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REVIEW REPORT

on the

Bachelor of Technology in Applied Computing Science

and

Bachelor of Science Computing Science Major Programs

MARCH 2005

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EXECUTIVE SUMMARY

The following document provides a synopsis of the observations and findings of the Bachelor of Technology in Applied Computing Science (BTACS) and Bachelor of Science Computing Science Major (CS Major) Program Review Committee. While the committee feels that both programs are fundamentally sound, it is also of the opinion that improvements can occur by addressing the following issues.

Faculty members should reconsider the desire to make the CS Major degree more theoretical. It is apparent that most stakeholders feel that applied education is more congruent with the career expectations of the learners. Continuing to focus on theory may diminish the limited numbers of students enrolled in the program.

Both the BTACS/CS Major faculty and the CSOM faculty need to put aside their philosophical differences and historic antagonistic behaviours towards one another in order to put the best interests of the students back in the forefront. While some faculty members have indicated that logically there should be much more cooperation and acceptance between departments, it is also apparent that historic issues between the departments have yet to be resolved, which only further undermines the opportunity to develop a strong well recognized credential. The committee feels that there is value in placing all of these programs in one department; however a mechanism to protect independent program integrities must be maintained.

In order to create a more efficient operation, the appropriate committees (the Space Allocation Committee and EATAC) need to closely examine issues surrounding the physical space and the lack of multimedia equipment respectively, while the department should explore the use on non-Windows-based software and equipment in the classroom.

As with many departments at UCC/TRU, program marketing instruments for prospective students are inconsistent in their content and information. While chairs struggle to develop reasonable materials for program marketing, the committee considers this to be inefficient use of departmental resources.

The narrowness of the BTACS program is seen as a detriment, and the faculty are encouraged to expand the liberal arts component of this degree.

Finally, course workload distribution needs to be thoroughly examined. It is the feeling of the committee that many of the problems and issues identified during the review process can be rectified through a realistic and objective examination of faculty credential, course assignments, course offerings, and overload allocation.

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COMMITTEE MEMBERS FOR THE REVIEW OF THE BACHELOR OF TECHNOLOGY IN APPLIED COMPUTING SCIENCE AND THE BACHELOR OF SCIENCE COMPUTER SCIENCE MAJOR PROGRAMS

CHAIR	Ted Wykes, Chairperson, Tourism, UCC
ASSSISTANT CHAIR	Troy Welch, Chairperson, EDDT & DAAD, UCC
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EXTERNAL REPRESENTATIVE	Dr. Benjamin Yu, Program Head, Bachelor of Technology, Computing and Academic Studies, British Columbia Institute of Technology
PROGRAM REVIEW COORDINATOR	Dr. Gordon Tarzwell, Assistant Professor, Economics, & Program Review Coordinator, Office of AVP Planning & Administration

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REVIEW SUPPORT	Dorys Crespin-Mueller, Research Analyst, Office of AVP Planning & Administration

CHRONOLOGY OF THE PROGRAM REVIEW FOR THE BACHELOR OF TECHNOLOGY IN APPLIED COMPUTING SCIENCE AND THE BACHELOR OF SCIENCE MAJOR IN COMPUTER SCIENCE

An initial information meeting with members of BTACS/CS Major programs and Dr. Gordon Tarzwell of Institutional Research and Planning was held on April 28, 2004 to discuss questionnaire content and format. Questionnaires were refined and finalized between August 24 and September 14, 2004.

Stakeholders in the BTACS/CS Major programs were surveyed on the following dates:

Former Students (2000-04):	24 August, 2004
Employers:	7 September, 2004
Faculty:	15 September, 2004
Current Students (Yrs. 3 & 4):	12-15 October, 2004
Current Students (Yr. 2)	5 November, 2004

Reminders were mailed to non-responding former students members on September 14 and to employers on September 28. Most faculty members had responded by November 4. The Office of Institutional Research attempted to contact non-responding former students by phone between October 5 and 8. Non-responding employers were contacted by phone on October 19.

Former student data for the BTACS/CS Major programs were summarized from Student Outcomes Reporting System (SORS) data (1999-2004), as provided by BC Stats.

The cut-off date for all responses was November 9, 2004. Information binders were sent to members of the BTACS/CS Major Programs Review Committee on November 15 and that committee met to analyze the data and form its recommendations on December 6 and 7, 2004.

PROGRAM BACKGROUND

Computing Science education at Cariboo College started with a 2 year Diploma Program, 'Computer Systems Operations and Management', in 1981. With the introduction of the University College (UCC) the Department embarked on the development of an undergraduate degree. Initially the only option was in partnership with the University of British Columbia; a Mathematical Sciences degree combining Computing Science with Mathematics and Statistics was offered. Graduates of this program were forced to spend one additional year at UBC as a 'Visiting Student' to obtain a BSc degree in Computer Science or in Mathematics.

The Department concentrated its effort to develop a modern 2+2 undergraduate computing program that offered 3rd and 4th year to all qualified entrants (computing diploma or combination of academic and professional experience). The program was designed as an applied program with special emphasis on breadth and sound current applied knowledge and skills. The program was named Bachelor of Technology in Applied Computing Science (BTACS) and was approved in 1997. Students first enrolled in this program in 1997 and the first graduation was in 1999.

The applied nature of the BTACS program was attractive to many professionals but still the faculty in the Department felt that UCC should offer a traditional Computing Degree. In 1996 a Computing Science Major was proposed as an option in the Bachelor of Science degree program. The Major was approved in 1998 and the first students enrolled in this program in September 1998. The first students graduated with a BSc Computing Science Major in 2000.

Since the programs' inceptions UCC has graduated 33 students from BTACS and 25 students from the CS Major.

The main differences between the Major and BTACS program are as follows. The Major is geared more towards providing scientific computing skills and a theoretical basis in computing science. Graduates are expected to be more suitable for research-oriented occupations and are prepared for potential advanced studies. Graduates of the BTACS program, on the other hand, will have skills that will make them immediately productive in industry without further training required in specific skills. The Major is intended to produce scientists and research scholars as well as computing professionals. BTACS graduates will have been introduced to the development of business information systems during their course of study. In the BTACS program several courses, such as the course in networks, will devote two units to principles and one unit to implementation while the counterparts in the Major will devote most of the effort to principles. Due to limited student numbers, all our courses have both BTACS and Major students enrolled, so it has not been possible to deliver these courses with a different emphasis to the different students. As a result only the elective courses differ between the BTACS and CS Major programs.

In order to initially offer both BTACS and the CS Major, while student enrolments in the CS Major and BTACS were small, we offered a restricted slate of courses – half BTACS, half CS Major. As a result, neither program of study fully met students' needs, compromising both programs and reducing their attractiveness. In particular, the different approach to offering courses mentioned above had to be compromised.

While enrolments in both programs are now strong, with a very high enrolment of international students, the number of elective courses that students in BTACS and the CS Major can select is limited.

ADMISSION REQUIREMENTS

Bachelor of Technology in Applied Computing Science Degree Program

General

UCC offers a four-year Bachelor of Technology in Applied Computing Science (BTACS) degree which is designed for those wishing to enter a career using modern information technologies to design, implement, maintain and upgrade information technology systems. The program combines theory, technical and hands-on skills, communication skills (written and oral) and business skills. A commitment to professionalism is an essential characteristic of the BTACS program.

Admission to the BTACS Program occurs primarily at the first or third year level. Four categories for admission to the BTACS Program are possible:

1. Entry from the CSOM Program at UCC (or equivalent) with a minimum 2.33 GPA.
2. Entry from Arts, Business, Education, Engineering, and Science with a minimum 2.33 GPA.
3. Professional entry with a suitable combination of relevant work experience in the information technology field and post-secondary study, as determined by the BTACS Coordinator (Program Advisor).
4. High school graduates.

Admission Requirements

General Admission Requirements

First Year Entry

To be considered for admission to BTACS, students must have completed:

- Principles of Math 12 with C+ or better within the past 2 years or equivalent, and English 12 with: 73% on the combined English 12 and Government exam (within the last 5 years)
- or Level 4, on the composition section of the Language Proficiency Index (within the last 2 years) or completion of English 060
- or completion of CESL 057 and CESL 058 with a grade of C+ or better with a mark of 73% or better.

Third Year Entry

To be considered for admission to the BTACS Degree Program at the third year level, students must have completed 48 UCC credits (or equivalent) as follows:

1. Core Requirements (24 credits):

* 6 computing courses (COMP 113, COMP 123, COMP 213, COMP 138, COMP 139, COMP 223 or equivalents)

* 2 English (ENGL 110, ENGL 229 or equivalents, or ENGL 181, ENGL 193 or equivalents)

2. Breadth Coverage (12 credits)

* 4 non-computing courses, one of which must be outside of science

3. Unspecified Lower Level (12 credits)

* 4 courses at the first year level or higher.

It is anticipated that not all students seeking third year entry will meet all of the BTACS Core requirements. Course deficiencies must be completed during the first semester of study upon commencement of the program.

<u>Admission from CSOM Diploma Program</u>

Graduates of UCC's CSOM Diploma Program have 60 UCC credits. The following exemptions and admission requirements apply:

General Admission Requirements	Exemptions	Requirements
• Core Courses (8 courses - 24 credits)		
- 6 Computing courses	5 (COMP 113, COMP 123, COMP 138, COMP 139, COMP 213)	1 (COMP 223)-
- 2 English	2 (ENGL 181, ENGL 193)	
• Breadth Coverage (4 courses - 12 credits)		
- 1 non-science course	ACCT 100	
- 3 non-computing courses	None	
• Unspecified (8 courses - 24 credits)	all	none

Application Procedure:

1. Applications should be obtained from, and filed with, the Admissions Office. The following documents must be included with all applications:
   - official transcript of all previous secondary and post-secondary education;
   - proof of citizenship, landed immigrant status, or valid student visa
2. Application Dates:

   October 1 to April 15 — For fall semester admission

   October 1 to November 30 — For winter semester admission
3. Applications will be assessed by the Admissions Office. Assessments will be reviewed by the BTACS Program Coordinator who will be responsible for assessing the academic qualifications of the applicant.
4. Applicants are required to meet with the BTACS Program Coordinator in order to create a program guide that will show the courses needed to complete the degree.

Co-Operative Education Option

Co-operative Education is an optional component in the four year Bachelor of Technology in Applied Computing Science degree completion program. It offers students the opportunity to obtain paid, career-related work experience in their field of study.

Each Co-op work term is generally four months in length. In addition to completing specific program courses, students must complete either two or three (3) co-op work terms to graduate with Co-op Designation. Participation in the co-op option extends the graduation date.

Students entering BTACS in third year must complete 2 co-op work terms to graduate with Co-op Designation while those entering before third year must complete 3 work terms.

BTACS Co-op Time Pattern:

Various time patterns are possible. Consult the Co-op Department for details.

Prerequisites/Corequisites: Students normally apply in their first semester of BTACS. Students who have completed CSOM diploma prior to BTACS may apply to do a work term prior to the start of their first BTACS academic semester. Students are expected to follow the Co-op Time pattern of work/study as established for their program, be taking all of the semester courses as described in the calendar, have credit for all previous courses in the program and students must maintain a minimum 2.33 (C+) grade point average. In addition, participation in the Working to Learn (WTL) seminar series is mandatory to maintain eligibility. WTL topics include resumes, cover letters, interview skills, effective behaviours on the job and the Co-operative Education process.

Note: other Co-op Time Patterns are available. Contact the Co-op office for more details.

Entry into BTACS prior to third year: 3 work terms required

	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Sept-Dec	Academic Semester 1	Academic Semester 3	Academic Semester 5	Academic Semester 6	Optional Work Term
Jan-Apr	Academic Semester 2	Academic Semester 4	Co-op Work Term 2	Academic Semester 7	Academic Semester 8
May-Aug		Co-op Work Term 1	Co-op Work Term 3	Optional Work Term	Grad

Third year entry into BTACS: 2 work terms required

	Pre BTACS	Year 3	Year 4	Year 5
Sept-Dec	Conditionally Admitted to BTACS	Academic Semester 1	Academic Semester 2	Optional Co-op Work Term
Jan-Apr	Optional Co-op Work Term	Co-op Work Term 1	Academic Semester 3	Academic Semester 4
May-Aug	Optional Co-op Work Term	Co-op Work Term 2	Optional Co-op Work Term	Grad

Degree Completion Requirements

1. The student must have completed at least 120 credits as specified by UCC Policy. At least 50% of these (60 credits) must be obtained at UCC.
2. The student must maintain a GPA of at least 2.0 (C) in each semester of study.
3. The student must earn a grade of "C" or better in all prerequisite courses.
4. A student whose semester GPA is 1.5 or below, will be required to permanently withdraw from the program immediately.

5. A student whose semester GPA falls below 2.0, but is above 1.5, will be placed on academic probation for the next semester, and will not be allowed to take more than 3 courses while on probation. The student may also incur additional academic restrictions or be required to withdraw from the program.
6. If the student does not succeed in obtaining a GPA of at least 2.0 in the probationary semester, the student will be required to withdraw from the BTACS program immediately.
7. The student must notify the program Advisor, in writing, of her/his intent to graduate. Notification must take place prior to the add/drop deadline in the final semester of degree study.
8. Any course duplication (repeating a course) will require prior approval of the BTACS Program Advisor. Normally, no more than 3 courses may be duplicated; only one duplication of a single course will be allowed. The highest grade achieved in duplicated courses will be used for post-admission CGPA calculations, but the student's record will show all attempts.

Specific Course Requirements

First and Second Years		Third and Fourth Years	
COMP 113, 123, 213, 223 (or equivalents)	12 credits	COMP 327, 341, 352, 354, 361, 491	18 credits
COMP 138 and 139 (or equivalents)	6 credits	Upper Level Computing Elective	18 credits
ENGL 110 and ENGL 229 (or equivalents)	6 credits	Upper Level Elective	9 credits
Non-computing Science elective	9 credits	Any academic course	15 credits
Any academic course	24 credits		
Non-science elective	3 credits		

Program guides will be developed for each student enrolled in the BTACS Program. These guides list all BTACS requirements in years one through four, and will identify if these requirements have been completed.
Students may enter the program in first or third year. Those entering in third year must complete any missing first or second year courses prior to starting BTACS, or, if approved by the BTACS Coordinator, during the first semester of study.

Sample Course Sequence

First year Fall Semester:	Third year Fall Semester:
• COMP 113 Computer Programming 1 • COMP 138 Discrete Structures 1 • ENGL 110 Composition • NS Elective • Non-science elective • NC Elective • Non-computing science elective. **Winter Semester:** • Comp 123 Computer Programming 2 • Comp 139 Discrete Structures 2 • Elective Any academic course • NC Elective Non-computing science elective • NC Elective Non-computing science elective	• COMP 327Computer Networks • COMP 354Web Design & Programming • COMP 361Database Systems • UL Elective Upper Level • Elective Any academic course **Winter Semester** • COMP 341Operating Systems • COMP 352 Software Engineering • COMP XXX Upper Level Computing Elective • UL Elective Upper Level Elective • Elective Any academic course

Second year Fall Semester:	Fourth year Fall Semester:
• COMP 213 Intro to Computer Systems • COMP 223 Data Structures & Algorithms • ENGL 229 Business and Technical Writing • Elective Any academic course • Elective Any academic course. **Winter Semester:** • Elective Any academic course • Elective Any academic course • Elective Any academic course • Elective Any academic course • Elective Any academic course	• COMP XXX Upper Level Computing Elective • COMP XXX Upper Level Computing Elective • COMP XXX Upper Level Computing Elective • UL Elective Upper Level Elective • Elective Any academic course **Winter Semester** • COMP 491Computing Science Project • COMP XXX Upper Level Computing Elective • COMP XXX Upper Level Computing Elective • Elective Any academic course • Elective Any academic course

Bachelor of Science Computing Science Major

Admission Requirements:

Students entering the Bachelor of Science program are required to complete English 110, along with specific science courses, which vary depending on the student's intended major. (See below for details.) Prerequisites for English 110 are 73% on combined English 12 and Government exam in the last five years, or Level 4 on the composition section of the Language Proficiency Index (within the last 2 years) or completion of English 060 or completion of CESL 057 and CESL 058 with a grade of B- or better.

Bachelor of Science majors have specific first year course requirements. It is strongly recommended that students become familiar with the prerequisite requirements for these courses before applying for admission. In general, the minimum prerequisite requirements for BSc programs are as follows:

Major	Prerequisites
Computing Science	Chemistry 11 or Chem 050 Principles of Math 12 with C+ or better within the past 2 years or equivalent Physics 11 or Physics 113

Course Requirements For A Major Program

Completion of a Bachelor of Science Major Degree requires the completion of 120 UCC credits of course work. Normally 30 credits are taken each year for a period of four years. Completion of the degree on a part-time basis is also possible. A detailed description of course requirements is found below under "Graduation Requirements".

Computing Science

The following requirements for Majors in Computing Science apply to those students entering first year Science in 1997/98 (and subsequently). Requirements for students who entered first year prior to 1997/98 are noted.

Computing Science Major

First and Second Years	
BIOL 111 or 121[1] or GEOL 111 or 205[1]	3 credits
CHEM 110 or 111[3]	3 credits
COMP 113/123/198[2]	9 credits
ENGL 110 or 111[4, 5]	3 credits
(or two of ENGL 110, 111 and 121)[4, 5]	(6 credits)
MATH 113/123 or 114/124	6 credits
PHYS 110 or 115[3]	3 credits
ENGL 229 or 230[3, 4]	3 credits
MATH 212	3credits
COMP 220 (MATH 222)	3 credits
COMP 213/223	6 credits
STAT 200	3 credits
Elective[6]	12-16 credits
Third and Fourth Years	
COMP 305//341/352/452	12 credits
COMP 311 or 312	3 credits
Computing Science Electives[7]	21 credits
Electives[6]	24 credits

[1] Students who entered first year Science prior to Fall 1997 are not required to take ENGL 229 or 230, or the first year BIOL or GEOL courses (although they may do so as electives).

[2] Students who registered in the Computing Science major prior to Fall 2002 are not required to take COMP 198. Students intending to take the Computing Science Major may not take COMP 100 for credit.

[3] Students who entered first year Science prior to Fall 1997 must complete 6 credits of first year Chemistry, CHEM 110/120 or 111/121 and 6 credits of first year Physics, PHYS 110/120 or 115/125.

[4] Students with a B or better in ENGL 110 or 111 may proceed into ENGL 229 or 230 in their second year; students with less than a B in first year English must take another 3 credits of 100-level English before their second year English requirement.

[5] Students who entered first year Science prior to fall 1997 must complete 6 credits of first year English from ENGL 110/111/121.

[6] Electives must include 9-12 credits in at least two disciplines outside of Science (other than English). The remaining elective credits may be chosen from any discipline; 12 of these must be in courses numbered 300 or higher.

[7] Computing Science electives; For students who entered first year Science between Fall 1997 and Summer 2002: At least 3 electives must be selected from: COMP 327, COMP 332, COMP 361, COMP 371, COMP 411, COMP 412, COMP 432, COMP 434, COMP 448, COMP 451, COMP 461, COMP 475, COMP 482, COMP 483 COMP 498. The remaining electives can be chosen from: COMP 314, COMP 354, COMP 423, COMP 424, COMP 425, COMP 454, COMP 462, COMP 463

For students who entered first year Science in Fall 2002 or later: At least 4 elective must be selected from: COMP 311, COMP 312, COMP 327, COMP 361, COMP 371, COMP 434, COMP 461. No more than 3 can be selected from: COMP 314, COMP 315, COMP 354, COMP 423, COMP 424, COMP 425, COMP 454, COMP 462, COMP 463

Note: Not all of these courses will be offered every year.

Example of the Computing Science Co-op Time Pattern:

	Year 1	Year 2	Year 3	Year 4	Year 5
Sept-Dec	Academic Semester 1	Academic Semester 3	Academic Semester 5	Co-op Work Term 2	Academic Semester 8
Jan-April	Academic Semester 2	Academic Semester 4	Academic Semester 6	Academic Semester 7	Grad
May-Aug		Optional Co-op Work Term	Co-op Work Term 1	Co-op Work Term 3	

BTACS/CS MAJOR PROGRAMS SEAT UTILIZATION

(Source: stable enrollment reports)

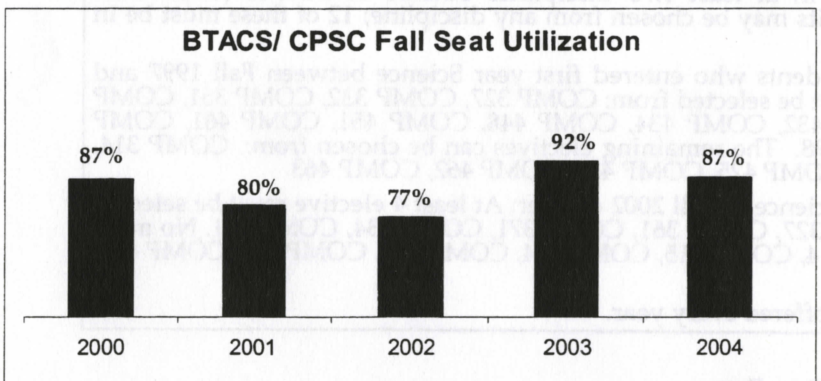
The seat utilization percentage is a measure of the total number of seats occupied in the courses in the program compared to the total seat capacity. This ratio is somewhat suspect since the seating capacity of a course can be affected by factors such as room size and the enrolments of other programs served by the course, but remains a reasonable indicator of whether a program is utilizing its course offerings to capacity. The following takes into account the stable enrollment and capacity from fall 2000 to fall 2004.

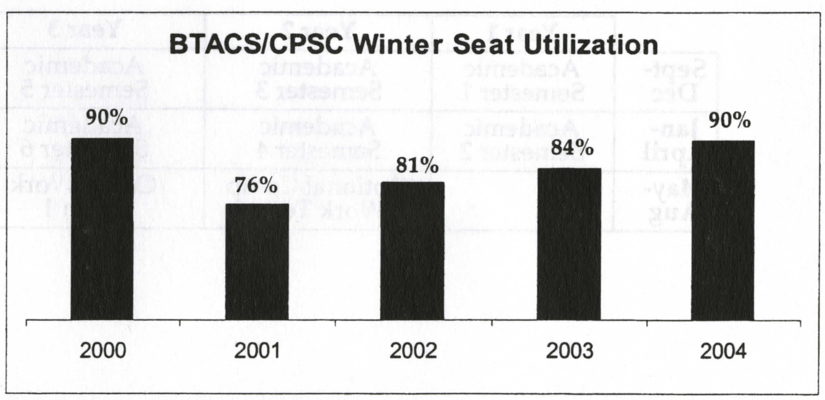
Fall Semester

Year	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
2000	407	452	**90%**	143	183	**78%**	550	635	**87%**
2001	445	503	**88%**	162	260	**62%**	607	763	**80%**
2002	398	465	**86%**	156	259	**60%**	554	724	**77%**
2003	335	347	**97%**	170	204	**83%**	505	551	**92%**
2004	372	445	**84%**	220	234	**94%**	592	679	**87%**

Winter Semester

Year	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
2000	537	554	**97%**	153	211	**73%**	690	765	**90%**
2001	313	404	**77%**	149	205	**73%**	462	609	**76%**
2002	434	476	**91%**	128	221	**58%**	562	697	**81%**
2003	392	446	**88%**	115	160	**72%**	507	606	**84%**
2004	389	424	**92%**	181	210	**86%**	570	634	**90%**





Fall Semester Comparison to Other Disciplines

FALL 2000

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	407	452	**90%**	143	183	**78%**	550	635	**87%**
PHYS	374	415	**90%**	27	42	**64%**	401	457	**88%**
MATH	1036	1258	**82%**	39	138	**28%**	1075	1396	**77%**

FALL 2001

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	445	503	**88%**	162	260	**62%**	607	763	**80%**
PHYS	477	513	**93%**	43	59	**73%**	520	572	**91%**
MATH	1053	1101	**96%**	87	138	**63%**	1140	1239	**92%**

FALL 2002

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	398	465	**86%**	156	259	**60%**	554	724	**77%**
PHYS	475	556	**85%**	37	46	**80%**	512	602	**85%**
MATH	1125	1229	**92%**	85	108	**79%**	1210	1337	**91%**

FALL 2003

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	335	347	**97%**	170	204	**83%**	505	551	**92%**
PHYS	397	438	**91%**	30	46	**65%**	427	484	**88%**
MATH	1025	1304	**79%**	67	88	**76%**	1092	1392	**78%**

FALL 2004

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	372	445	**84%**	220	234	**94%**	592	679	**87%**
PHYS	533	600	**89%**	22	46	**48%**	555	646	**86%**
MATH	1109	1305	**85%**	56	90	**62%**	1165	1395	**84%**

Winter Semester Comparison to Other Disciplines

WINTER 2000

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	537	554	**97%**	153	211	**73%**	690	765	**90%**
PHYS	313	388	**81%**	18	26	**69%**	331	414	**80%**
MATH	925	1109	**83%**	47	147	**32%**	972	1256	**77%**

WINTER 2001

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	313	404	**77%**	149	205	**73%**	462	609	**76%**
PHYS	240	333	**72%**	16	31	**52%**	256	364	**70%**
MATH	904	1091	**83%**	55	180	**31%**	959	1271	**75%**

WINTER 2002

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	434	476	**91%**	128	221	**58%**	562	697	**81%**
PHYS	346	443	**78%**	18	30	**60%**	364	473	**77%**
MATH	1047	1140	**92%**	83	112	**74%**	1130	1252	**90%**

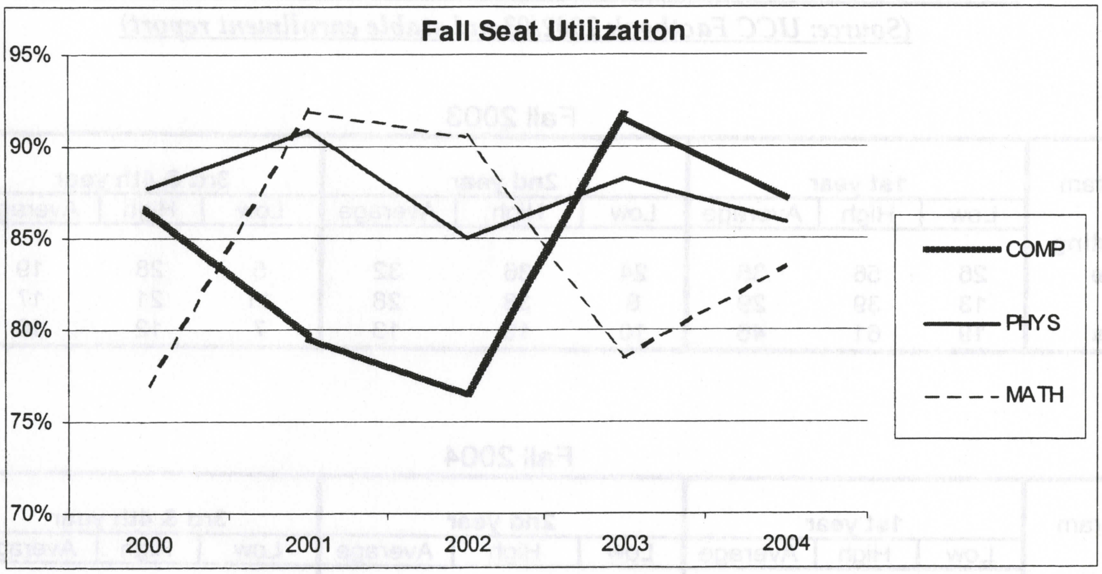
WINTER 2003

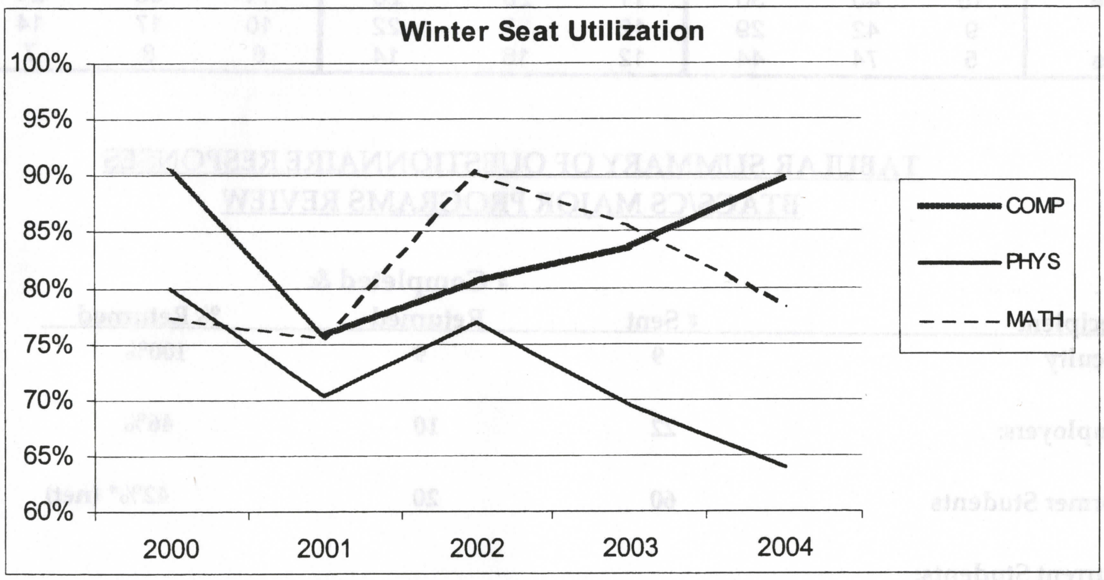
Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	392	446	**88%**	115	160	**72%**	507	606	**84%**
PHYS	343	499	**69%**	35	45	**78%**	378	544	**69%**
MATH	1073	1225	**88%**	72	112	**64%**	1145	1337	**86%**

WINTER 2004

Discipline	Lower Level enrolment	Lower Level capacity (# of seats)	Lower Level % utilization	Upper Level enrolment	Upper Level capacity (# of seats)	Upper Level % utilization	Total enrolment	Total capacity (# of seats)	Total % utilization
COMP	389	424	**92%**	181	210	**86%**	570	634	**90%**
PHYS	277	431	**64%**	18	30	**60%**	295	461	**64%**
MATH	999	1265	**79%**	68	98	**69%**	1067	1363	**78%**

Comparison to Other Disciplines





UTILIZATION - FUNDED VS ACTUAL FTE: 1998 - 2003

(Source: UCC Factbooks 1998/99 – 2002/03)

BTACS* Program

	98-99	99-00	00-01	01-02	02-03	03-04
Funded FTE	20.0	50.0	50.0	50.0	50.0	50.0
Actual FTE	15.6	27.9	24.3	27.9	31.8	26.1
Utilization Rate	**78.0%**	**55.8%**	**48.6%**	**55.8%**	**63.6%**	**52.2%**

*CS Major FTEs are combined with other BSc. Degree Programs

AVERAGE CLASS SIZES – KAMLOOPS CAMPUS: FALL 2003, FALL 2004

(Source: UCC Factbook 2002/03and stable enrollment report)

Fall 2003

Program	1st year			2nd year			3rd & 4th year			Average all Years
	Low	High	Average	Low	High	Average	Low	High	Average	
Computing Science	26	56	35	24	36	32	5	28	19	27
Math	13	39	29	8	38	28	11	21	17	28
Physics	19	61	46	10	15	13	7	12	10	32

Fall 2004

Program	1st year			2nd year			3rd & 4th year			Average all Years
	Low	High	Average	Low	High	Average	Low	High	Average	
Computing Science	15	40	30	11	28	20	14	35	24	26
Math	9	42	29	12	37	22	10	17	14	26
Physics	5	74	44	12	16	14	6	8	7	30

TABULAR SUMMARY OF QUESTIONNAIRE RESPONSES
BTACS/CS MAJOR PROGRAMS REVIEW

Recipient	# Sent	# Completed & Returned	% Returned
Faculty	9	9	100%
Employers:	22	10	46%
Former Students	60	20	42%* (net)
Current Students:			
3rd & 4th Yrs BTACS	22	22	100%
3rd & 4th Yrs CS Major	30	30	100%
2nd Yr CS Major	13	13	100%
SORS (BC College and Institutes Student Outcomes Data: 1999-2003)	34	22	65%
TOTAL	190	114	60%*

(Note: The number of returned envelopes is subtracted from the number sent to attain the % returned.)

Returned By Post Office:

Former Students = 12
Total Non Respondents = 28

SUMMARY OF QUESTIONNAIRE RESPONSES

In this summary, special attention will be given to scores at the extremes, usually above 4.0 and below 3.0 on a five point scale. The scales vary in terms of their point labels, but higher scores indicate a more positive evaluation or a greater agreement with a statement. In order to summarize the responses, an attempt will be made to describe themes reported by at least two individuals. Part of the challenge in summarizing this information is the fact that essentially two somewhat distinct programs were rolled into one program review. As a result, while BTACS students may have been quite satisfied with a particular aspect of their program, CS Major students may have felt quite differently. It is also worth noting that the number of responses to the surveys should be considered when evaluating the validity of the responses.

FORMER STUDENTS

Fourteen former CS Major students responded to the survey. Generally speaking, the major strength of the program, as identified by this group of former students, is that the program prepared them well to work in industry. This group felt confident that the program prepared them to think critically, to work as part of a team, and helped them develop good work habits including problem solving skills and research skills. Overall this group appears to be quite satisfied with the quality of the program and its relevance as well as the skills, abilities, and expertise of faculty. Areas of concern expressed by this group included a feeling that there could have been more emphasis on allowing students to develop creativity skills. As well there is general agreement (based on the number of comments) that there should be a shift away from Microsoft Windows-based technology as well as a concern about the limited number of courses actually offered.

It is worth noting that the six former BTACS students who responded to the survey generally rated the program lower than the CS Major students. There is concern by this group about the perceived lack of emphasis on such skills as mathematics, oral and written communication skills, management skills, and computing business knowledge. The program, however, did rate quite well in such areas as research skills, information access skills, team building, and independent study and creativity. This group, too, was generally quite satisfied with the quality of instruction and the program content.

CURRENT STUDENTS

This section of the surveys was broken down into three groups: upper-level CS Major students (30 respondents), upper-level BTACS students (22 respondents), and lower-level CS Major students (13 respondents). For the purposes of this report, each group's responses will be clearly identified by subheadings.

Upper-Level CS Major

In the area of skill emphasis, the only concern expressed by the students was lack of oral communications skills. However, it is also worth noting that no question in this section of the survey ranked above 4.00. In terms of program content, the only categories that ranked above 4.00 revolved around quality of instruction. No questions received a score lower than 3.03 in this section. Once again, however, the issue of more variety in technology was raised.

Upper Level BTACS students

Generally speaking, this group of students feels similar to the upper-level CS Major students about skill levels learned. The lone exception is that this group feels quite strongly (2.86) that they would like the opportunity to regularly evaluate the program and instruction. It is worth noting that the major limitation of the program, according to this group of learners, revolves around issues related to quality of instruction, limited delivery of courses (i.e. alternating years), and overlap with CSOM. As with the upper-level CS Major students, there were no specific areas of the program that could be identified as significant strengths with only a select few categories (problem solving skills, co-op, degree of difficulty of program, and encouragement to use the internet) nudging into the 4.00 range.

Lower-Level CS Major students

Overall, this group is the most satisfied with the quality of the program. There is consensus that the skill emphasis (ironically with the exception of computing business knowledge) is adequate. The only other low score worth noting is that there appears to be little encouragement by faculty to make use of the library. Several scores among this group of learners ranked above 4.00, including problem solving skills, work habits , and quality of instruction.

FACULTY MEMBERS

As is often the case, it is the faculty members who tend to be most critical of the program. While there is consensus that there is a good balance of skills delivered in the program, concern was expressed over weakness in the areas of management skills (2.89) and research skills (2.89). Other areas of concern included capital and resources: specifically, lab facilities (2.78), capital equipment (2.89), professional development funds (2.57), number of faculty (1.67), distribution of non-instructional duties (2.57), and release time (1.75). Faculty also feel that more effort should be put into tracking alumni and networking with other institutions. A general theme within the comments section pointed to staff shortages and the challenges of trying to teach both academic (theoretical) and applied (practical) philosophies.

EMPLOYERS

Ten employers responded to the survey. While no questions in this section received a rating below 3.00, employers do seem generally satisfied with graduates' ability to work as part of a team as well as independently. It is interesting to note that good work habits (4.50) received the highest ranking from employers while communication skills (3.37) received the lowest ranking. This group, too, identified a lack of exposure to emerging technology and non-Windows/Microsoft systems as a shortcoming of the program.

STRENGTHS OF THE BTACS/CS MAJOR PROGRAMS

The Review Committee has identified the following strengths of the UCC BTACS and CS Major programs.

1. Skills

Former students, current students, employers and faculty surveys all rated the programs quite highly in terms of the skills that students acquire. Areas such as critical thinking, problem solving, ability to work as part of a team as well as independently all would indicate that the two programs are providing a good foundation for graduates. These skills bode well for a program that industry will turn to when seeking employees.

2. Employment

Former students report a high rate of employment. Of the former students surveyed by the Student Outcomes survey from 1999 to 2004, 87% reported being in the work force, out of that group, 85% indicated their job being 'very related' or 'related' to their studies.

3. Knowledgeable and committed faculty

The committee would also like to note that all faculty interviewed appear to care a great deal about the future of the program and seem keen to develop strategies to try and ensure its longevity as a credible contributor to the program mix at UCC. We are encouraged that many of the faculty members interviewed exhibited some willingness to be more flexible in terms of facilitating a more seamless transfer of credits to allow diploma students to pursue higher credentials (BTACS/CS Major)

4. Small class and lab sizes

The small class and lab sizes were noted by students as a strength of the program as it allows for more individual attention from faculty.

5. Co-op option

The relatively new component of a co-operative option has been received very positively by students. They value the skills that they are gaining on the work-terms and the option assists greatly in the marketability of the programs.

AREAS OF THE BTACS/CS MAJOR PROGRAMS WHICH CAN BE IMPROVED (WITH RECOMMENDATIONS)

The Review Committee identified the following aspects of the BTACS and CS Major programs as being in need of improvement.

1. PROGRAM STRUCTURE

Philosophically, the key difference between the BTACS and CS Major centres on the balance of theory vs. practical content: BTACS is intended to be much more applied than CS Major. While this difference is well reflected in the first two years of these programs, it has not been stressed during the third and fourth years. During the review, the committee noted that the faculty generally desired the CS Major to become more theoretical than is presently the case. However, the committee noted that there is a higher demand for applied rather than theoretical computing programs, as indicated in the BTACS and CS Major student surveys, and as clearly articulated in the direction from the ministry. The demands of the students and the ministry therefore seem to be at odds with those of the faculty concerning the CS Major.

The desire by many faculty to make the CS Major more theoretical appears to be putting at risk both the BTACS and the CS Major program. Due to the small number of students in the BTACS program, and the relatively small number of students majoring in CS Major efficiency would dictate that these students should share classes whenever possible. This then implies that the two programs should not strive for completely independent third and fourth year offerings.

RECOMMENDATION 1(a):
That the Department of Computing Science maintain an applied focus in both the BTACS and CS Major.

ACTION: Department of Computing Science

The committee does however, recognize that these two programs appeal to a slightly different type of student. It is our belief that students should be able to self-select the mix of practical versus theory courses that best suits their desires (presumably the BTACS students will select more practical courses while the CS Major students will select more theoretical ones).

RECOMMENDATION 1(b):
That the Department of Computing Science offer as small a core of distinct courses for the CS Major and the BTAC students as possible, thereby allowing these students to select their own mix of practical versus theoretical courses through elective selections.

ACTION: Department of Computing Science

In reviewing the calendar, website, course outlines and other program information, the committee noted a need for more accuracy and consistency. More specifically, the following types of inconsistencies were observed: course numbering, admissions information, prerequisites/corequisites, vectoring, and calendar descriptions. It was also noted that the range of listed courses in the calendar is much larger than the list actually offered. The current range of listed courses gives a distorted picture of department offerings.

RECOMMENDATION 1(c):
That the Department of Computing Science engage in a thorough editing of all of their written material on the web, in the calendar, and on course outlines, and eliminate courses from the calendar that are unlikely to be taught in the near future.

ACTION: Department of Computing Science

The review committee feels that the programs could benefit from a curriculum analysis.

RECOMMENDATION 1(d)
That the Department of Computing Science set aside some time as soon as is practical to review and clarify the purposes and goals of the BTACS and CS Major programs, and conduct a curriculum analysis for both programs by:

- **identifying the desired outcomes required to meet the purposes and goals of the programs**
- **mapping these outcomes to specific courses within the program.**
- **where outcomes are not mappable to existing courses, or where the outcome is mappable to multiple courses, designing new courses or redesigning existing ones.**

ACTION: Department of Computing Science

RECOMMENDATION 1(e)
That, with respect to Recommendations 1(c) and 1(d), the Computing Science faculty seeks ways to use strategies such as two- year rotation of less popular courses to maximize options for the students.

ACTION: Department of Computing Science; Computing Science Chair

RECOMMENDATION 1(f):
That a BTACS program advisory committee be created, and appropriate funds be allocated, and that this committee include at least one current student and one graduate of the program.

ACTION: Dean of Advanced Technologies and Mathematics; Department of Computing Science

2. RELATIONSHIP WITH CSOM

There exists a disconnect between the degree programs and CSOM that has manifested itself to the committee in the following ways:

- an apparent lack of respect among some members of each of the departments for the goals and outcomes of their counterparts' program.
- laddering from CSOM to BTACS that is not as seamless as it should be, resulting in some duplication of material and lack of recognition for courses that have similar outcomes.
- a sentiment among some members of the Computing Science Department that CSOM should be reworked as a two-year exit point for BTACS, rather than being a free-standing program.
- a lack of acceptance of the ability of each group to be able to instruct effectively in the other's program.

Several of these factors have led to unnecessary restrictions to the efficient use of faculty across the two programs. In spite of the disconnect between these two programs, the committee feels that the survival of the BTACS degree, and the efficient use of UCC resources (specifically faculty), hinges on a substantial amount of interaction between these two groups.

RECOMMENDATION 2(a):
That the Department of Computing Science and the CIST Department be recombined.

ACTION: Dean of Advanced Technologies and Mathematics; VP Academic

The committee realizes that the recombining of these two departments must occur in the context of a specific structure in order to avoid the difficulties that have occurred in the past. It is with this in mind that the following recommendations are made.

RECOMMENDATION 2(b):
That, recognizing that the proposed BCCAT policy change allows non-masters degree holders to instruct lower level computing science courses when appropriate mentoring takes place, the minimum educational qualifications for instruction at the first-year level be reduced to a relevant Bachelor degree.

ACTION: Dean of Advanced Technologies and Mathematics; Recombined Department of Computing Science

RECOMMENDATION 2(c):
That a CSOM curriculum committee be established, comprised of those teaching in this program and the BTACS advisor, and that this committee be solely responsible for changes to the CSOM program.

ACTION: Dean of Advanced Technologies and Mathematics; Recombined Department of Computing Science; BTACS Advisor

RECOMMENDATION 2(d):
That a BTACS/CS Major curriculum committee be established, comprised of those teaching in these programs and the CSOM advisor, and that this committee be solely responsible for changes to the BTACS and the CS Major Programs.

ACTION: Dean of Advanced Technologies and Mathematics; Recombined Department of Computing Science; CSOM Advisor

3. FACILITIES AND EQUIPMENT

The physical distance between instructor offices and the computing labs works against effective and efficient support of the students in the projects and lab work.

RECOMMENDATION 3(a):
That the Computing Science faculty be housed in offices in close proximity to the labs.

ACTION: Dean of Advanced Technologies and Mathematics; Space Allocation Committee

A common criticism by faculty members concerned the lack of projectors in all of the instructional facilities, the age of the some of the equipment and software, and the "Windows-centric" nature of equipment, software and curriculum.

RECOMMENDATION 3(b):
That the Department of Computing Science's needs be met in future proposals concerning the installation of multimedia capabilities in both labs and classrooms.

ACTION: Dean of Advanced Technologies and Mathematics; EATAC Committee

RECOMMENDATION 3(c):
That the Department of Computing Science ensure that an appropriate balance between Windows-centred and non-Windows-centred software and hardware platforms be included in their programs.

ACTION: Computing Science Department

RECOMMENDATION 3(d)
That the Department of Computing Science request, and Information Technology Services provide, non-Windows-centred equipment and software for classrooms and labs used by the Department of Computing Science.

ACTION: Department of Computing Science; Information and Technology Services

In touring the lab space, the committee noted much outdated equipment. While they acknowledged that this equipment is serving a useful role in providing a historical perspective of the computing industry, a much more efficient facility for the storage of such instructional aids needs to be found.

RECOMMENDATION 3(e):
That the Department of Computing Science identify its requirements for storage of the archived computing equipment now being held in the OM 1365 and communicate these requirements to the Space Planning Committee.

ACTION: Space Planning Committee; Dean of Advanced Technologies and Mathematics; Department of Computing Science

4. MARKETING

There are inconsistencies between materials provided to prospective students and the general public. With respect to institutional marketing and enrolment management initiatives, the program review committee feels that resources need to be allocated to a coordinated marketing pro gram for BTACS and CS Major. The current practice of leaving program marketing to the department Chair, who has neither the time nor the expertise to create effective marketing programs and materials, is unacceptable.

RECOMMENDATION 4:
That budget and resources be allocated, and that the Department of Computing Science work with the UCC Public Relations Office and the UCC Enrolment Management Office, to provide for effective program marketing and student recruitment initiatives.

ACTION: Dean of Advanced Technologies and Mathematics; Department of Computing Science

5. CHAIR AND PROGRAM CO-ORDINATION

While the committee recognizes that this is a contractual issue that is being reviewed/debated it would like to stress that the pressures on the Chair and Program Co-ordinators to deal with the volume and range of expectations and responsibilities required to effectively administer these programs are in no way being adequately compensated by release time and support.

RECOMMENDATION 5:
That UCC settle the issue of adequate compensation for Chairs and Co-ordinators as soon as possible.

ACTION: UCC Executive

6. PROGRAM CONTENT

The Review Committee noted that, despite the commonplace acknowledgement of the importance of the liberal arts education, there is little in the way of course offerings outside the field of computing in the BTACS program.

RECOMMENDATION 6(a):
That the Department of Computing Science examine the Conference Board of Canada's Employability Skills and UCC service course offerings in liberal arts disciplines for possible inclusion in the program.

ACTION: Department of Computing Science

RECOMMENDATION 6(b):
That the Department of Computing Science consider the following additional computing-related areas for inclusion in the BTACS/CS Major programs: ethics and human-computer interaction (perhaps team taught with a psychologist).

ACTION: Department of Computing Science

7. STAFFING ISSUES

At the time of review, each department member had taken on an extra course on an overload basis. Two frequent complaints of faculty were: a lack of time to attend to their non-instructional duties, and a shortage of faculty members. Staffing levels should be such that overloads are not necessary for course coverage on a regular basis. As well as the issue of overloads is diversity in the ability of faculty to cover the range of areas within computing science. While the most common suggestion to solving this problem offered by faculty was the hiring of more faculty, the Review Committee felt that there were other avenues that could be explored. For example, the recombination of the Computing Science and CIST departments, urged in recommendation 2 (a), will provide a broader base of qualified computing science faculty. However, three other recommendations can be made:

RECOMMENDATION 7(a):
That the Department of Computing Science recognize that it cannot offer all areas of computer science and as such must consolidate and more narrowly focus its offerings to a reasonable number of areas.

ACTION: Department of Computing Science

RECOMMENDATION 7(b):
That the Department of Computing Science utilize faculty with less advanced academic degrees for the lower level courses and thereby more effectively utilize faculty engaging in research for the more theoretical upper level courses.

ACTION: Department of Computing Science

RECOMMENDATION 7(c):
That if recommendation 2(a) is insufficient to eliminate overloads, additional faculty be recruited.

ACTION: Dean of Advanced Technologies and Mathematics; VP Academic

In the interviews, it became apparent that, when hired, new faculty members are not sufficiently oriented to the nature of the programs in which they will be teaching. A clear need exists to better orient new faculty members to program structure and objectives. While the committee acknowledges the typical timing of the arrival of new faculty members and the chair workloads make this difficult, it needs to be addressed.

RECOMMENDATION 7(d):
That the Department of Computing Science consider a "mentorship model" of faculty orientation so that existing faculty may explain to new faculty the environment and programs in which they are working.

ACTION: Department of Computing Science

8. MISCELLANEOUS

The committee notes that the benefits of CIPS accreditation have been raised on a number of occasions and would strongly urge the department to pursue this accreditation forthwith.

RECOMMENDATION 8 (a):
That the Department of Computing Science pursue accreditation with CIPS.

ACTION: Dean of Advanced Technologies and Mathematics; Department of Computing Science

In reviewing the library support for the BTACS degree, it was noted that very little expenditure had occurred. While the committee realizes that computing science is an area that is constantly changing and, as such, has less need for traditional library resources, library representatives indicate that there may be a greater demand for some of the new online journals and non-traditional resources.

RECOMMENDATION 8 (b):
That the Department of Computing Science meet regularly with UCC Library representatives to determine appropriate methods and levels of resource acquisition and support.

ACTION: Department of Computing Science

APPENDIX A
METHODOLOGY

The data were collected in the following ways:

1) Consultation took place with Kevin O'Neil, Chair, and the faculty members of the Department of Computing Science on the design of the surveys on May 4th, 2004. Consultation continued over the summer with the new Chair, Richard Paweska, and several acting Chairs.

2) Surveys were administered to the BTACS/CS Major faculty, current students, former students, and employers. All data were processed using SPSS to achieve frequency rates and mean responses. Subjective comments for each group were recorded separately and anonymously. Former student data from 1999-2004 graduates of the program were summarized from Student Outcomes Reporting System (SORS), as provided by BC Stats.

3) "Descriptive Data" on the BTACS/CS Major Programs' objectives, course outlines, resumes, etc., were solicited from Richard Paweska, Chair, Computing Science, and Computing Science faculty.

4) Data on enrolment figures, graduation rates, gender and grade distributions were provided by the Office of AVP Planning & Administration.

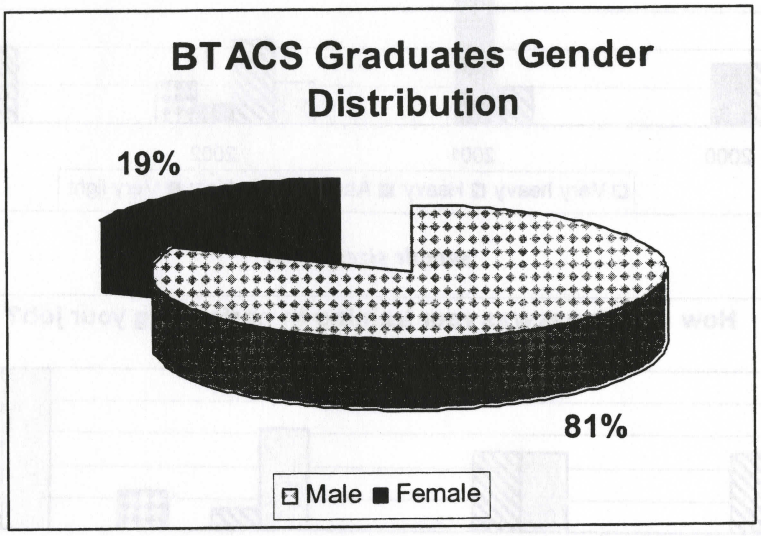
5) Faculty and students associated with the program were invited to be interviewed. The following people participated:

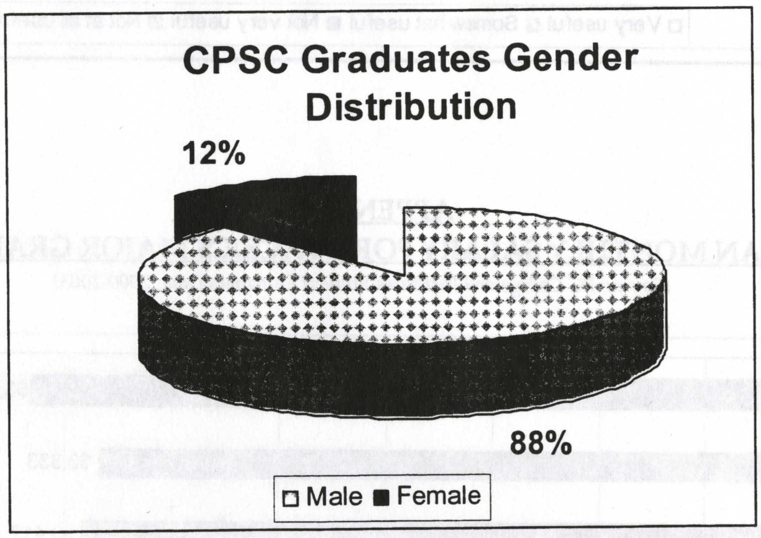
- Wayne Babinchuck, Computing Science Faculty
- Rick Cummer, Computing Science Faculty
- Yanni Giftakis, Computing Science Faculty
- Penny Haggerty, Collections Librarian
- Mila Kwiatkowska, Computing Science Faculty
- Mahnhoon Lee, Computing Science Faculty
- Nancy Levesque, Director of Library Services
- Brenda Mathews, CIST Faculty
- Oscar Meruvia, Computing Science Faculty
- Kevin O'Neil, Computing Science Faculty
- Alastair Watt, Associate Vice President Planning & Administration

APPENDIX B
GENDER RATIO OF THE BTACS/CS MAJOR GRADUATES:

(Source:Colleague)

	Male	Female	Total
BTACS	26	6	32
CPSC	22	3	25
Total	48	9	57





APPENDIX C
GRADUATION RATES

(Source: Colleague)

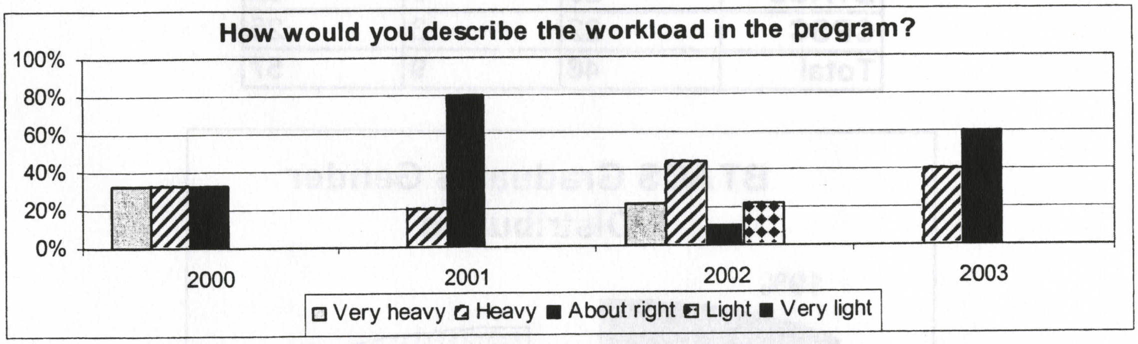
The following table reflects numbers of graduating students by program since 2000:

	2000	2001	2002	2003	2004	Total
BTACS	6	10	11	1	4	32
CS Major	1	3	4	6	11	25
TOTAL	7	13	15	7	15	57

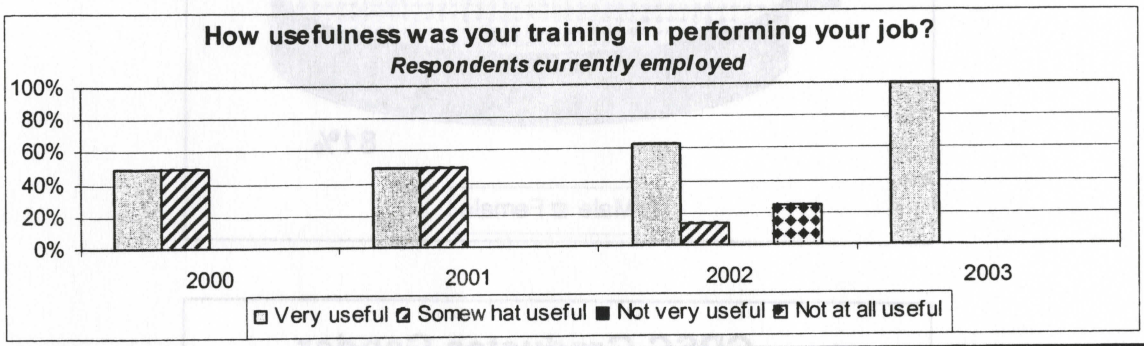
APPENDIX D
FORMER STUDENTS EVALUATION OF EDUCATION

(Source: BC College and Institutes Student Outcomes Data: 2000-2003)

sample size: 3 to 9

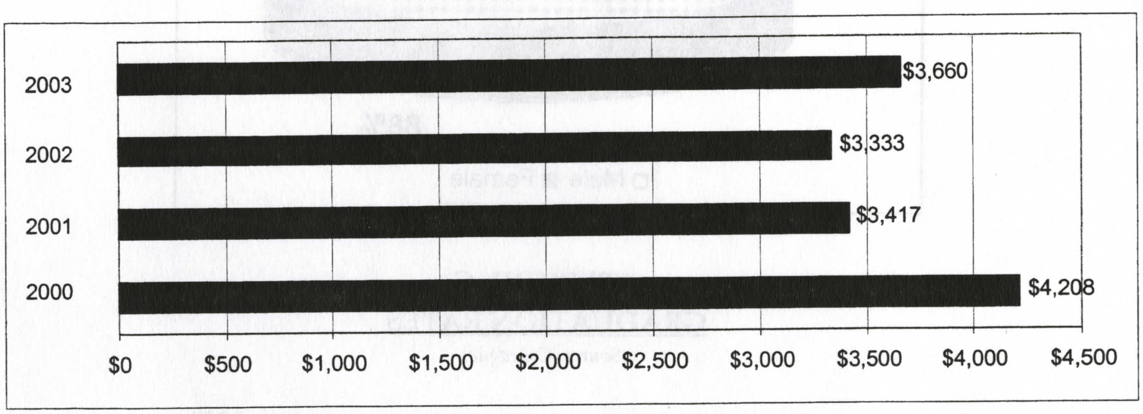


sample size: 2 to 8



APPENDIX E
MEDIAN MONTHLY SALARY FOR BTACS/CS MAJOR GRADUATES

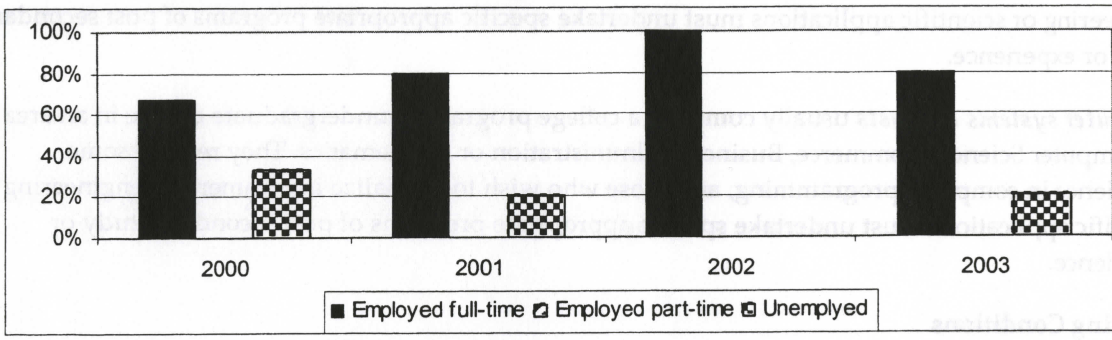
(Source: BC College and Institutes Student Outcomes Data: 2000-2003)



APPENDIX F
LABOUR FORCE STATISTICS

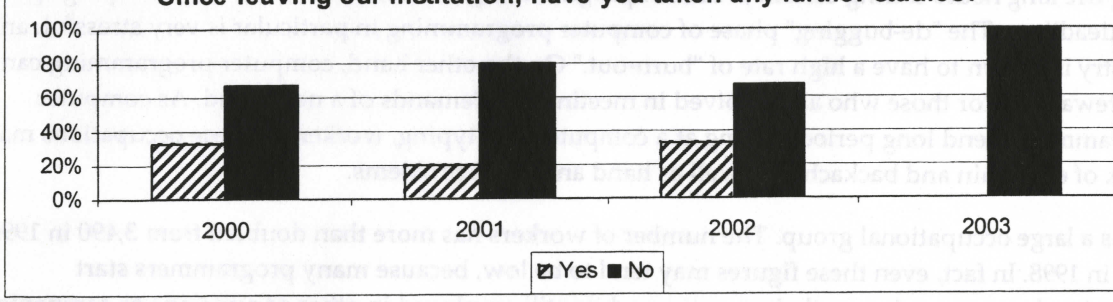
(Source: BC College and Institutes Student Outcomes Data: 2000-2003)

sample size: 3 to 8



sample size: 3 to 9

Since leaving our institution, have you taken any further studies?



APPENDIX G
EMPLOYMENT PROSPECTS

Computer Programmers (NOC 2163) & Computer Systems Analysts (NOC 2162)

Main Duties

Computer programmers write computer programs or software packages by coding instructions and algorithms into computer-readable form. They test, debug, document and implement computer programs or software packages, as well as maintain existing computer programs by making modifications as required. Computer programmers may act as a resource aide, solving computer problems for users along with helping to develop and customize company software applications.

Computer systems analysts confer with clients regarding the nature of the information processing or computation needs that a computer program is to address. They analyse these needs into related components that can be solved through the application of computer technology, and they write requirement specifications for computer programs, identifying the steps in the program and the algorithms to be employed. They communicate program specifications to computer programmers. They test and implement computer programs and provide user training, and they plan and implement computer security systems for database access control. They also analyse and develop database directories, generate and maintain databases and analyse databases and their required software solutions. They may supervise computer programmers or other systems analysts or serve as project leaders for particular systems projects.

While there are many different functions and niches in the field of systems analysis, the main duty of a systems analyst is to design and apply computer system setups for a variety of business and research applications.

Education & Training

Computer programmers usually complete a college program or bachelor's degree in computer science, or an undergraduate degree in another discipline with a significant programming component, such as commerce, business administration or mathematics. Programmers who wish to specialize in commercial, engineering or scientific applications must undertake specific appropriate programs of post secondary study or experience.

Computer systems analysts usually complete a college program or undergraduate degree in an area such as Computer Science, Commerce, Business Administration or Mathematics. They require some experience in computer programming, and those who wish to specialize in commercial, engineering or scientific applications must undertake specific appropriate programs of post secondary study or experience.

Working Conditions

Working conditions in computer programming can vary between firms. However, the industry is known to require long hours during certain phases of programming, with intense workloads bumping against tight deadlines. The "de-bugging" phase of computer programming in particular is very stressful, and the industry is known to have a high rate of "burn-out." On the other hand, computer programming can be very rewarding for those who are involved in meeting the demands of a new trend. As computer programmers spend long periods sitting at a computer and typing, workers in these occupations may be at risk of eye strain and backaches as well as hand and wrist problems.

This is a large occupational group. The number of workers has more than doubled from 3,490 in 1990 to 8,460 in 1998. In fact, even these figures may tend to be low, because many programmers start professional programming on their own time while still employed in other occupations or companies. Therefore, such part-time programmers may not be included in the employment estimates. This situation also affects self-employment and part-time employment numbers. Self-employed computer programmers account for approximately 18% of the workers, which is higher than the all-occupation average in B.C. (15%). Part-time workers represent only 10% of the total employment in computer programming. The all-occupation rate for part-time employment in B.C. is 26%.

The unemployment rate in computer programming is lower than the average for all occupations. Unless a programmer has not kept up with new skills, unemployment is likely to be limited to frictional unemployment, which refers to people who are not currently employed but only because they are between definite jobs. As is the case with many other computer-related occupations, there is relatively little seasonality in programming work. More than half of computer programmers in B.C. (56%) work for software and other companies as part of the professional and other business services sector. Software companies also contract with corporations in other areas (such as government or banking) for programming development. Another 7% of computer programmers are employed directly in the finance, insurance and real estate sector, 4% work for telecommunication carriers, and 3% work in education.

In terms of geographical distribution, 75% of computer programmers work in the Lower Mainland, and a further 14% work in Victoria. By comparison, 57% of the entire workforce are located in the Lower Mainland, and 9% are located in Victoria. The concentration of programmers in these two communities is a reflection of the occupation's focus on serving the computing needs of medium and large companies and public organizations. The balance of programming employment tends to follow the general distribution of the workforce, with 6% located in the Okanagan/Kootenay region, 2% in Northern B.C. and 3% on the rest of Vancouver Island. While growth in computer programming employment is expected to occur in all regions of B.C., the Lower Mainland will probably remain the most dominant region in terms of its share of employment.

Women make up only 22% of B.C.'s computer programmers. This is expected to change as educational institutions are actively recruiting more women students to enter studies for this well-paid, high-growth profession. Workers in this profession tend to be young. Those in the 25 to 34 age range represent 43% of all computer programmers, compared to just 25% of the workforce as a whole. In addition, another 31% of the workers are in the 35 to 44 age range (which is about the same as for all occupations). Overall, 86% of programmers are under 45, compared to just 68% for all occupations. The average age for computer programmers is 34.

Systems analysts are generally in high demand. Their working conditions can be interesting but challenging. They work in offices or laboratories in comfortable surroundings. Although they often work a regular 40 hour week, both the implementation of a new computer system (or software) and "trouble shooting" in mission-critical applications can translate into very long hours during times of crisis. Further, some computer/network maintenance or upgrade work can only be performed after hours or on weekends, during off-peak hours. The working environment can require a systems analyst to be both patient and flexible. In addition, because their work requires them to sit for long hours at a keyboard, computer systems analysts can be at risk of developing eye strain and backaches as well as hand and wrist problems.

This is primarily a full-time occupation. Over 90% of the workers are employed full time, 71% work full time for the whole year, and only 8% work on a part-time basis. The unemployment rate is lower than the average for all occupations. Much of the unemployment usually is temporary in nature, when people are "between projects." There is little seasonal variation in the employment patterns of systems analysts.

More than half (52%) of systems analysts are employed in professional and other business services. The balance of workers are spread across a variety of industries with the federal and provincial governments accounting for 6% and telecommunication carriers and education accounting for 4% each.

This is an occupation that tends to address the needs of medium and large companies and public organizations. It is not surprising that about 74% of the workers live in the Lower Mainland and another 16% live in Victoria. In contrast, only 5% of the workers live in the Okanagan/Kootenay region, and 2% live in Northern B.C. (The respective all-occupation worker distribution is 57% in the Lower Mainland, 9% in Victoria, 15% in the Okanagan/Kootenay region and 10% in Northern B.C.)

Employment Prospects

This is a large occupational group, made up of about 8,460 workers in B.C. in 1998. The Canadian Occupational Projection System (COPS) projects employment in this occupation to grow at an annual rate of 4.5%, much faster than the average for all occupations. In fact, this occupation (and related ones, such as computer systems analysts) is projected to be among the fastest growing professional occupation in the B.C. economy. According to this projection, a total of 6,260 positions will become available from 1998 to 2008. Three-quarters of these openings are projected to result from growth in the number of new positions, and the remainder will come from the need to replace workers who retire.

Increasing global competition and the continued trend toward computerization are interacting in a way that is causing rapid employment growth for *computer programmers*. Organizations are striving toward maximizing the efficiency of their information, financial and other computer systems in order to remain competitive in the global economy. A growing number of new ways that computers can help to make organizations more efficient are being discovered. Often these discoveries entail hiring a computer programmer(s) to write the appropriate program(s). As well, with each new generation of computer technology and operating systems, computer programmers are often called upon to make existing business applications compatible, or upgrade them altogether.

Industry sources agree that there will be significant employment growth for computer programmers. They support this by pointing to the rapid growth in the computer services sector and the growing utilization of information technology throughout the whole B.C. economy. Other factors include growth in the use of local and wide area computer networks (LANS and WANS), increased use of the Internet for commerce and business functions and the growing utility of data base systems to enable more informed decision making by businesses.

The computer services field is also evolving, and new related occupations are emerging. For example, the occupation of *data base administrator* (DBA) has recently emerged. The National Occupational Classification System (NOCS) has not been adjusted to account for this occupation because it is so new and encompasses aspects of other occupations. It requires strong statistical skills and encompasses aspects of occupations in the field of data base architecture but is primarily a high-skilled computer-related occupation. For this reason, persons in this and other similar occupations are presently accounted for under the NOC occupational titles of *computer systems analysts* and *computer programmers*.

While some *applications programmers* do work for companies and industries to tailor computers and software to their specific needs, many work on more generic software for business, industrial and personal computer use.

Self-employment, contract and consulting work is important for this occupation. Entrepreneurial programmers can be successful starting their own software companies that specialize in a particular niche of programming, such as games or business accounting software.

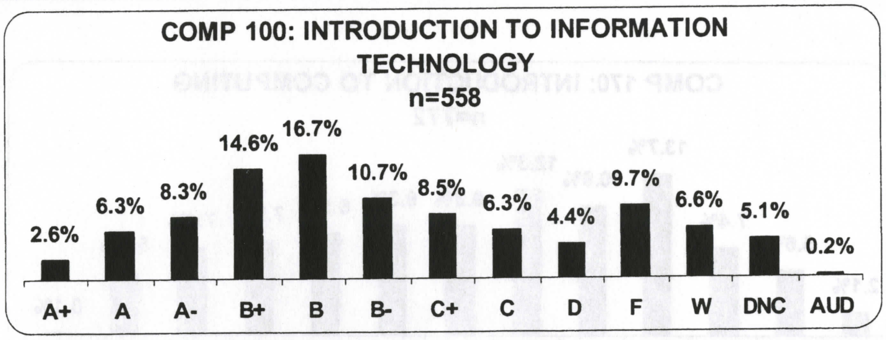
Programming work is already global in scope. As developments continue to provide seamless communications and applications worldwide through the Internet, there will be greater international competition for contracts. This could mean more opportunities for workers located in B.C., but it will also mean that those interested in this field will have to be able to market their services both locally and internationally.

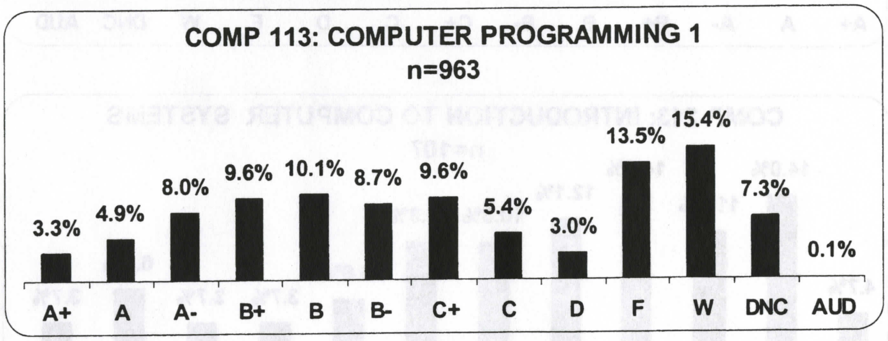
Employment of computer programmers is less sensitive to general economic conditions than most other occupations. This is because the services that these professionals provide contribute to efficiency and cost reductions of many organizations regardless of economic conditions. However, opportunities in this field are greatly affected by the adoption of new computer technologies throughout the economy. Generally, new computer technologies need to be integrated into existing systems, and this will increase the employment demand for computer programmers.

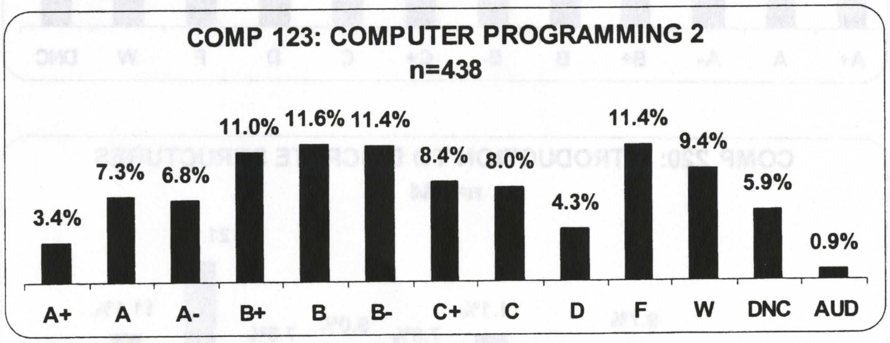
Systems Analysts make up a very large occupational group, made up of about 10,930 workers in B.C. in 1998. The Canadian Occupational Projection System (COPS) projects employment in this group to grow at an annual rate of 4.5%, much faster than the average for all occupations. In fact, this occupation (and related ones such as computer programming) is projected to be among the fastest growing professional occupations in the B.C. economy. According to this projection, a total of 8,080 positions will become available from 1998 to 2008. Three-quarters of these openings are projected to result from growth in the number of new positions and the remainder will come from the need to replace workers who retire.

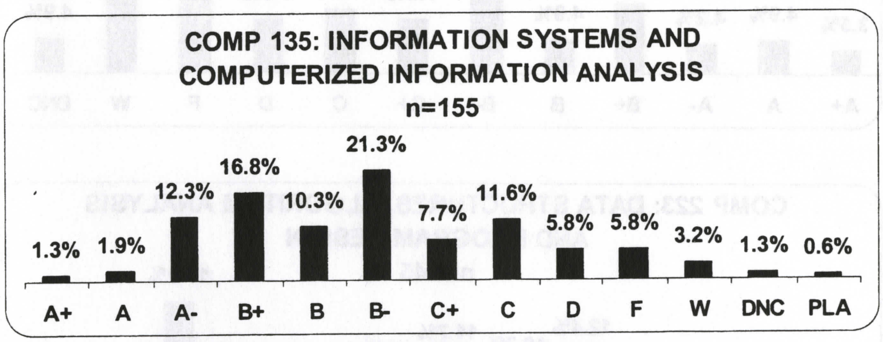
Increasing global competition and the continued trend towards computerization are interacting in a way that is causing rapid employment growth for *computer systems analysts*. Organizations are striving toward maximizing the efficiency of their computer systems in order to remain competitive in the global economy. This has led to the further proliferation of communications and computer networks, including the Internet and new "cable" technologies. With each new generation of computer technology and operating system, existing business applications have to be made to work, or upgraded altogether. Furthermore, the increase in the networking of computers will tie more and sometimes different platforms together. That, in turn, will make specialized systems analysts indispensable. Finally, many of these professionals move into management positions as companies integrate technical developments into their operations. This will create additional openings for computer systems analysts.

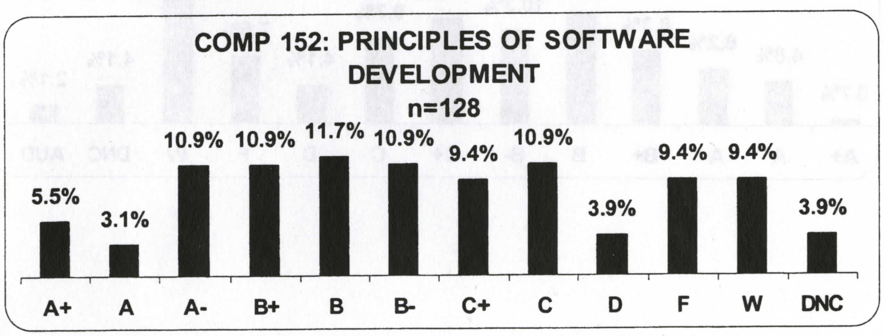
APPENDIX H
LOWER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 98/FA-02/WI BY COURSE



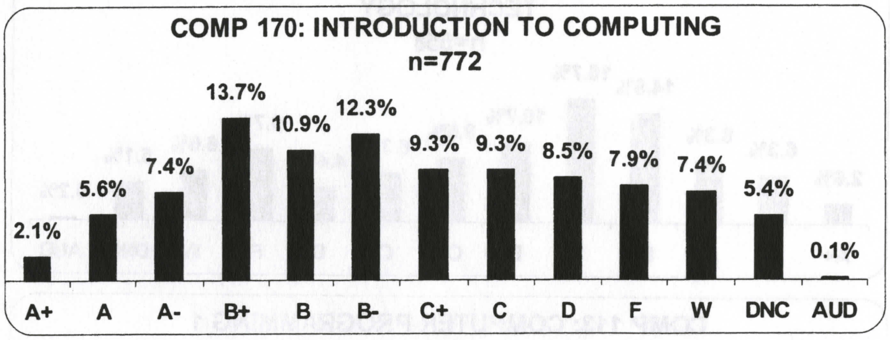


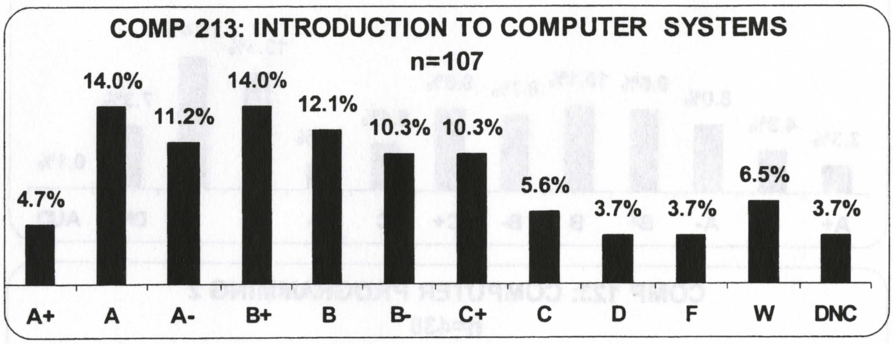


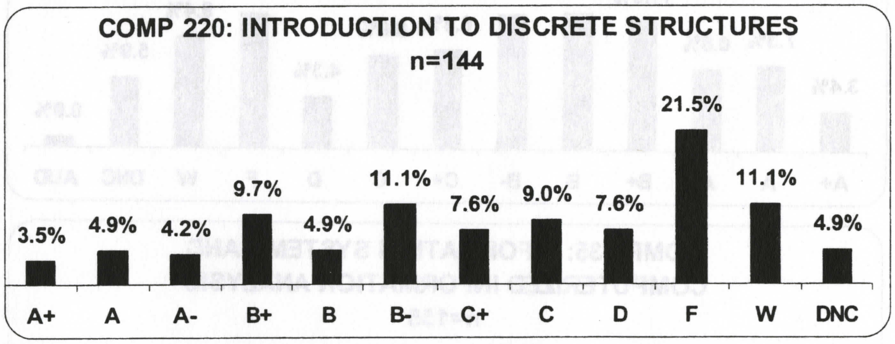


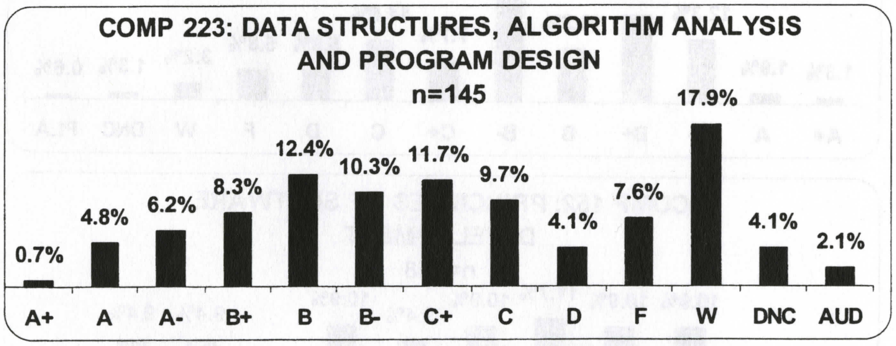


LOWER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 98/FA-02/WI BY COURSE



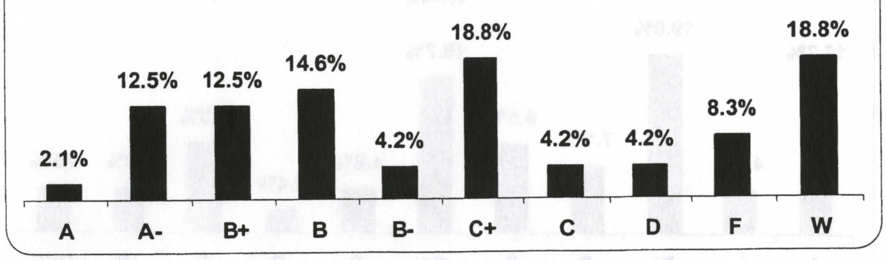






UPPER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 98/FA-02/WI BY COURSE

COMP 305: ALGORITHM DESIGN & ANALYSIS
n=48



COMP 311: MODELS OF COMPUTATION
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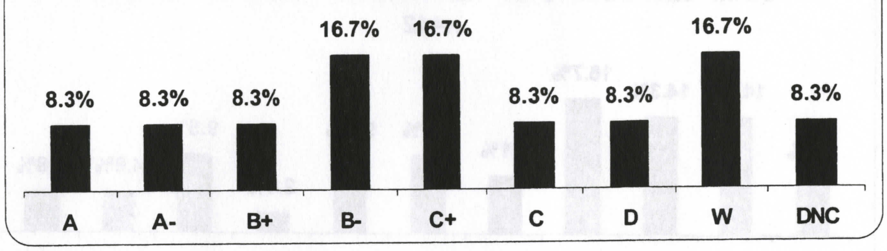
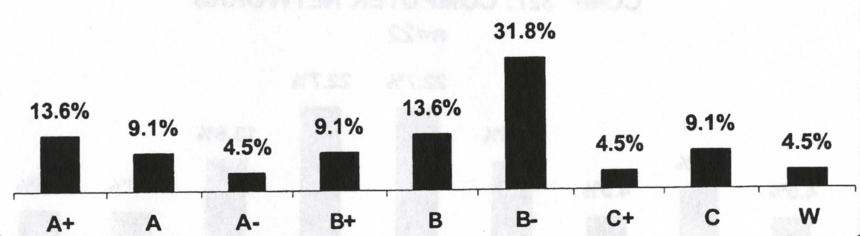
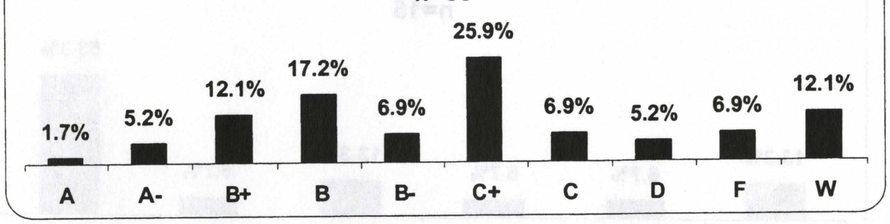


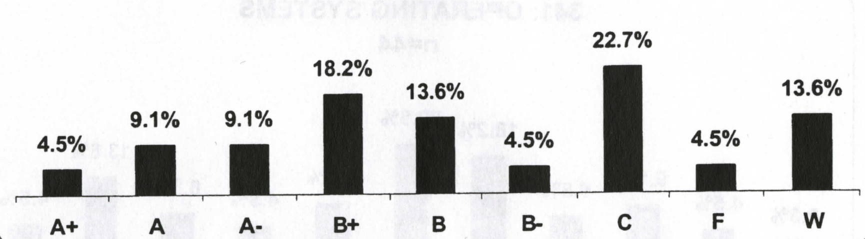
COMP 312 : PROGRAMMING LANGUAGES
n=22



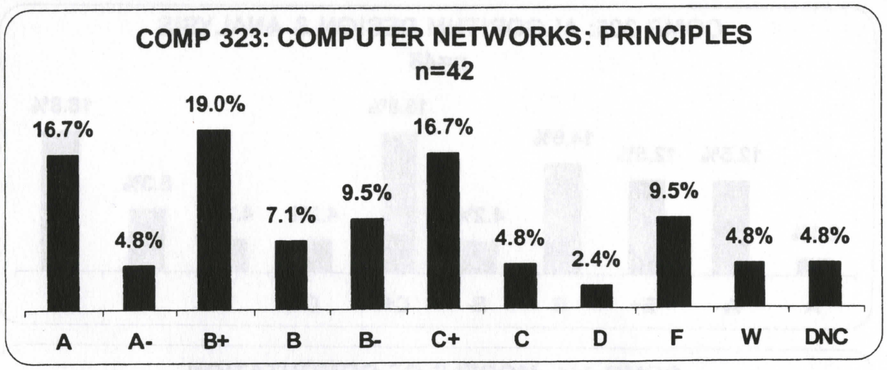
COMP 314: OBJECT ORIENTED DESIGN AND PROGRAMMING
n=58

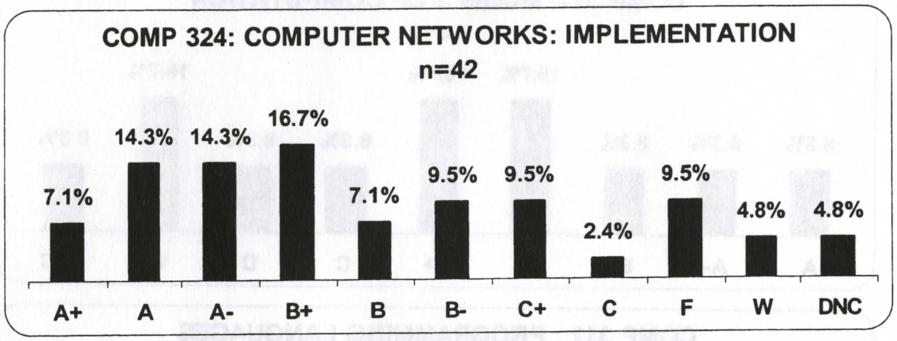


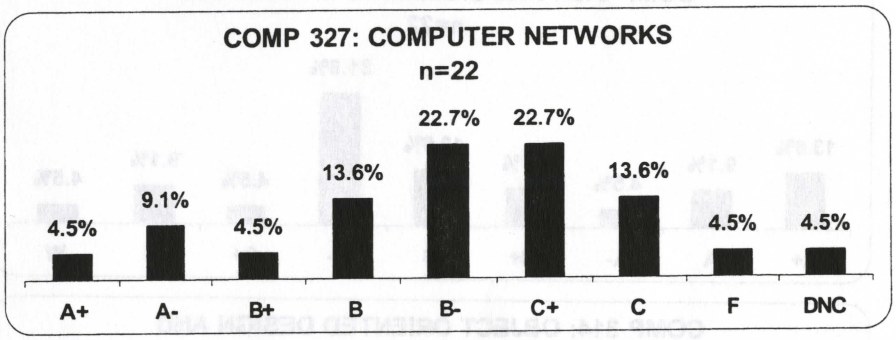
COMP 315: JAVA PROGRAMMING
n=22

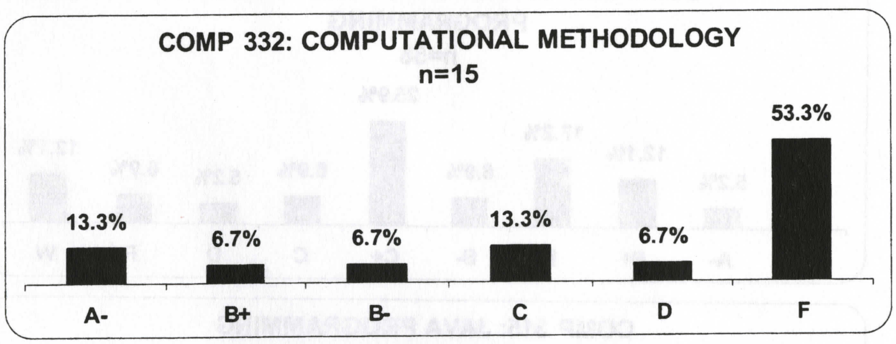


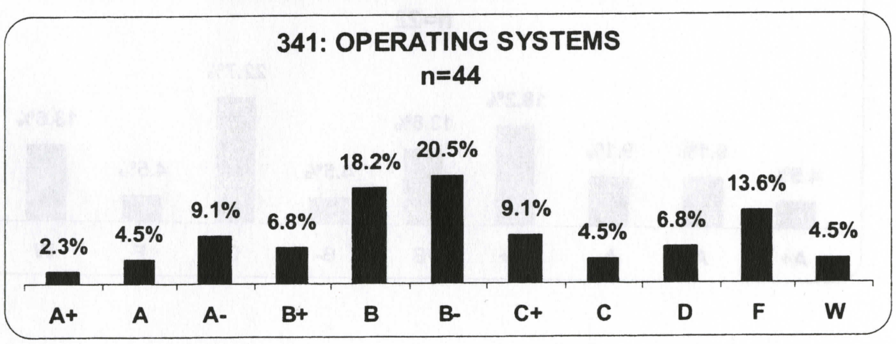
UPPER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 98/FA-02/WI BY COURSE











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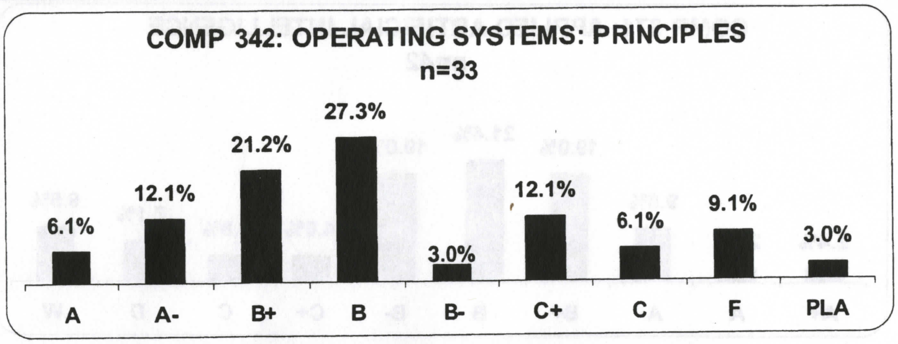

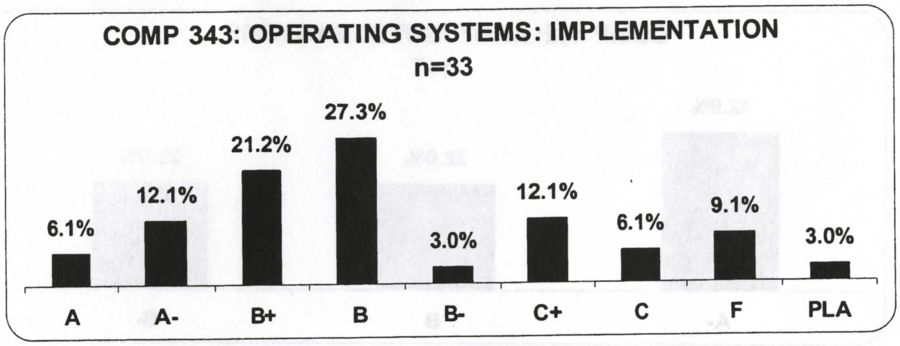

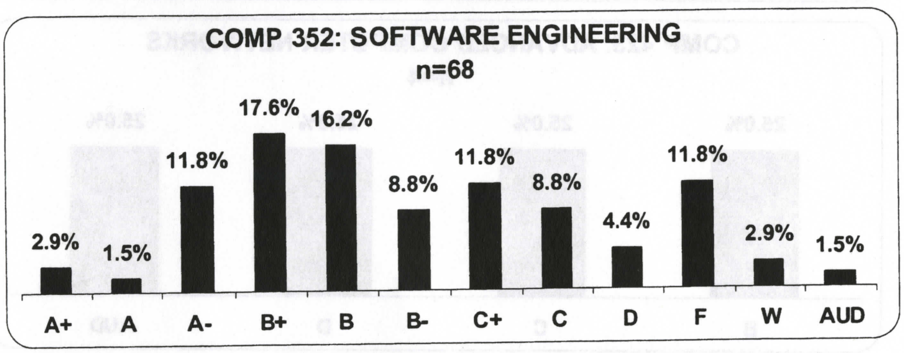

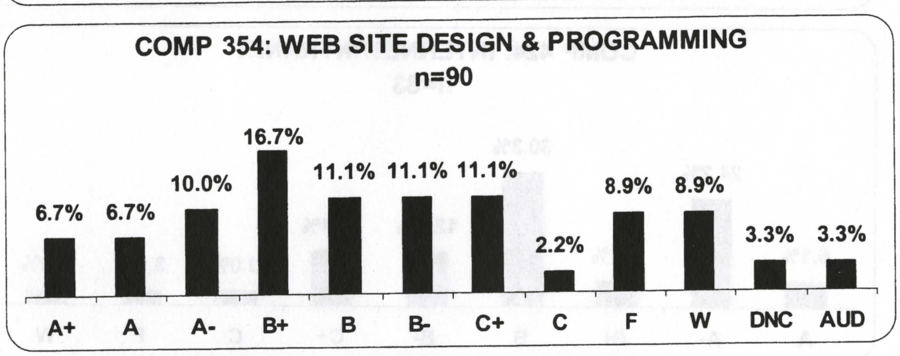

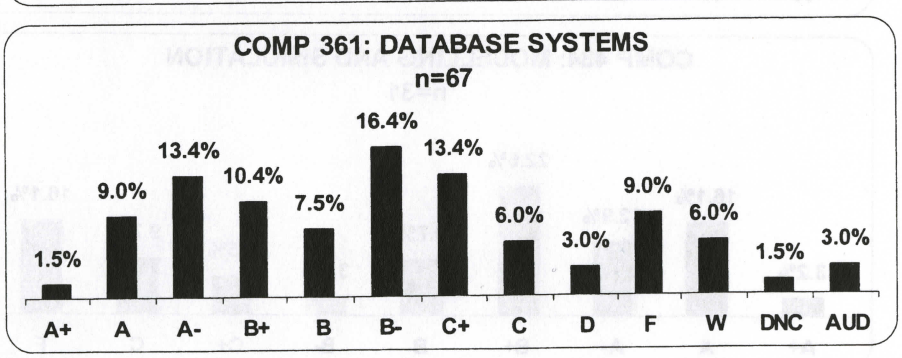

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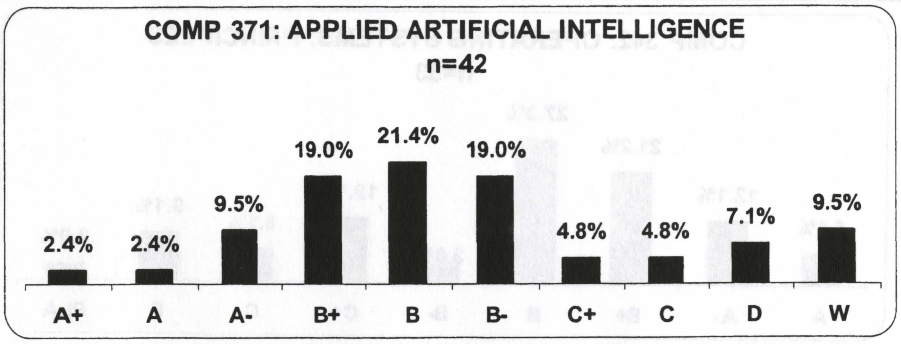

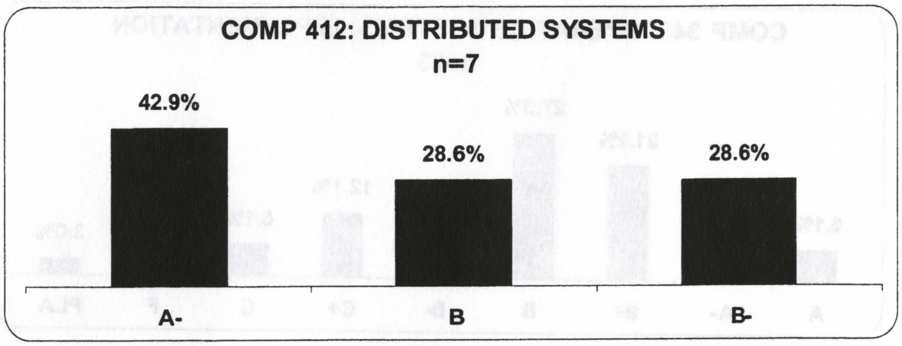

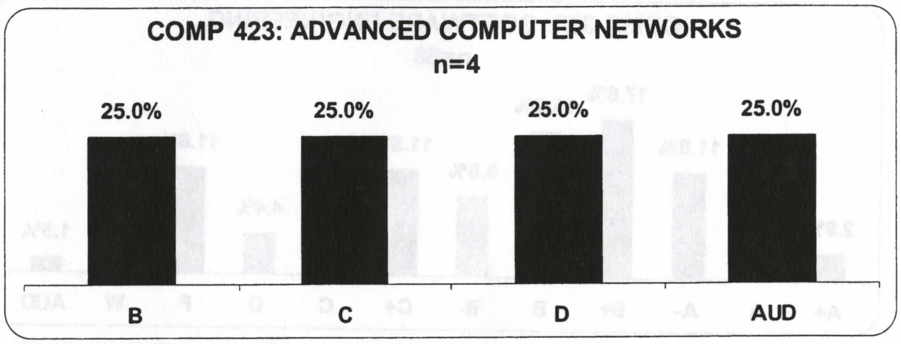

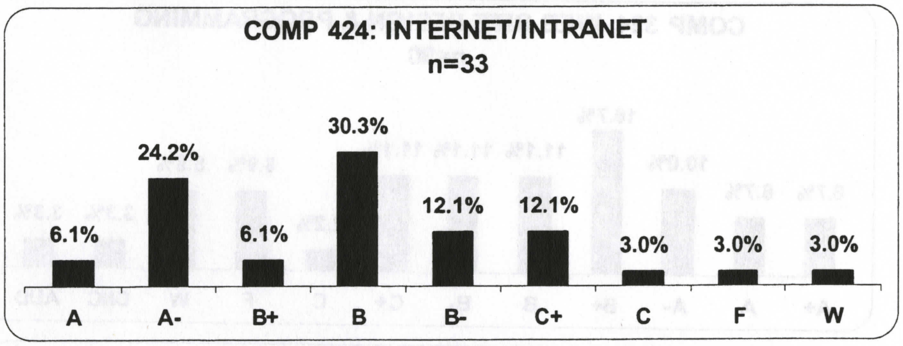

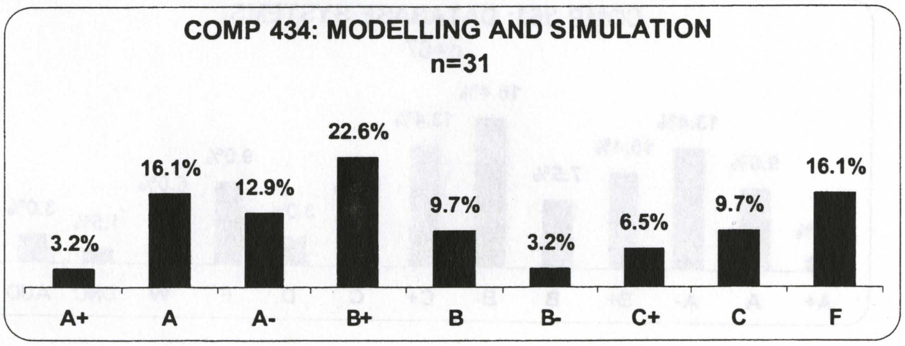

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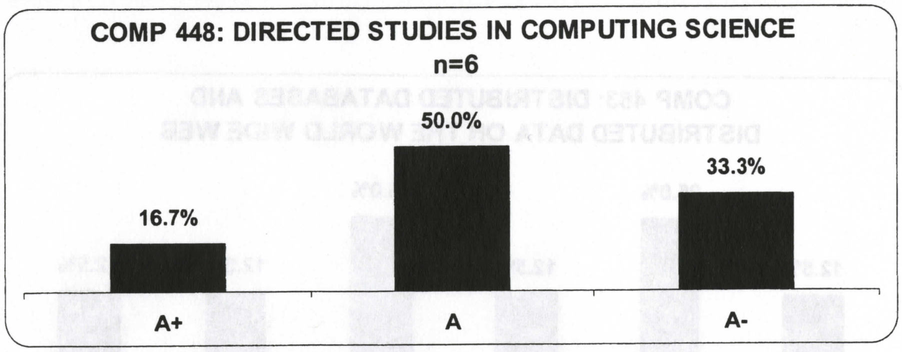
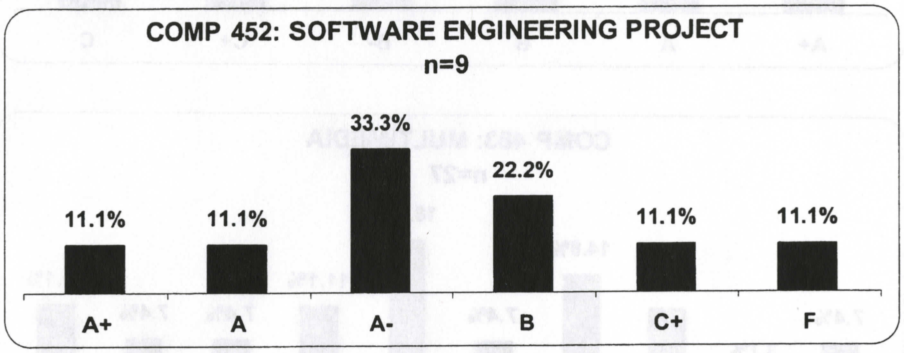
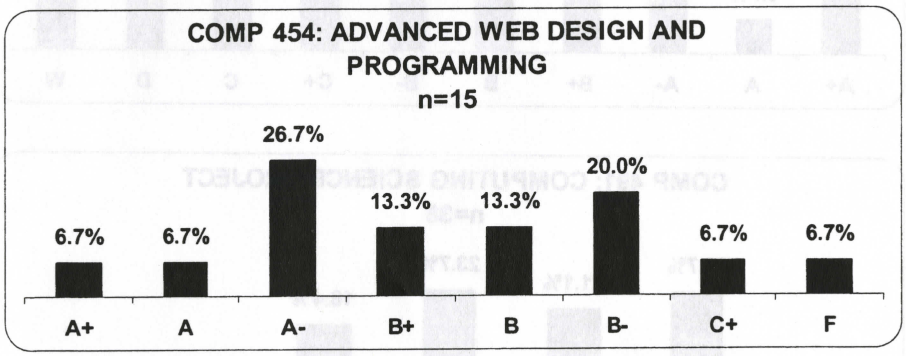
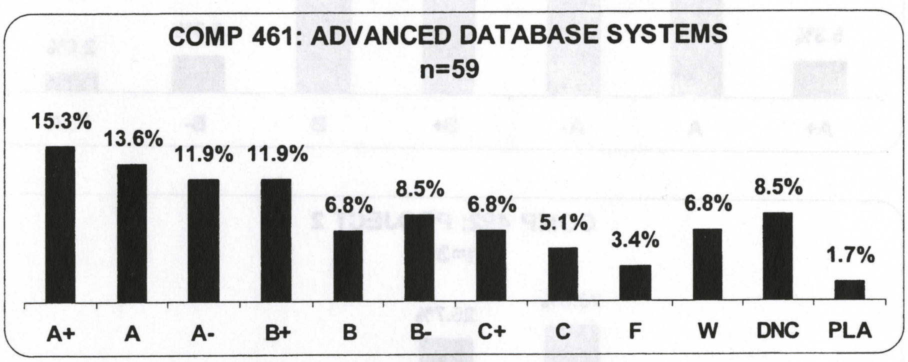
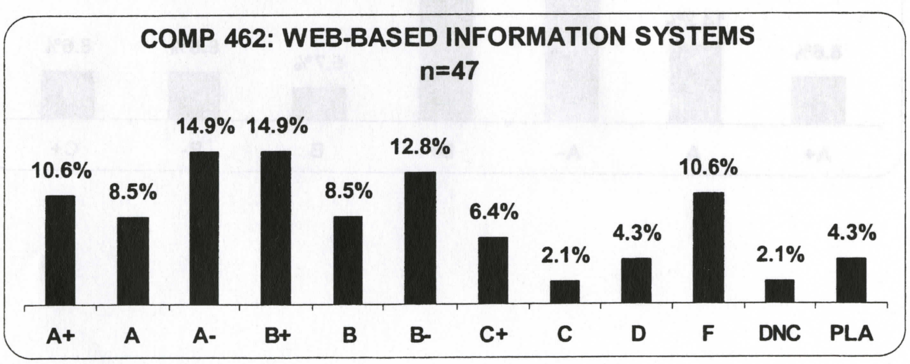




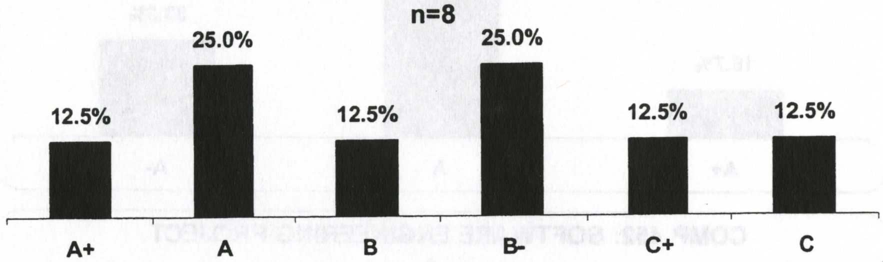




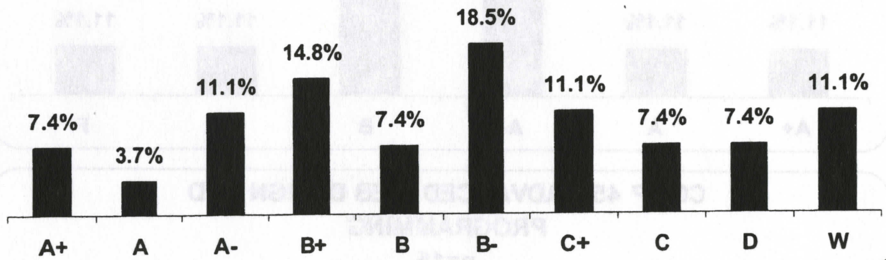


UPPER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 98/FA-02/WI BY COURSE

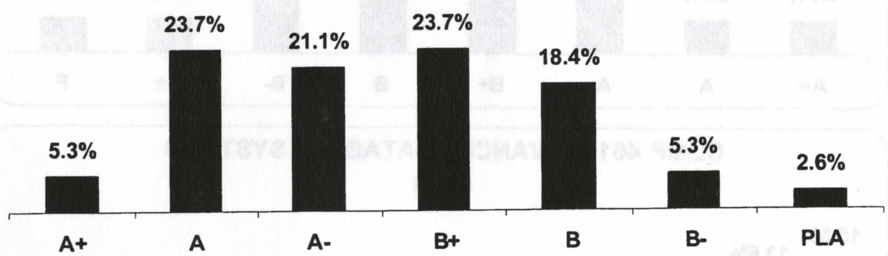
COMP 463: DISTRIBUTED DATABASES AND DISTRIBUTED DATA ON THE WORLD WIDE WEB
n=8



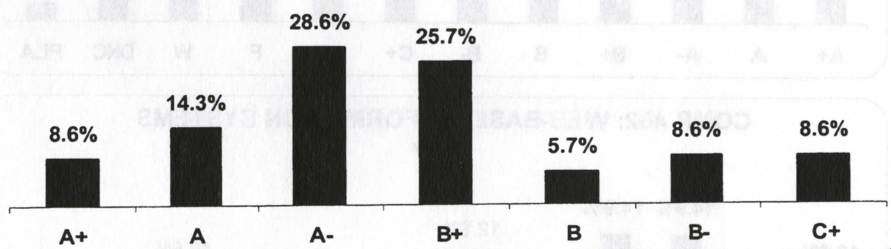
COMP 483: MULTIMEDIA
n=27



COMP 491: COMPUTING SCIENCE PROJECT
n=38

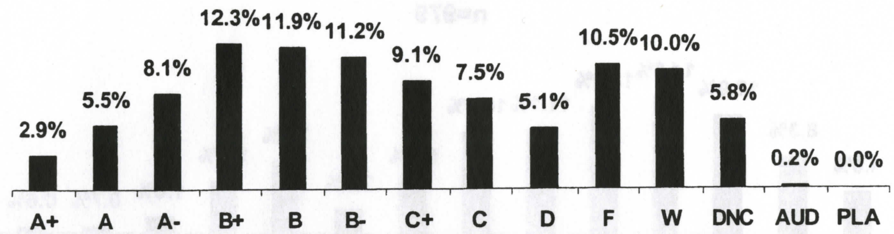


COMP 492: PROJECT 2
n=35

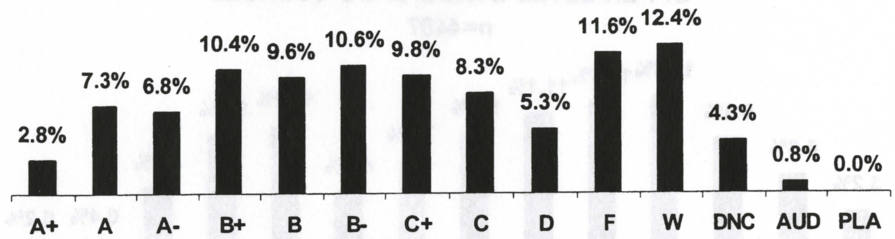


BTACS/CS MAJOR GRADE DISTRIBUTION SUMMARIES - 98/FA – 02/WI

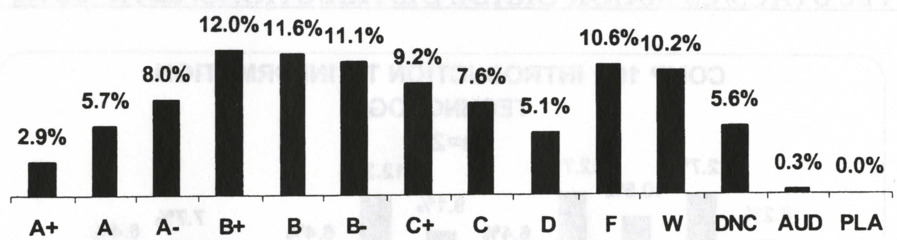
GRADE DISTRIBUTION SUMMARY OF 100 LEVEL BTACS/CPSC COURSES
n=3032



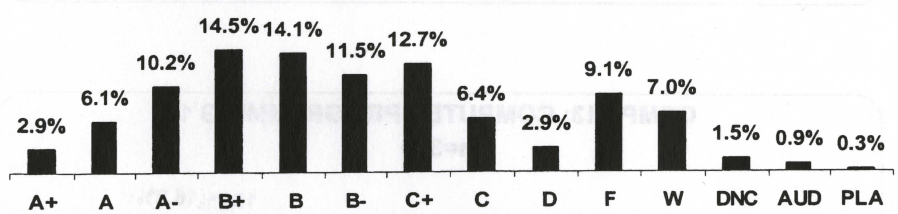
GRADE DISTRIBUTION SUMMARY OF 200 LEVEL BTACS/CPSC COURSES
n=396



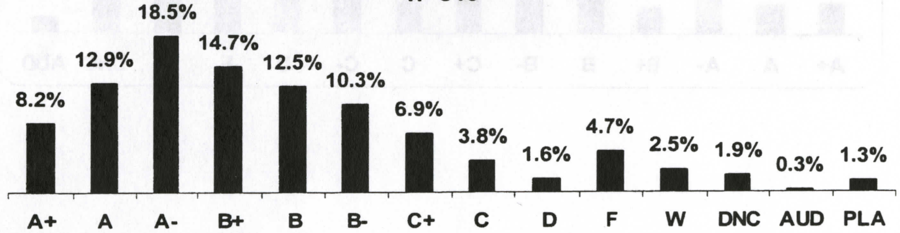
GRADE DISTRIBUTION SUMMARY OF ALL LOWER LEVEL BTACS/CPSC COURSES
n=3428



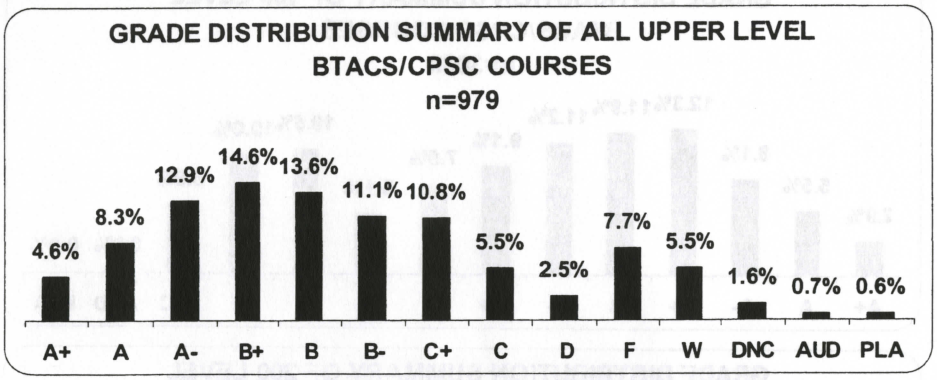
GRADE DISTRIBUTION SUMMARY OF 300 LEVEL BTACS/CPSC COURSES
n=660

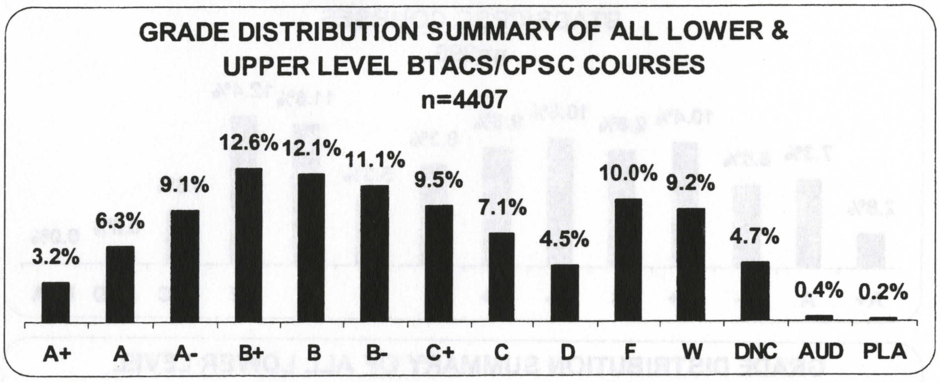


GRADE DISTRIBUTION SUMMARY OF 400 LEVEL BTACS/CPSC COURSES
n=319

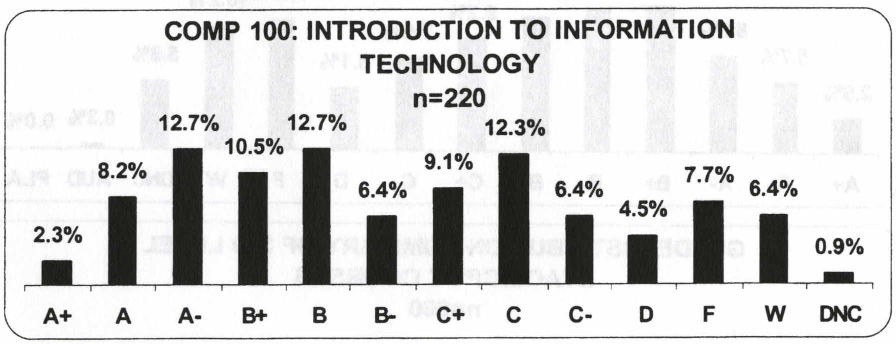


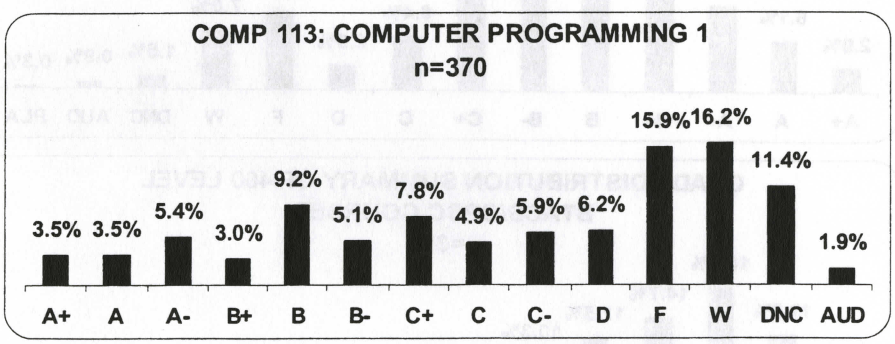
BTACS/CS MAJOR GRADE DISTRIBUTION SUMMARIES - 98/FA – 02/WI





LOWER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 02/FA -04/WI BY COURSE





COMP 123: COMPUTER PROGRAMMING 2
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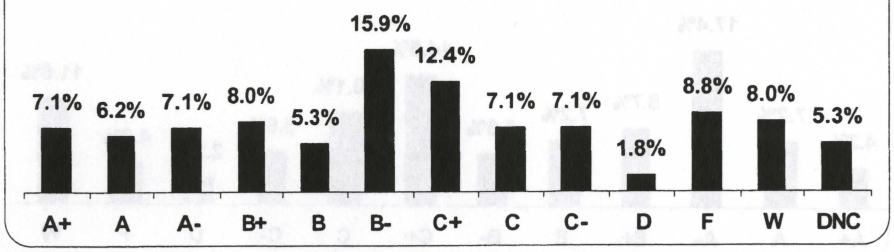

COMP 135: INFORMATION SYSTEMS AND COMPUTERIZED INFORMATION ANALYSIS
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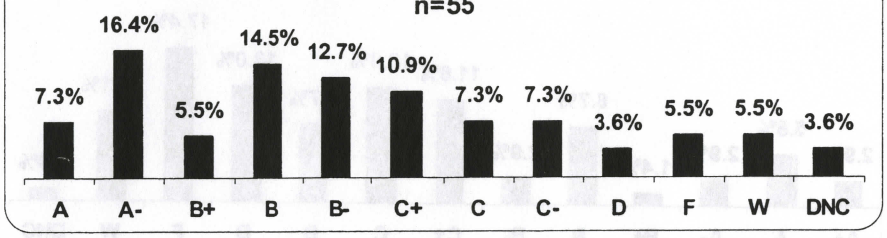

COMP 152: PRINCIPLES OF SOFTWARE DEVELOPMENT
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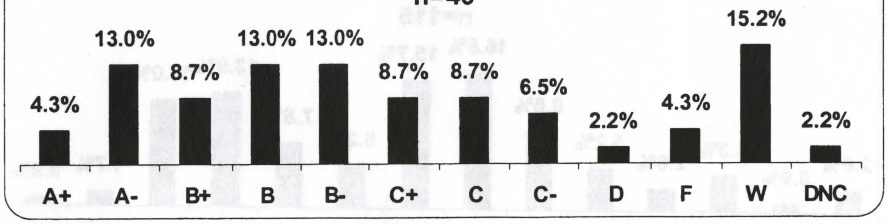

COMP 170: INTRODUCTION TO COMPUTING
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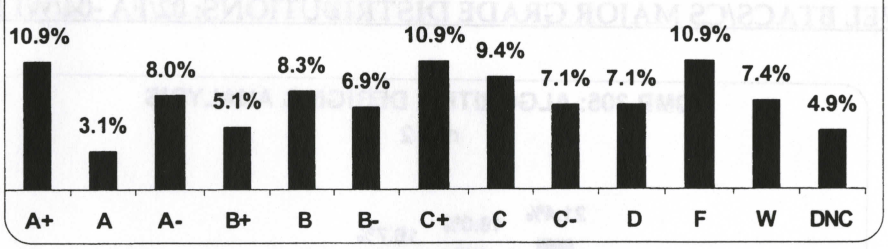

COMP 198: FOUNDATIONS OF COMPUTING SCIENCE
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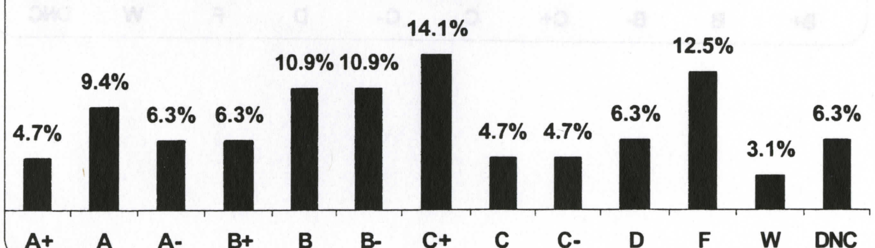
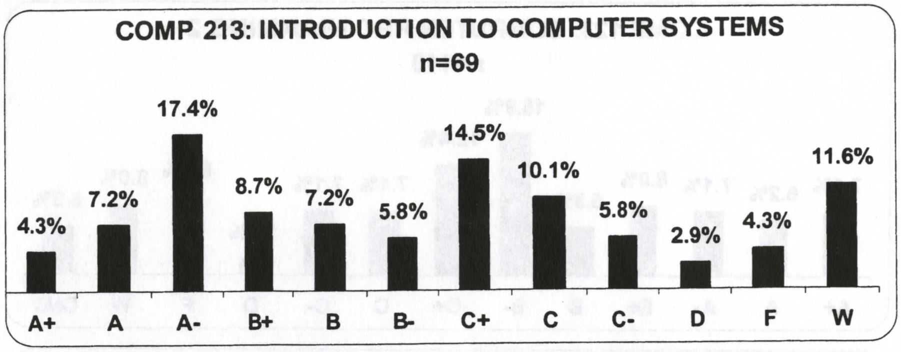
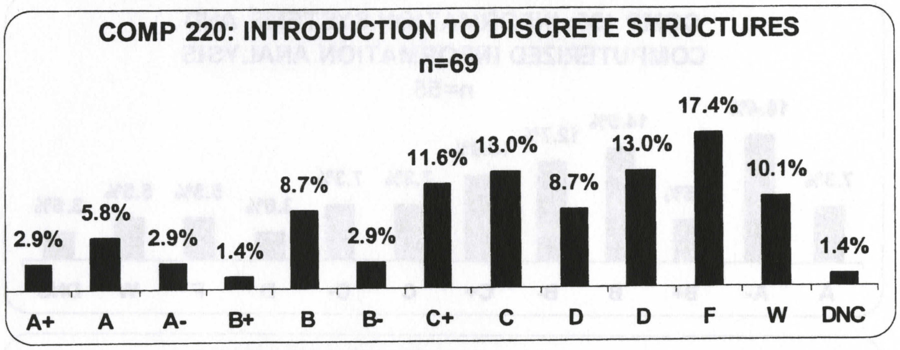
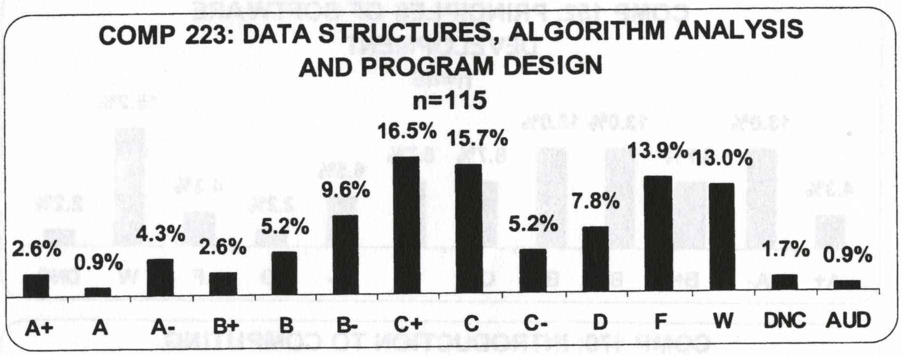


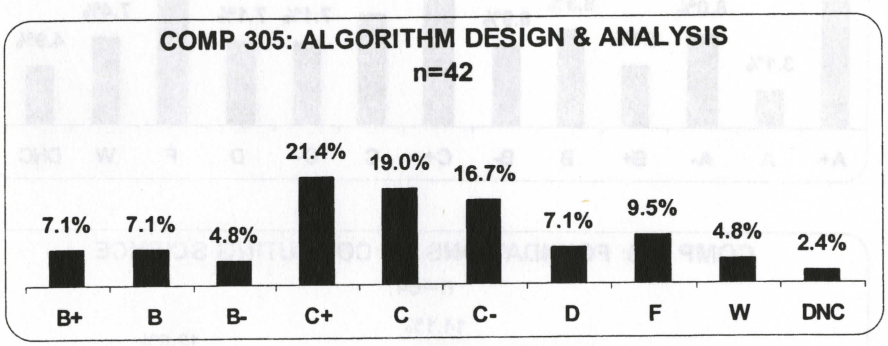
LOWER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 02/FA -04/WI BY COURSE

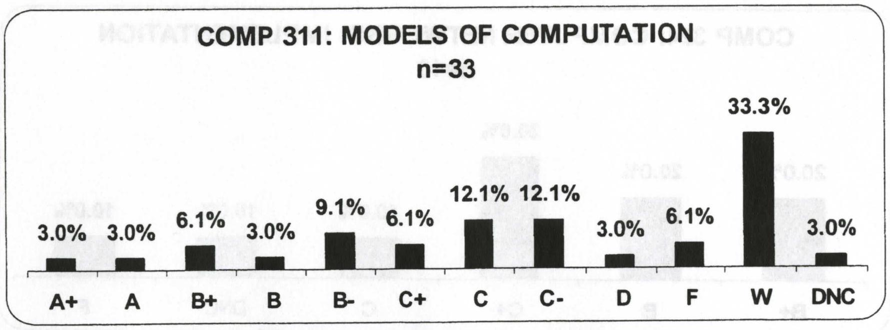


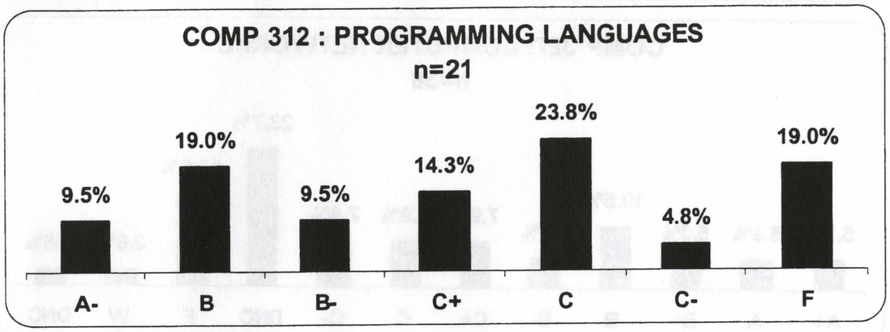


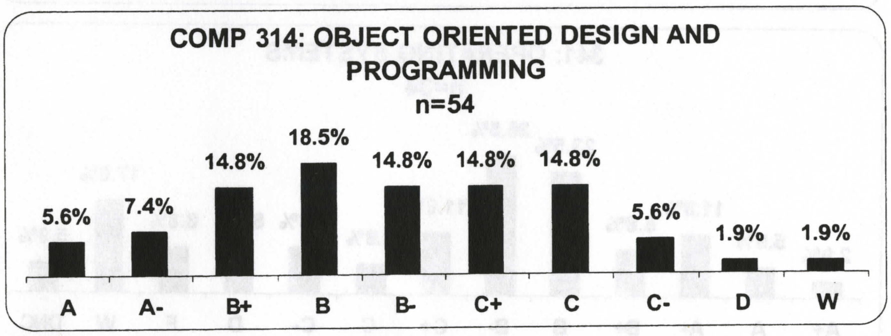


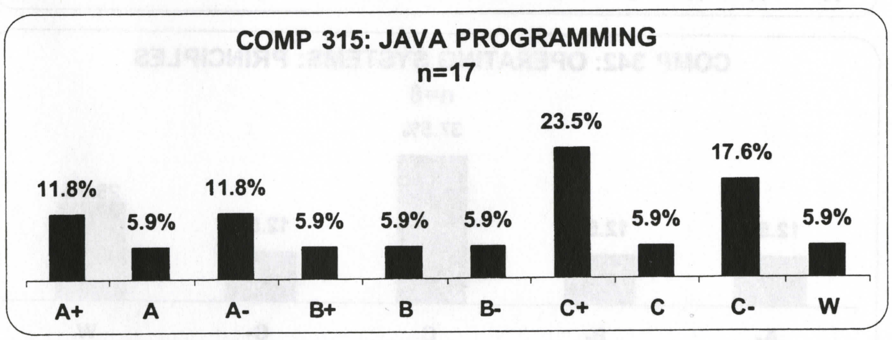
UPPER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 02/FA -04/WI BY COURSE

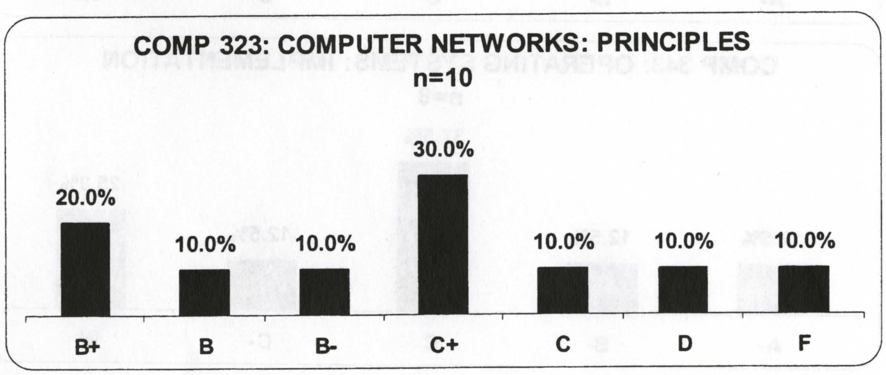



COMP 311: MODELS OF COMPUTATION
n=33
3.0% 3.0% 6.1% 3.0% 9.1% 6.1% 12.1% 12.1% 3.0% 6.1% 33.3% 3.0%
A+ A B+ B B- C+ C C- D F W DNC

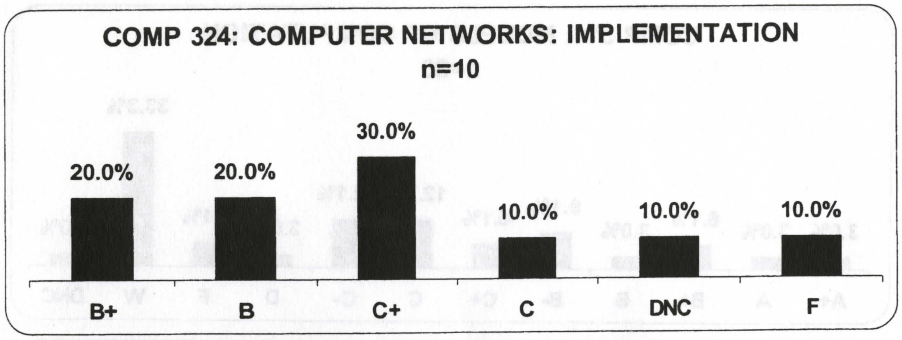

COMP 312 : PROGRAMMING LANGUAGES
n=21
9.5% 19.0% 9.5% 14.3% 23.8% 4.8% 19.0%
A- B B- C+ C C- F

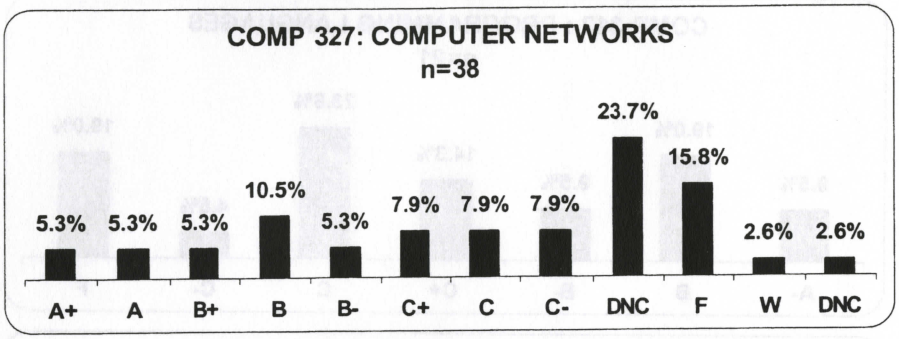

COMP 314: OBJECT ORIENTED DESIGN AND PROGRAMMING
n=54
5.6% 7.4% 14.8% 18.5% 14.8% 14.8% 14.8% 5.6% 1.9% 1.9%
A A- B+ B B- C+ C C- D W

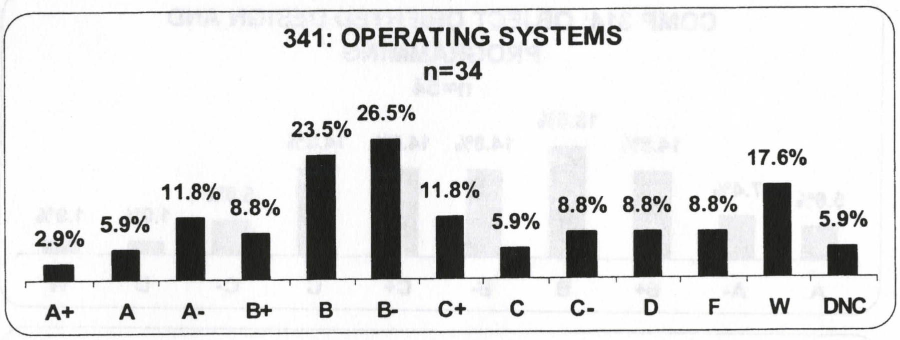

COMP 315: JAVA PROGRAMMING
n=17
11.8% 5.9% 11.8% 5.9% 5.9% 5.9% 23.5% 5.9% 17.6% 5.9%
A+ A A- B+ B B- C+ C C- W

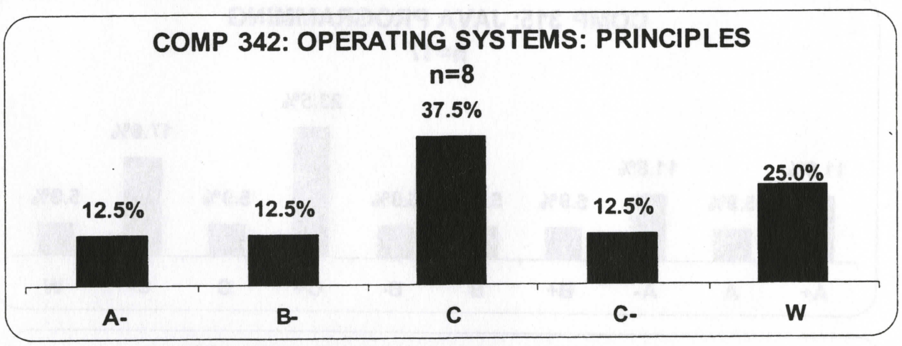

COMP 323: COMPUTER NETWORKS: PRINCIPLES
n=10
20.0% 10.0% 10.0% 30.0% 10.0% 10.0% 10.0%
B+ B B- C+ C D F

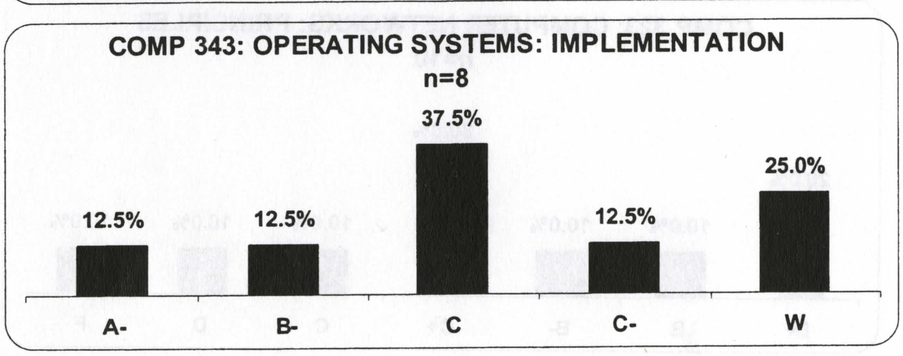
UPPER LEVEL BTACS/CS MAJOR GRADE DISTRIBUTIONS: 02/FA -04/WI BY COURSE











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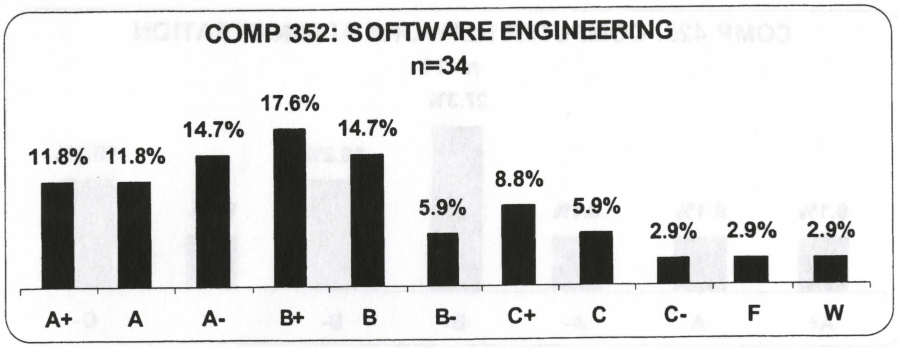

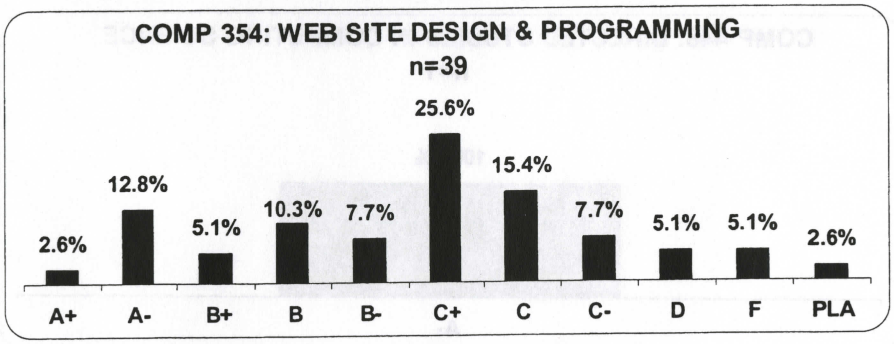

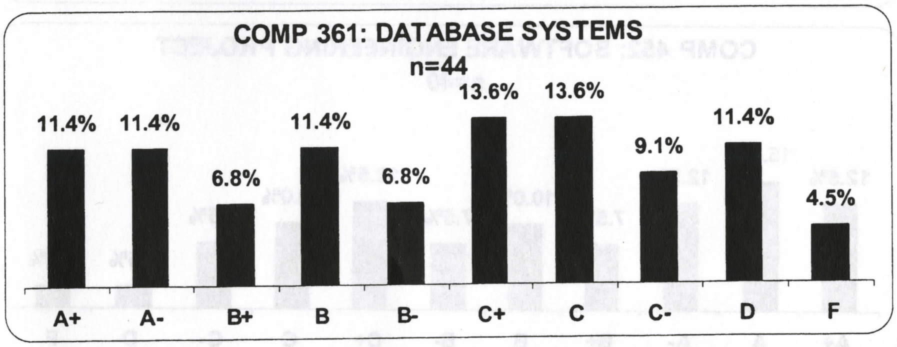

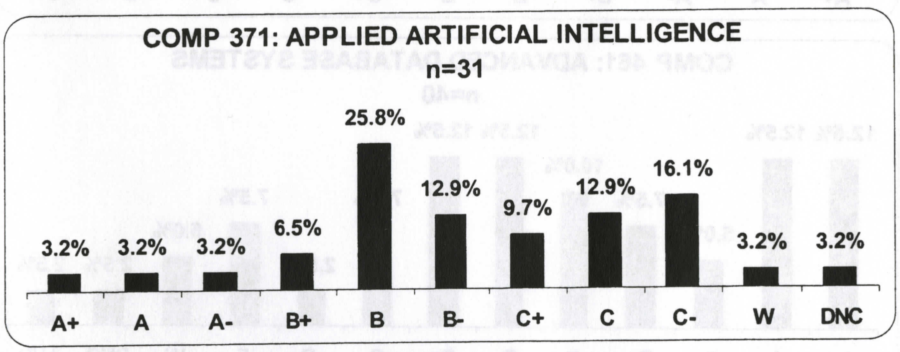

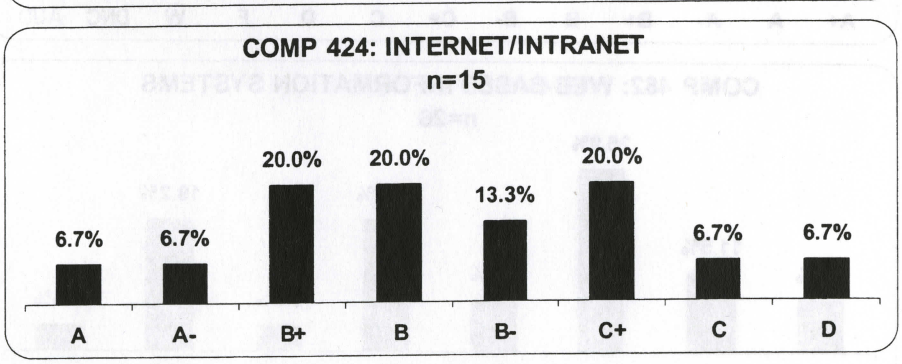

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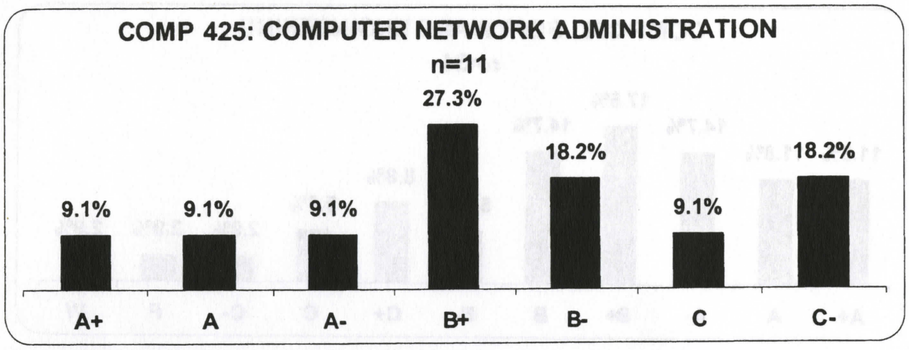

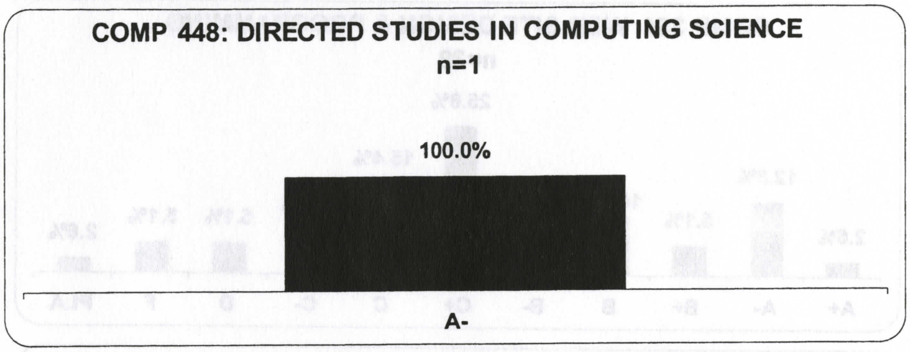

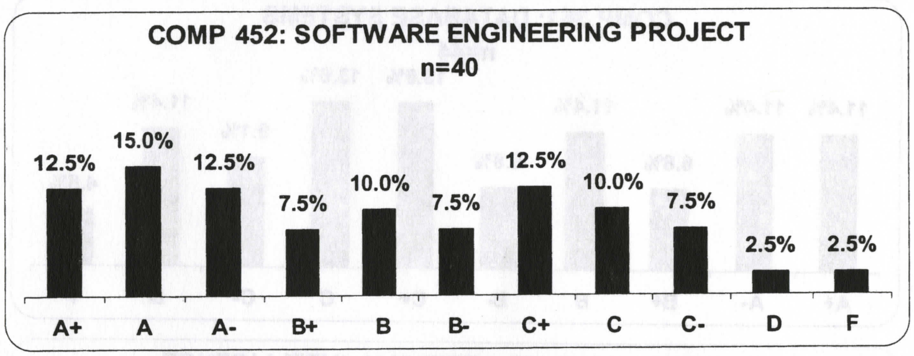

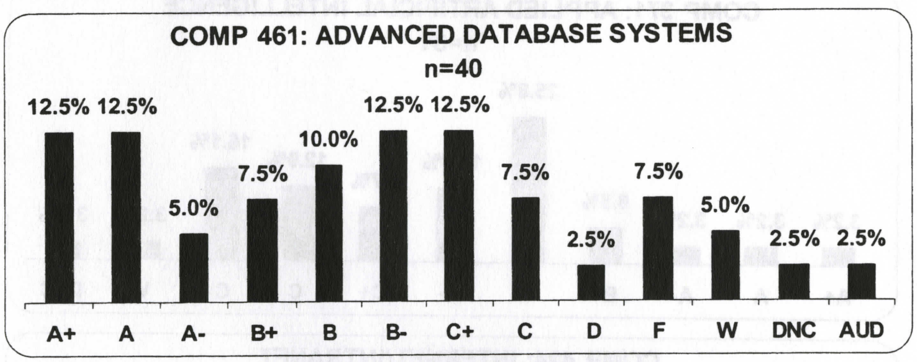

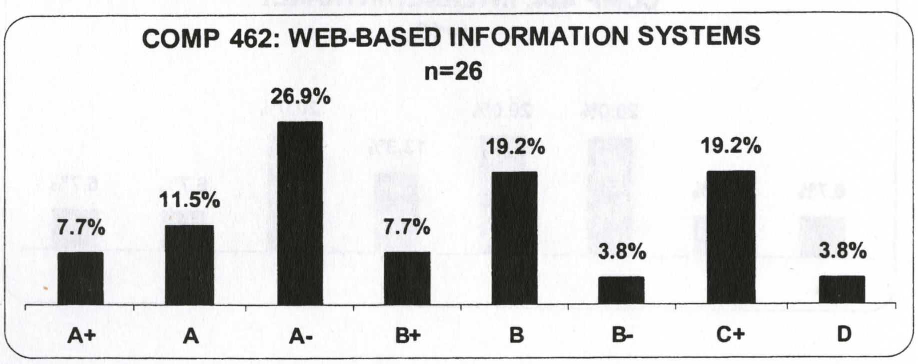

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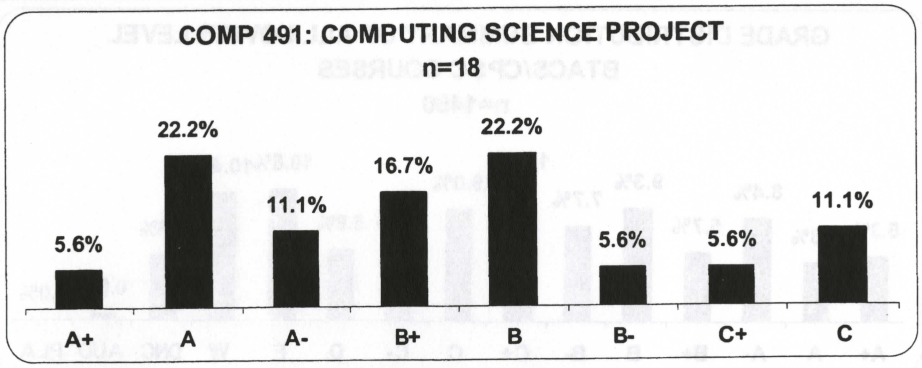
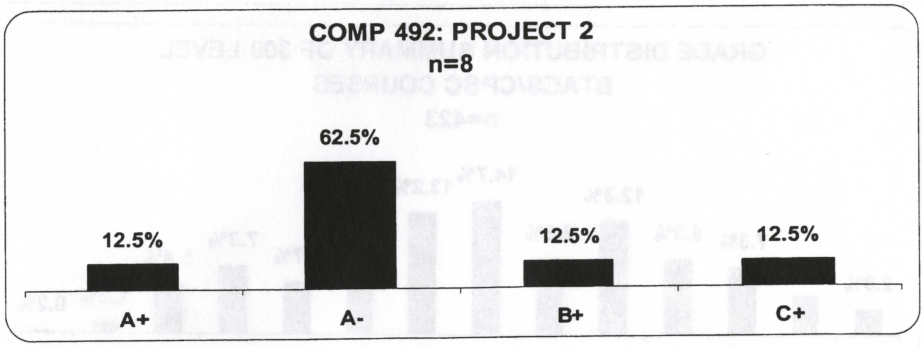
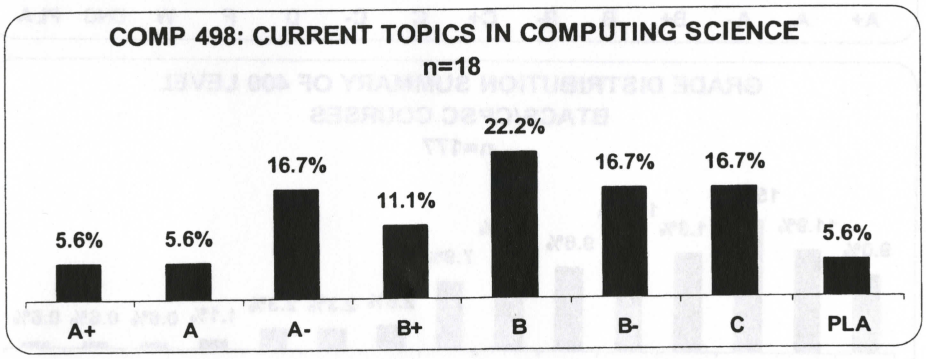
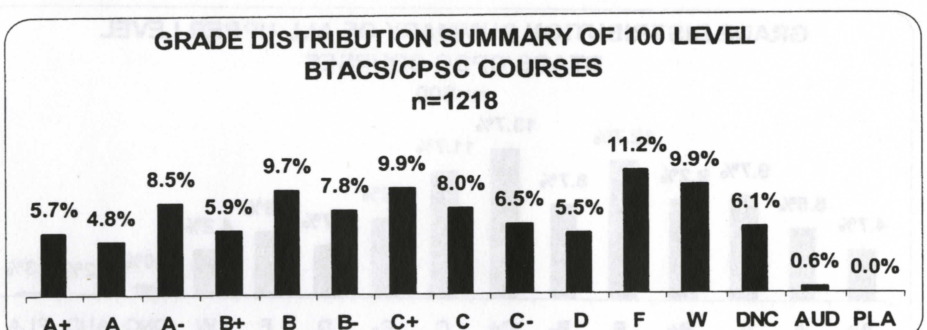
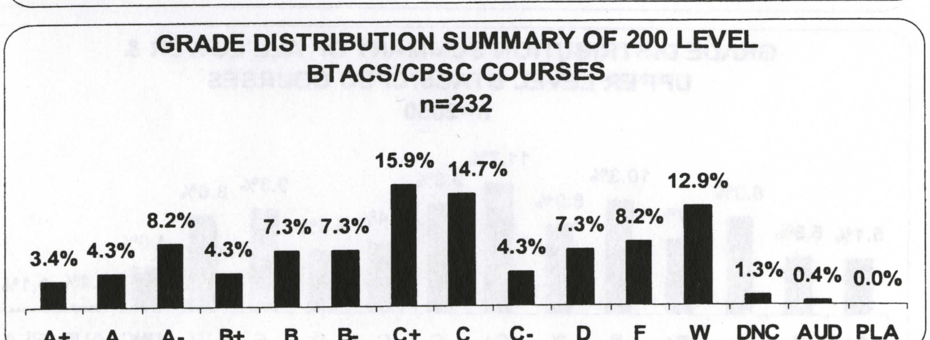




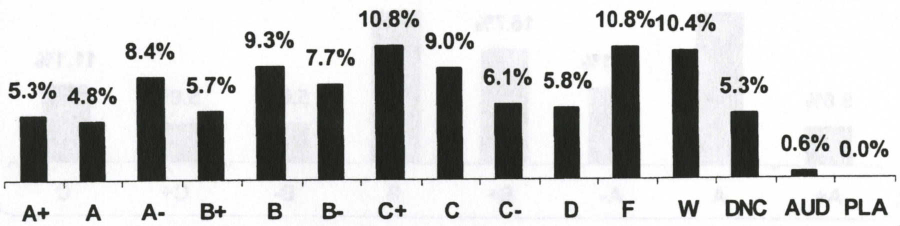


BTACS/CS MAJOR GRADE DISTRIBUTION SUMMARIES - 02/FA -04/WI

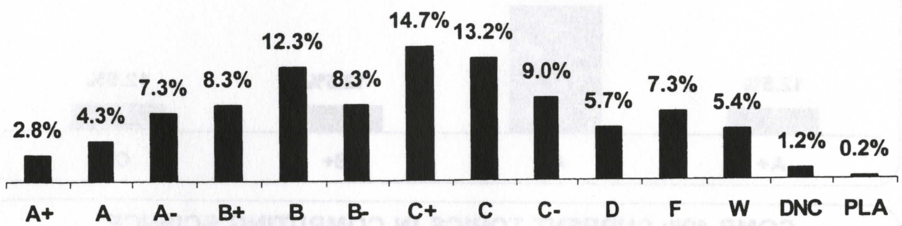




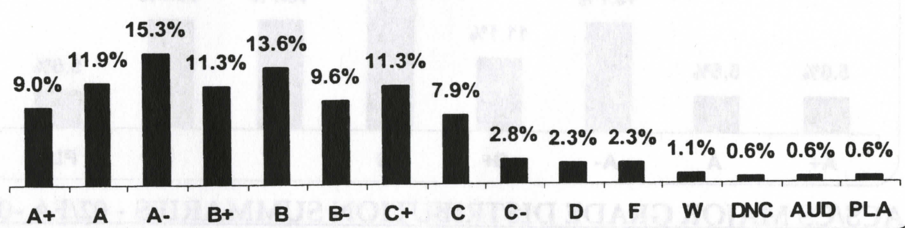
GRADE DISTRIBUTION SUMMARY OF ALL LOWER LEVEL BTACS/CPSC COURSES
n=1450



GRADE DISTRIBUTION SUMMARY OF 300 LEVEL BTACS/CPSC COURSES
n=423



GRADE DISTRIBUTION SUMMARY OF 400 LEVEL BTACS/CPSC COURSES
n=177



GRADE DISTRIBUTION SUMMARY OF ALL UPPER LEVEL BTACS/CPSC COURSES
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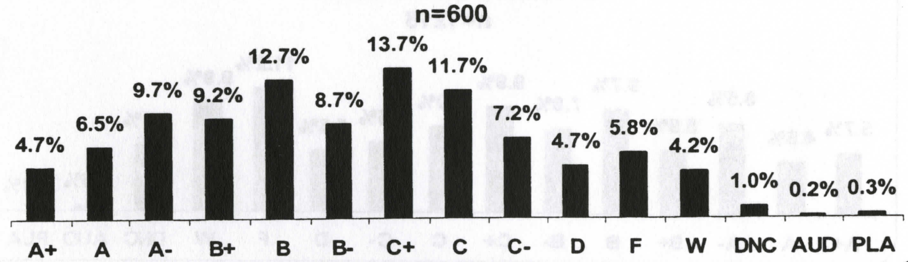

GRADE DISTRIBUTION SUMMARY OF ALL LOWER & UPPER LEVEL BTACS/CPSC COURSES
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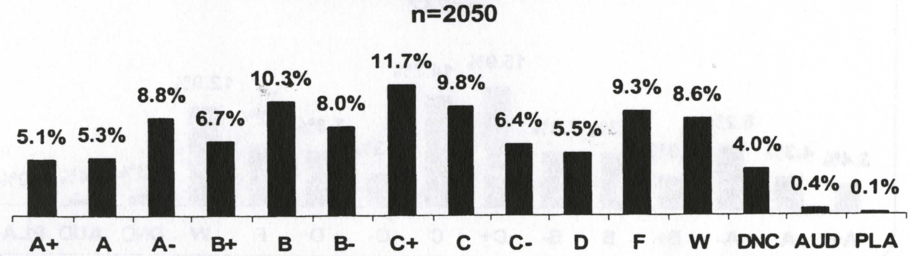

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