensuring that all course outlines conform to UCC guidelines (Policy 3009); and
(d) linking each course objective to one or more lesson plans.

ACTION: Electronics Faculty; Electronics Chairperson

Recommendation #7

That the Dean and Assistant Dean, AIT, ensure that adequate secretarial support is provided to produce these course outlines.

ACTION: Dean; Assistant Dean

Recommendation #8

That all Electronics Department program course outlines resulting from Recommendation #6 be submitted to the Electronics Advisory Committee for scrutiny, feedback and approval.

ACTION: Electronics Faculty; Advisory Committee

6. Curriculum

The Electronics faculty are to be complimented for their dedication and efforts to provide high quality training in transferrable electronic skills; the high employment rates of UCC graduates testifies to their success in this area. However, certain aspects of curriculum and related matters still need attention.

Recommendation #9

That Electronics faculty place greater emphasis on written communication skills. Pursuant to this goal, the faculty should seek input from the Advisory Committee for the type of writing skills required by employers (progress reports, accident reports, general composition). Also, they should consult with UCC English Department's technical writing instructors with a view of mounting a workshop on technical writing skills and promoting communication skills across the Electronics curriculum.

ACTION: Electronics Faculty; English Faculty

Recommendation #10

That Electronics faculty and the Advisory Committee consider changes in the TCOM option, including increased emphasis on fibre optics, trouble-shooting and PBX.

ACTION: Electronics Faculty; Advisory Committee

7. Program Admission & Recruitment

Employer data and input from the Co-op Coordinator indicate that students and employers perceive a greater emphasis on the Electronics programs should be given to computer software. Subjective comments also revealed student concerns over "hidden" costs for the program.

Recommendation #11

That Electronics faculty, in consultation with the Advisory Committee, establish demonstrable experience or a course(s) in DOS and Windows, as a prerequisite to program admission.

ACTION: Electronics Faculty; Advisory Committee

Recommendation #12

That Electronics faculty ensure that <u>total</u> semester costs (tuition, lab fees, kit, text and tool costs) appear prominently in the Admission Package, the UCC Calendar and the Electronics orientation handout.

ACTION: Dean; Electronics Chairperson

Recommendation #13

That faculty and the Program Advisory Committee (PAC) reconsider current entry requirements and explore additional selection instruments (e.g. a problem-solving exercise) for applicants to the program.

ACTION: Electronics Faculty; Advisory Committee

As a corollary to this, the Review Committee makes a further recommendation:

Recommendation #14

That Electronics faculty re-address the issues of attrition and completion rates, and decide as a program whether it can condone the higher than average rates of attrition outlined on p. 5 of this report, or whether these rates can be justified by the program's provision of education opportunities to the non-traditional learner who may not be able to meet higher academic prerequisites.

ACTION: Electronics Faculty

Recommendation #15

That Electronics Department continue to endeavour to make the program and the career of Electronics more attractive to females. Pursuant to this goal, the Women in Trades and Technologies Support Group (WITT) should be re-established, and the Career Information Events for Women should be continued.

ACTION: Electronics Faculty; Counselling Faculty; Dean; Assistant Dean

8. Co-operative Education

The data testify to the value of Co-op Education. The contribution of Co-op Coordinator Kathie Bryenton to the Review meetings also emphasized the instructional role of Co-op Education, and the benefits of Co-op Coordinators collaborating and cooperating with faculty in the development and delivery of high quality programs.

Recommendation #16

That Co-operative Education workshop(s) on resume writing and employment interview skills be made available to non-Co-op Electronics students.

ACTION: Chairperson, Co-operative Education

Recommendation #17

That Co-op Education Department revise the program brochures in the light of the recommended curriculum review and concerns expressed regarding the possibility of employers misinterpreting recruitment information.

ACTION: Chairperson, Co-operative Education

Recommendation #18

That Co-op Education Department review its Employer, Student Self-Evaluation and Work Term Evaluation questionnaires with a view to standardizing the response scales on them.

ACTION: Chairperson, Co-operative Education

9. Faculty

In view of rapid technological changes in the industry, it is important to recognize that faculty expertise underscores the credibility of the program. It is imperative that Divisional Management and the Electronics Department place a high value on professional development. Professional development is designed so that faculty are able to maintain the high standards of the program, carry out pedagogic duties in a professional manner, and develop new programs for identified market needs within the faculty's purview.

This report draws attention to the fact that although Electronics faculty have had the largest share of PD and short-term leave monies in the AIT division in the last three years, only three of them (R. Opp, D. Graham, H. Reiser) have availed themselves of PD funds (see Appendix B) and short-term leave, and none has submitted proposals for monies to UCC Scholarly Activity Committee. It is important that all Electronics faculty are afforded ongoing professional development opportunities to enhance their technical and instructional expertise, and that they take advantage of these to maintain their technical currency.

Recommendation #19

That the Dean, Assistant Dean and Electronics faculty develop a formal process to review the need and the opportunities for professional development. The result of this process should, with leadership, encouragement and financial support, lead to the following outcomes:

(a) attendance at conferences and short courses/workshops to enhance faculty knowledge of and expertise in Electronics;
(b) pursuance of higher qualifications;
(c) research applications to the Scholarly Activity Committee;
(d) secondment to industry;
(e) consultancy; and
(f) creation of a pool of expertise that will allow for instructional coverage when other program faculty are on PD or short-term leave.

ACTION: Dean; Assistant Dean; Chairperson; Faculty

To address allegations of unavailability after 2:30 pm, faculty should ensure that they are available after classes, and should indicate when departmental meetings and other duties will prevent them from keeping office hours.

Recommendation #20

That Electronics faculty respond to student concerns about their unavailability after class.

ACTION: Electronics Chairperson; Faculty

11. Program Advisory Committee

The newly re-constituted Program Advisory Committee (PAC) must continue its mandate to provide direction and advice to the Electronics program. It was stated by both faculty and Advisory Committee members that the PAC has, until recently, met irregularly and that some PAC members are unclear about their role. These concerns were also recorded in the 1987 report.

Recommendation #21

That the PAC should continue to meet a minimum of twice a year.

ACTION: Assistant Dean; Electronics Chairperson; Advisory Committee

Among the first tasks of the PAC should be a review of this report and a thorough scrutiny and validation of the new directions that should emerge from the SWOT analysis cited in Recommendation #3. The PAC should also be involved in examining and approving the program objectives that Recommendation #8 addresses.

Recommendation #22

That the PAC validate the goals and objectives of the Electronics programs and ensure that they correspond with the University College Mission Statement, Divisional goals and objectives, and with industrial imperatives.

ACTION: Electronics Chairperson; Advisory Committee

Finally, the Review Committee notes the strong expressions of interest among former and current students in a technologist upgrade diploma. Twenty-six first of 29 year students (90%) expressed interest, 35 of 49 second year students (71%), and 38 of 53 former students (72%). These figures lead the Review Committee to recommend:

Recommendation #23

That the PAC move swiftly to examine the opportunity to develop and offer a Technologist-level Electronics diploma at UCC.

ACTION: Electronics Chairperson; Advisory Committee

APPENDIX A

METHODOLOGY

The data were collected in the following ways:

1) **Consultation took place with Don Graham, Chairperson, Electronics and Electrical Trades, Earl Bloor, Dean, Applied Industrial Technology, and Carole Hebden, Manager, Co-operative Education on the design of the questionnaires.**

2) **Standard questionnaires were administered to Electronics former students, employers, faculty, current students and Advisory Committee members. All data were processed with in SPSSX software program to achieve mean, mode, and standard deviation responses. Verbal comments for each group were recorded separately and anonymously.**

3) **"Descriptive Data" on the Electronics Program's history, description, objectives, budget, etc. were solicited from Don Graham, Chairperson, Electronics and Electrical Trades, and Earl Bloor, Dean, Applied Industrial Technology, via the standard "Data Required from Dean/Chairperson/Program Co-ordinator" form, along with course outlines.**

4) **Statistical data on annual FTE utilization, attrition rates, graduation rates, and grade distribution were provided by the Office of Institutional Research.**

5) **The following people associated with the program participated in the review process or were interviewed:**

Ron Opp, Instructor, Electronics (TCOM option);
Henry Reiser, Instructor, Electronics (CAST option);
J.S. Bourget, Instructor, Electronics (CTEC option);
Ben Giudici, Instructor, Electronics;
John Feller, Director, Facility Services

APENDIX B

ELECTRONICS FACULTY†
PD, SHORT-TERM AND LONG-TERM LEAVE
EXPENDITURES

Year	PD Requests/Approved	Total $	PD Requests/Approved	Total $
	AIT DIVISION		ELECTRONICS	
1992/93	7/3	n/a	3/3*	$ 1,718.01
1993/94	4/4	n/a	3/3**	$ 4,181.14
1994/95	5/5	$11,331.12	3/3***	$ 1,407.31
Total	16/12		9/9	$ 7,306.46
	Short term Leave Requested/Approved		Short term Leave Requested/Approved	
1992/93	6/$10,459 3/$ 4,000	$ 4,000	1/$ 2,415 0/$0✣	$ 0
1993/94	4/$12,217 4/$10,486	$10,486	2/$ 8,607 2/$ 7,330✣✣	$ 7,330
1194/95	5/$11,016 5/$ 9,037	$ 9,037	1/$ 2,415 1/$ 2,415✣✣✣	$ 2,415
1995/96	1/$16,000 1/$16,000	$16,000	1/$16,000 1/$16,000✣✣✣✣	$16,000
Total		$39,523		$25,745
	Long Term Leave		Long Term Leave	
	AIT DIVISION		ELECTRONICS	
1992/93	-		-	
1993/94	-		-	
1994/95	-		-	

† J.S. Bourget, D. Graham, A. Green, B. Giudici, R. Opp, H. Reiser, D. Charbonneau (part-time)

* B. Giudici, R. Opp, H. Reiser

** D. Graham, R. Opp, H. Reiser

*** D. Graham, R. Opp, H. Reiser

✣ D. Graham (4 weeks salary)

✣✣ R. Opp (8 weeks salary); H. Reiser

✣✣✣ B. Giudici (20 days release)

✣✣✣✣ H. Reiser (4 months leave @ 80%)