

School of Computing Science

SCUS Reference: SCUS 93 - 34
SCAP Reference: SCAP 93 - 41a

- i) Changes to Lower Division Requirements
- ii) Changes to Upper Division Requirements
- iii) Proposed Certificate Program in Computing Studies ~~including~~

New courses:

- CMPT 098-3 Computers, Applications and Program
- CMPT 363-3 User Interface Design
- CMPT 454-3 Database Systems II
- CMPT 468-3 Scientific Visualization
- CMPT 469-3 Special Topics in Computer Graphics
- CMPT 480-3 Foundations of Programming Languages
- CMPT 481-3 Functional Programming
- CMPT 487-3 Software Engineering Tools and Environments"

For Information:

Acting under delegated authority of Senate, SCUS has approved the following revisions as detailed in SCUS 93 - 34:

- CMPT 001 Change in description
- CMPT 100 Change in title and description
- CMPT 101 Change in prerequisite
- CMPT 301 Change in description
- CMPT 307 Change in description
- CMPT 351 Change in number and description
- CMPT 354 Change in title
- CMPT 370 Change in prerequisite
- CMPT 371 Change in description
- CMPT 383 Change in description and prerequisites
- CMPT 384 Change in description and prerequisites
- CMPT 391 Change in prerequisite
- CMPT 400 Change in title and description
- CMPT 401 Change in description and prerequisites

CMPT 402 Change in prerequisite
CMPT 405 Change in description
CMPT 451 Change in number, title and description
CMPT 490 Change in prerequisite"

Simon Fraser University

MEMORANDUM

To: Senate Committee on Undergraduate Studies

From: Robert D. Cameron
Director, Undergraduate Programs
Computing Science

Subject: Computing Science Curriculum Revisions

Date: October 19, 1993

Please find enclosed the School of Computing Science Curriculum Revision Package for the 1994-95 calendar, with changes approved at the Faculty of Applied Sciences Undergraduate Curriculum Committee meeting of October 13, 1993.

Library Resources. Please also find enclosed a report from the Library outlining the additional Library resources needed for the course. The School of Computing Science will arrange for the purchase of the required books.

Instructional Resources. We expect that the overall impact of our curriculum package on instructional resources will be small, and perhaps beneficial. Several of the new courses simply formalize offerings that had previously proceeded under Special Topics designations. Others are specifically designed for joint graduate/undergraduate offerings which should allow better utilization of our graduate teaching resources.

The package continues a trend started last year towards more flexibility in our upper division requirements. Specifically, the addition of the upper division Computer Graphics concentration and the elimination of CMPT 354 as a required course add flexibility. In the past, the need to offer all the necessary courses for timely completion of graduation requirements and the lack of flexibility of those requirements has forced us into some poorly subscribed upper division offerings.

If the Certificate in Computing Studies proves popular beyond our expectations, we may need to increase enrolments in lower division courses somewhat. We are prepared to do that.

Computing Resources. Probably the most important impact of these changes on computing resources is the shift away from the CMPT 103-104 stream to the CMPT 098-101 stream. CMPT 098 is less programming-oriented than CMPT 103; we consequently expect it will reduce the demand on open lab facilities. This may be balanced, however, by an increased load in CMPT 101 versus CMPT 104.

In the upper division, our computing resources are limited to a good approximation by the total number of course enrolments. The main effect of the curriculum changes will be to vary the set of courses offered, not the total enrolment count. (However, for other reasons we are attempting to increase upper division enrolments within the constraints of resource availability.)

Robert Cameron

MEMORANDUM

W.A.C. Bennett Library, Simon Fraser University
Burnaby, British Columbia, Canada V5A 1S6

Date: 14 October, 1993

From: Ralph Stanton (Collections Librarian)

To: Robert D. Cameron, Director, Undergraduate Programmes
Computing Science (3284)

Re: Library Course Assessment of new courses in Computing
Science (Revision of document dated September 22,
1993)

I have assessed the Library's ability to support the following new undergraduate courses in computing science, here are the results. Bibliographic checking was done in October when use was high.

Book Prices:

The average price of books in this field is \$65 (BNA93-p.56).

Comparison to UBC

A composite list of subject heading was drawn up and compared to the holdings of UBC Library as follows:

	UBC	SFU
Combinatorial Analysis	86	86
Computer Graphics	245	269
Data Base Management	275	426
Design	77	54
Electronic Data Processing Mathematics	1	35
Electronic Digital Computers Programming	368	547
Expert Systems Computer Science	248	270
Functional Programming Computer Science	13	8
Human Computer Interaction	34	36
Interactive Computer Systems	74	75
Mental Imagery	0	1
Programming Languages (E C's) Semantics	46	33
Programming Languages (E C's) Syntax	7	6
Software Engineering	41	44
System Design	161	219
User Interfaces	19	31
Visual Perception	286	192
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Totals	1981	2332

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In almost all subjects our collection is superior to UBC's. Included with this assessment is a listing of UBC and SFU holdings in the subjects Programming Languages - Electronic Computers - Semantics and Functional Programming Computer Science; if there are any important titles missing from our holdings the Library will try to purchase them from existing funds, please advise us. The Library book selection profile appears to be functioning well in this area.

Since the reading lists for these ten courses are all short, each book becomes important for the student. We have therefore asked to duplicate almost all existing holdings where there is evidence of good use.

CMPT 098-3 Computers Applications and Programs

This course will be offered every semester beginning in 94-3 to between 40 and 80 students.

There is 1 monograph listed as the course text, it is not in the catalogue, 4 copies should be bought at a cost of \$260.

Summary of Costs:

One time:
Monographs not in the catalogue \$260

CMPT 363-3 User Interface Design

This course will be offered once per year beginning in 94-3 to between 20 and 40 students.

There are 11 monographs listed in the course reading list of which 1 is not in the catalogue, it should be bought at a cost of \$65. A further 3 are on loan, we want to purchase added copies of two titles at \$130.

Two periodicals are listed in the bibliography, one is in the catalogue and one the *International Journal of Human Computer Interaction* is on order.

Summary of Costs:

One time:
Monographs not in the catalogue \$ 65
Added copies of monographs \$130

Total \$195

CMPT 454-3 Database Systems II

This course will be offered once per year beginning in 94-3 to between 20 and 40 students.

There are 4 monographs listed in the course reading list of which all are in the catalogue. Of the six copies of these 4 titles one is missing, two are at the bindery and three are on loan. These are all indications of high use and we recommend the purchase of one copy of each of the 4 titles for \$260. There are no periodicals cited.

Summary of Costs:

One time:
Added copies of monographs \$260

CMPT 468-3 Scientific Visualization

This course will be offered once every two years beginning in 95-1 to between 20 and 40 students.

There are 7 monographs listed in the course reading list, all are in the catalogue. 3 are on loan, we would like to add copies for \$195.

Summary of Costs:

One time:
Added copies of monographs \$195

Total \$195

CMPT 469-3 Special Topics in Computer Graphics

This course will be offered occasionally and has an unknown start date. There is no reading list for this course but we believe the resources purchased for CMPT 468 will serve for this course as well.

Summary of Costs:

Total \$000

CMPT 480-3 Foundations of Programming Languages

This course will be offered once per year, concurrently with CMPT 730, to between 20 and 40 students.

There are 6 monographs listed in the course reading list of which 1 is not in the catalogue and should be purchased

for \$65. Only one item is on loan and it has a second copy available. Four periodicals are cited and all are in the catalogue.

Summary of Costs:

One time:
Monographs not in the catalogue \$65

CMPT 481-3 Functional Programming

This course will be offered approximately once per year beginning in 94-3 to between 20 and 40 students.

There are 3 monographs listed in the course reading list, all are in the catalogue. 1 of them is on loan and should have an added copy purchased for \$65. There are 4 periodicals listed, all are in the catalogue.

Summary of Costs:

One time:
Added copies of monographs \$65

CMPT 487-3 Software Engineering Tools and Environments

This course will be offered every two years beginning in 95-1 to between 20 and 40 students.

There are 8 items listed in the course reading list, all are in the catalogue.

There are no costs attached to this course.

Summary of Costs for all CMPT courses:

One time:	
Monographs not in the catalogue	\$ 390
Added copies of monographs	\$ 650

Total	\$1040

THE TOTAL ONE TIME COSTS ARE \$1,040 OR \$130 PER COURSE.
THERE ARE NO RECURRING COSTS.

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School of Computing Science Curriculum Revision Package: 1994–95 Calendar

Robert D. Cameron
Director of Undergraduate Programs

October 13, 1993

This document describes curriculum revisions proposed by the School of Computing Science for the 1994–95 calendar as approved by the School of Computing Science and with amendments approved at the Faculty of Applied Sciences Undergraduate Curriculum Committee.

It is organized in four sections.

1. Changes to CMPT Lower Division Requirements.
2. Changes to CMPT Upper Division Requirements.
3. Individual Changes to Existing CMPT courses.
4. The Certificate Program in Computing Studies.

1 Changes to CMPT Lower Division Requirements

There are four changes to the lower division CMPT requirements affecting the Major, Honors and Minor programs.

1. Introduction of CMPT 098 Computers, Applications and Programs.
2. ~~Replacement of MATH 151/152 and CMPT 205 by the new courses MACM 101/201 and MATH 159. This item has been deferred because the necessary approvals from the Department of Mathematics and Statistics are not in place.~~ (Temporarily withdrawn by School)
3. Replacement of the PHIL 210 requirement by a PHIL 214 requirement.
4. A change of credit hour requirements for CMPT 275.

Each of these changes is described in a subsection below.

1.1 CMPT 098—A New Precomputing Course for CMPT Students

CMPT 098 is introduced as a new first course for CMPT students who have not taken BC High School Computer Science 12. (A SCUS new course proposal form and course outline is contained in the appendix.)

Rationale: At present we have two main streams for CMPT majors:

- (1) BC CMPT 12–CMPT 101 (100–150 students/year).
- (2) CMPT 103–CMPT 104 (200–300 students/year).

This proposal would essentially supplant stream (2) by a new stream CMPT 098–CMPT 101, with the following benefits.

1. Students would be given an overview of computers and computing science early on, before being immersed in the technical side of program construction. The current CMPT 103–104 sequence is too programming-oriented.
2. CMPT 101 would be taken by both streams, making it easier to provide a more standardized background for CMPT 201.
3. It would eliminate unnecessary duplication between Pascal and Modula-2 in the current CMPT 103–104 sequence (CMPT 104 must allow for non-Pascal backgrounds).

The addition of CMPT 098 should have no significant impact on Computing Science instructional resources, because each enrolment in CMPT 098 should see a corresponding reduction in the enrolment in CMPT 103.

1.2 New Mathematics Requirements

This item cannot be presented at this time, as approvals for the new MATH and MACM courses involved have been held up. It will be presented at a later date.

1.3 PHIL 214 Requirement

PHIL 214-3 (Elementary Formal Logic II) replace PHIL 210-4 (Elementary Formal Logic I) in the lower division requirements for CMPT Honors and Major programs and in all occurrences of PHIL 210 as a prerequisite to CMPT courses.

Rationale: PHIL 210 is the required formal logic course in our lower division curriculum. Unfortunately, it is a relatively gentle introduction to logic, emphasizing the application of logic to verbal reasoning rather than formalism. Our students need more formalism in support of their upper division courses.

PHIL 214 is a rather more formal introduction to logic that makes a good replacement for PHIL 210. PHIL 214 has no prerequisites, although “PHIL 210 or other suitable background” is recommended. We have been assured by PHIL that any reasonable background in formal methods (e.g., CMPT 205 or the new MACM 101) would be fine.

1.4 CMPT 275—Change in Credit Hours

The credit hours associated with CMPT 275 (Software Engineering) are increased from 3 to 4.

Rationale: CMPT 275 is an intensive software engineering course involving team projects. The course imposes a considerable workload on students—typically beyond the work required by other 4-credit courses. However, the value of these intensive projects is widely recognized by students, faculty and co-op employers. Rather than reducing the workload, it is more appropriate to recognize the difficulty of the course by increasing the credit-hour value.

2 Changes to CMPT Upper Division Requirements

2.1 Regularization of Topics Courses

We have been regularly offered certain courses under CMPT 4x9 (Special Topics in XXX) designations. It is now appropriate to introduce these as regular courses with their own calendar entries. In offering courses under these new designations, there will be a corresponding reduction in the CMPT 4x9 offerings and consequently little impact on instructional resources.

The following table lists the new courses, how they were previously offered, and the Computing Science concentration in which they are included.

New Course		Previously Offered As	Concentration
CMPT 363	User Interface Design	CMPT 479	Computer Graphics
CMPT 454	Database Systems II	CMPT 459	Information Systems
CMPT 481	Functional Programming	CMPT 489	Programming Languages and Software
CMPT 487	Software Engineering Tools and Environments	CMPT 489	Programming Languages and Software

SCUS new course proposal forms and course outlines for these courses are contained in the appendix.

2.2 Graduate/Undergraduate Cross Listings

CMPT 468 (Scientific Visualization) and CMPT 480 (Foundations of Programming Languages) are introduced as undergraduate versions of courses offered at the graduate level. It is intended that combined graduate/undergraduate offerings of these courses will be made to promote efficient resource utilization. Although there will be common meeting times, the course requirements for undergraduates will typically differ from those for grad students, so separate designations are appropriate. The graduate version of CMPT 468 is currently offered under a Special Topics designation. The graduate version of CMPT 480 is CMPT 730.

CMPT 468 is included in the Computer Graphics concentration while CMPT 480 is included in the Programming Languages and Software concentration.

SCUS new course proposal forms and course outlines for these courses are contained in the appendix.

2.3 Addition of Computer Graphics Concentration

Computer Graphics is added as a seventh upper division concentration in Computing Science, comprising the existing graphics courses CMPT 361 and CMPT 461 (renumbered from CMPT 351 and 451, as described subsequently in the Course Revisions section), the new courses CMPT 363 and CMPT 468 as described above, and a special topics course CMPT 469. A SCUS new course proposal form for CMPT 469 is contained in the appendix. CMPT 351 and CMPT 451 are removed from Table II—Intensive Application Courses.

The major effect of this change is to allow CMPT Majors an additional choice in fulfilling breadth and depth requirements. CMPT Majors must demonstrate breadth by taking one course in each of five areas and must demonstrate depth by taking four additional courses in these areas, including at least two 400-level courses. Now Majors will have a choice of 5 of 7 areas rather than existing 5 of 6 areas.

A CMPT Honors degree will require courses in all seven concentrations. To keep the overall requirements consistent with a credit hour requirement of 50 hours, the depth requirement for Honors is reduced from seven courses to six, including at least 4 400-level courses.

2.4 Computing Science Tables—Summary of Changes

The effect of the curriculum revisions described above (and of title and number changes to individual courses described later) on Table I (Computing Science Concentrations) and Table II (Intensive Application Courses) are summarized below.

Table I - Computing Science Concentrations			
Current		Revised	
<i>Computer Design and Organization</i>			
CMPT 390-3	Digital Circuits and Systems	CMPT 390-3	Digital Circuits and Systems
391-3	Microcomputer Hardware Workshop	391-3	Microcomputer Hardware Workshop
400-3	Hardware Architecture	400-3	High-Performance Computer Architecture
490-3	VLSI Systems Design	490-3	VLSI Systems Design
495-3	Digital Systems Design and Specification Project	495-3	Digital Systems Design and Specification Project
496-3	Digital Systems Implementation Project	496-3	Digital Systems Implementation Project
499-3	Special Topics in Computer Hardware	499-3	Special Topics in Computer Hardware
<i>Computing Systems</i>			
CMPT 300-3	Operating Systems I	CMPT 300-3	Operating Systems I
371-3	Data Communications and Networking	371-3	Data Communications and Networking
401-3	Operating Systems II	401-3	Operating Systems II
402-3	Operating System Software Laboratory	402-3	Operating System Software Laboratory
479-4	Special Topics in Computing Systems	479-4	Special Topics in Computing Systems
<i>Programming Languages and Software</i>			
CMPT 383-3	Comparative Programming Languages	CMPT 383-3	Comparative Programming Languages
384-3	Symbolic Computing	384-3	Symbolic Computing
483-3	Parsing and Interpretation	480-3	<i>Foundations of Programming Languages</i>
489-3	Special Topics in Programming Languages	481-3	<i>Functional Programming</i>
		483-3	Parsing and Interpretation
		487-3	<i>Software Engineering Tools and Environments</i>
		489-3	Special Topics in Programming Languages
<i>Information Systems</i>			
CMPT 301-3	Information Systems Management	CMPT 301-3	Information Systems Management
302-3	System Development Projects	302-3	System Development Projects
354-3	File and Database Structures	354-3	<i>Database Systems I</i>
370-3	Information System Design	370-3	Information System Design
459-3	Special Topics in Database Systems	454-3	<i>Database Systems II</i>
		459-3	Special Topics in Database Systems
<i>Artificial Intelligence</i>			
CMPT 410-3	Artificial Intelligence Survey	CMPT 410-3	Artificial Intelligence Survey
411-3	Knowledge Representation	411-3	Knowledge Representation
412-3	Computational Vision	412-3	Computational Vision
413-3	Computational Linguistics	413-3	Computational Linguistics
414-3	Model-Based Computer Vision	414-3	Model-Based Computer Vision
419-3	Special Topics in Artificial Intelligence	419-3	Special Topics in Artificial Intelligence

Table I - Computing Science Concentrations (cont'd)			
Current		Revised	
<i>Theoretical Computing Science</i>			
CMPT 307-3	Data Structures and Algorithms	CMPT 307-3	Data Structures and Algorithms
405-3	Design and Analysis of Computing Algorithms	405-3	Design and Analysis of Computing Algorithms
406-3	Computational Geometry	406-3	Computational Geometry
409-3	Special Topics in Theoretical Computing Science	409-3	Special Topics in Theoretical Computing Science
MACM 300-3	Introduction to Formal Languages and Automata with Applications	MACM 300-3	Introduction to Formal Languages and Automata with Applications
		<i>Computer Graphics</i>	
		CMPT 361-3	<i>Introduction to Computer Graphics</i>
		363-3	<i>User Interface Design</i>
		461-3	<i>Advanced Computer Graphics</i>
		468-3	<i>Scientific Visualization</i>
		469-3	<i>Special Topics in Computer Graphics</i>

Table II - Intensive Application Courses				
Current		Revised		
CMPT 305-3	Computer Simulation and Modelling	CMPT 305-3	Computer Simulation and Modelling	
340-3	Computers in Biomedicine		340-3	Computers in Biomedicine
351-3	Introduction to Computer Graphics			
451-3	Interactive Graphics and Animation Systems			

2.5 Social Aspects of Computing Requirement: Alternative Courses

This requirement is changed to allow additional alternatives. From:

One of CMPT 320-3 (Social Implications of a Computerized Society) or CMPT 350-3 (Information and Public Policy) must be completed.

To:

Completion of an approved course dealing with computing from a social perspective is required. Any of the following courses may be used to meet this requirement.

- CMPT 320-3 (Social Implications of a Computerized Society).
- CMPT 350-3 (Information and Public Policy).
- CMNS 353-4 (Social Contexts of Information Technology).

Other courses may be approved on submission of a detailed course outline to the School.

Rationale: The essential goal of our Social Aspects of Computing Requirement is to have students think about computing technology from a social as opposed to a technological perspective. At present, we allow students to fulfill this by taking either CMPT 320 (Social Implications of a Computerized Society) or CMPT 350 (Information and Public Policy)—two rather different courses. The proposal would allow other alternatives as well. It would also allow courses to be approved on an offering-by-offering basis.

2.6 CMPT 354 No Longer Explicitly Required

The statement that CMPT 354 (File and Database Systems) be used as one of the courses to fulfill the Breadth Requirement for CMPT Majors is dropped. CMPT 354 will remain a key alternative for fulfilling breadth and will be strongly recommended to students. However, it will now be possible for students to choose combinations of Computing Science concentrations that are not artificially constrained to include the Information Systems area.

Many faculty members, including those in the area, have pointed out that there is no good academic reason for favoring the Information Systems area over other possible concentrations. From a practical perspective, Information Systems has been particularly important for many computing careers and hence also for the Computing Co-op program. However, this is a matter for student advising, not for program requirements.

4 Certificate Program in Computing Studies

A new lower division certificate program is proposed as follows.

Certificate Program in Computing Studies

This program provides both part-time and full-time students an opportunity to obtain an understanding of the fundamentals of computers and programming without necessarily specializing in Computing Science.

Admission to the Certificate Program is governed by the regulations pertaining to admission to Simon Fraser University.

Program Requirements

The Certificate Program in Computing Studies requires completion of 29 credit hours of required course work and electives, as follows:

Required Courses:

- CMPT 098-3 Computers, Applications and Programs
- 101-4 Modula-2
- 105-3 Fundamental Concepts of Computing
- 201-4 Data and Program Organization
- 205-3 Introduction to Formal Topics in Computing Science
- 275-4 Software Engineering
- MATH 151-3 Calculus I

Electives:

Two courses in the CMPT 11x-1 series (Introduction to an Additional Programming Language). One additional 3-credit CMPT course at the 300-level.

Notes:

The CMPT 098-3 requirement may be waived for those with appropriate background. CMPT 104-2 may be used to satisfy the requirement for CMPT 101-4.

At least 10 credit hours of the CMPT courses required for this program must be completed at Simon Fraser University.

A grade point average of 2.00 is required on the courses used for this Certificate. Only courses taken at Simon Fraser University are used in this calculation.

Rationale: This Certificate Program is being proposed to meet a strong demand for a university program in Computing Science which does not involve a full four years of study. First of all, it provides recognition for a program of courses that can be completed part-time within two years. Secondly, this program should be attractive to students pursuing degree programs in disciplines outside of Computing Science. For such students, this program would be useful both to provide background in computers which are becoming increasingly important as tools in all areas of intellectual endeavor and to provide a program of computer studies which could be a valuable asset in securing career opportunities. Thirdly, the Certificate Program is also proposed as a means of providing recognition to those students who initially intend to undertake a Computing Science Major or Minor program, successfully complete the lower division requirements of such a program, but fail to gain admission to the program due to enrolment limitations. We feel that the completion of the set of courses indicated above with a minimum 2.0 CGPA is an accomplishment worthy of recognition.

**SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM**

1. *Calendar Information*

Department: **Computing Science**

Abbreviation Code: **CMPT** Course Number: **098** Credit Hours: **3** Vector: **3-0-0**

Title of Course: **Computers, Applications and Programs**

Calendar Description of Course:

An introduction to computers, computing systems, application programs and programming. The course emphasizes principles of computing science and is intended for those wishing to major in Computing Science or a related program.

Nature of Course:

Lecture

Prerequisites (or special instructions):

Students with a grade of B or higher in BC high school Computer Science 12, or those who have obtained credit for or are currently enrolled in any other Computing Science course may not take CMPT 098 for further credit.

What course (courses), if any, is being dropped from the calendar if this course is approved:
None, but the offerings of CMPT 103 and CMPT 104 will be substantially curtailed.

2. *Scheduling*

How frequently will the course be offered? **Every semester.**

Semester in which the course will first be offered: **Fall 1994**

Which of your present faculty would be available to make the proposed offering possible?

P. Brearley, M. Drew, M. Evans

3. *Objectives of the Course*

This is a course in "computing literacy" for students intending to study Computing Science. It is designed to provide students with an appreciation of the breadth of the discipline before immersing them in the details of software development. It is intended as an alternative entry point into CMPT 101 for those students lacking B.C. Computer Science 12.

4. *Budgetary and Space Requirements (for information only)*

What additional resources will be required in the following areas:

Faculty **None**

Staff **None**

Library **Computing Unbound, D.A. Patterson et al., Norton, 1989**

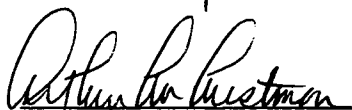
Audio Visual **None**

Space **None**

Equipment **Assignment Lab, Campus Computer Network, Wordstation**

5. *Approval*

Date: Oct. 19, 1993 _____



Department Chairman

Dean

Chair, SCUS

SCHOOL OF COMPUTING SCIENCE
CMPT 098 — Computers, Applications and Programs
Course Outline

CMPT 098 is a computing literacy course for students intending to study Computing Science. It provides a broad exposure to computers, computing systems, applications and programming. In preparation for CMPT 101, it provides roughly the equivalent of B.C. High School Computer Studies 11 and Computer Science 12.

Course Outline:

Below is a *sample* syllabus covering 13 weeks. Note that the symbol '•' represents one lecture and the symbol '♣' represents one week == 3 lectures.

- intro
- ♣ operating systems - Unix, Dos, Mac, NeXT
- hardware, history
- ♣ AI
- social aspects
- graphing (gnuplot or S+)
- e-mail, conferencing, libraries
- database systems, spreadsheet systems
- programming languages

plus

8 weeks of planning, problem-solving, and programming in Pascal. Covers rudimentary problem-solving techniques on a computer to the level of BC High School Computer Science 12, but from a disciplined standpoint. Emphasis is on methodologies and notations for problem analysis and solution design, with the implementation of the solutions being in the Pascal language. Pascal is used in order to have all students entering CMPT 101 arrive from the the same background, and to obviate problems in CMPT 104 occurring because of students entering with non-Pascal backgrounds.

Grading:

Assignments, 1 midterm, and a final examination. A minimum of 50% on the final examination or a weighted average of 50% on the final examination and midterm is required to pass the course.

Course Materials: *Computing Unbound*, D.A. Patterson et al., Norton, 1989

**SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM**

1. *Calendar Information*

Department: **Computing Science**

Abbreviation Code: **CMPT** Course Number: **363** Credit Hours: **3** Vector: **3-0-0**

Title of Course: **User Interface Design**

Calendar Description of Course:

This course provides a comprehensive study of user interface design. Topics include: goals and principles of UI design (systems engineering and human factors), historical perspective, current paradigms (widget-based, mental model, graphic design, ergonomics, metaphor, constructivist/iterative approach, and visual languages) and their evaluation, existing tools and packages (dialogue models, event-based systems, prototyping), future paradigms, and the social impact of UI.

Nature of Course:

Lecture/Laboratory

Prerequisites (or special instructions):

Prerequisite: CMPT 201.

What course (courses), if any, is being dropped from the calendar if this course is approved:
None, but offerings of CMPT 479 will be reduced.

2. *Scheduling*

How frequently will the course be offered? **Once per year.**

Semester in which the course will first be offered: **Fall 1994**

Which of your present faculty would be available to make the proposed offering possible?

D. Fracchia, T. Calvert, J. Dill, T. Shermer.

3. *Objectives of the Course*

This course introduces students to the field of scientific visualization. It stresses the importance and necessity of visualization, and presents the current approaches and tools for developing visualization systems. Students will gain valuable knowledge and experience by applying the lectures to an actual problem/data in another area or discipline (such as Geography, Physics, Engineering, etc.). This may involve the pairing of students with other faculty/students.

4. *Budgetary and Space Requirements* (for information only)

What additional resources will be required in the following areas:

Faculty	None
Staff	None
Library	See attached course outline.
Audio Visual	None
Space	None
Equipment	None

5. *Approval*

Date: Oct. 19, 1993



Department Chairman

Dean

Chair, SCUS

SCHOOL OF COMPUTING SCIENCE
CMPT 363 — User Interface Design
Course Outline

The topics covered by this course are listed below. Noted chapters are from the required textbook, unless stated otherwise.

1. Goals and Principles

- Chapter 1.
- System-Engineering Goals
 - functionality, reliability, availability, security, standardization, integration, consistency, portability, schedules and budgets.
- Human-Factors Goals
 - measurable (learning time, performance, error rate, retention, satisfaction), perceptual issues, coping with human diversity.

2. Historical Perspective

- Chapters 3, 4.
- command language, form fill-in, menus, natural language, graphics, direct manipulation, symbolic languages (icons, visual languages).

3. Current Approaches/Paradigms and their Evaluation

- Widget-based Approach
 - Chapters 2.2.5, 9.
 - most common approach, model based on widgets (which have had considerable human-factors thought put into them).
- Mental Model
 - Chapters 2.2.1, 2.2.2.
 - design based on user's impression of what system will accomplish for him/her.
- Graphic Design
 - Chapter 8 and Siggraph'93 Course Notes 24 - Graphic Design for User Interfaces.
 - screen layout problems, graphic design principles (positioning, grouping, visual cues, colour).
- Ergonomics
 - Chapters 5, 6, 7.
 - consider physical actions of user, kinesiology issues, actual devices (mouse, trackball, etc.), direct manipulation, dynamic response.
- Metaphor
 - Siggraph'93 Course Notes 61 - Film Craft in User Interface Design.
 - metaphor for system and/or actions performed (e.g. MacIntosh interface).
- Constructivist/Iterative Approach
 - Chapter 13.
 - user involved in iterative formation of interface.
- Visual Languages
 - Chapter 2.3 and J. Vis. Lang. (V. 4, N. 1, March 1993).

– syntactic-semantic models, symbolic languages.

4. Existing Tools and Packages

- Chapter 4.
- object-oriented systems, dialogue models, event-based systems, windowing systems, widget sets, prototyping tools, logical devices, existing packages (on platforms such as MacIntosh, NeXT, Sun, SGI), limitations.

5. Future Directions

- Chapter AFTERWORD.
- Future Paradigms
 - visual formalisms, semiotics, meta-knowledge, visualization, transparency, 3D interfaces, animation.
- Social Impact

An instructor may use his/her own discretion as to the amount of time spent on each topic, as well as the addition of new topics.

Text: Shneiderman, B.; *Designing the User Interface* (2nd Edition); Addison-Wesley Publishing Company, Reading, MA, 1992.

Suggested References:

Badre, A. and Shneiderman, B. (eds); *Directions in Human-Computer Interaction*; Ablex Pub. Corp., Norwood, N.J., 1982.

Barratt, K.; *Logic and Design : In Art, Science and Mathematics*; Herbert Press, London, 1989.

Bodker, S.; *Through the Interface*; L. Erlbaum, Hillsdale, N.J., 1991.

Foley, J. D., Van Dam, A., Feiner, S. K., and Hughes, J. F.; *Computer Graphics Principles and Practice* (2nd Edition); Addison-Wesley Publishing Company, Reading, MA, 1990.

Richardson, J. A., Coleman, F. W., and Smith, M. J.; *Basic Design : Systems, Elements, Applications*; Prentice-Hall, Englewood Cliffs, N.J., 1984.

West, T.; *In the Mind's Eye : Visual Thinkers, Gifted People with Learning Difficulties, Computer Images, and the Ironies of Creativity*; Prometheus Books, Buffalo, N.Y., 1991.

Zelanski, P. and Fisher, M. P.; *Colour : For Designers and Artists*; Herbert Press, London, 1989.

ACM SIGGRAPH'93 Course Notes 24 - Graphic Design for User Interfaces.

ACM SIGGRAPH'93 Course Notes 61 - Film Craft in User Interface Design.

ACM CHI (Conference Proceedings).

International Journal of Human-Computer Interaction (Journal).

Journal of Visual Languages and Computing (Journal).

**SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM**

1. *Calendar Information*

Department: **Computing Science**

Abbreviation Code: **CMPT** Course Number: **454** Credit Hours: **3** Vector: **3-0-0**

Title of Course: **Database Systems II**

Calendar Description of Course:

An advanced course on database systems which covers crash recovery, concurrency control, transaction processing, distributed database systems as the core material and a set of selected topics based on the new developments and research interests, such as object-oriented data models and systems, extended relational systems, deductive database systems, and security and integrity.

Nature of Course:

Lecture/Laboratory

Prerequisites (or special instructions):

Prerequisite: CMPT 354.

What course (courses), if any, is being dropped from the calendar if this course is approved:
None, but the offerings of CMPT 459 will be substantially curtailed.

2. *Scheduling*

How frequently will the course be offered? **Once per year.**

Semester in which the course will first be offered: **Fall 1994**

Which of your present faculty would be available to make the proposed offering possible?

J. Han, W. S. Luk

3. *Objectives of the Course*

The course will introduce advanced concepts of database systems with an emphasis on database transaction management, new database systems and advanced database applications. It is an important course for those senior students who are going to work in the areas of database systems and/or information systems.

4. *Budgetary and Space Requirements* (for information only)

What additional resources will be required in the following areas:

Faculty **None**

Staff **None**

Library **See reference list on attached course outline.**

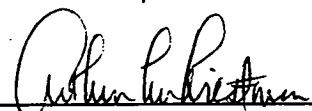
Audio Visual **None**

Space **None**

Equipment **None**

5. *Approval*

Date: Oct. 19, 1993 _____



Department Chairman

Dean

Chair, SCUS

CMPT 454—Database Systems II
Course Description

General Description:

An advanced course on database systems which covers crash recovery, concurrency control, transaction processing, object-oriented data models and systems, extended relational systems, deductive database systems, distributed database systems, and security and integrity.

Objectives:

The course will introduce advanced concepts of database systems with an emphasis on database transaction management, new database systems and advanced database applications. It is an important course for those senior students who are going to work in the areas of database systems and/or information systems.

Prerequisite:

An introductory course on Database Systems (CMPT 354 or equivalent) with a minimum grade of C.

Textbook:

1. H. F. Korth and A. Silberschatz, Database System Concepts, McGraw-Hill, 2nd ed., 1991. (ISBN0-07-044754-3).
2. Class Notes (online directory: /ugrad1/CMPT/459/notes) and some recent papers.

References:

1. J. D. Ullman, Principles of Database and Knowledge-Base Systems, Vol. 1, Computer Science Press, 1988.
2. R. Elmasri and S. B. Navathe, Fundamentals of Database Systems, Benjamin/Cummings, 1989.
3. M. Stonebraker, Readings in Database Systems, Morgan-Kaufmann, 1988.

**SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM**

1. *Calendar Information*

Department: **Computing Science**

Abbreviation Code: **CMPT** Course Number: **468** Credit Hours: **3** Vector: **3-0-0**

Title of Course: **Scientific Visualization**

Calendar Description of Course:

This course is an introduction to the field of scientific visualization. Topics include: the necessity/importance of visualization and its impact on science, approaches to visualization (current trends, the role of the computer scientist, identification of the purpose, data, and audience, user interface issues), existing tools and techniques for data, future trends, and social impact. Applications range from medical imaging to architecture. Projects will be of an interdisciplinary nature.

Nature of Course:

Lecture/Laboratory

Prerequisites (or special instructions):

Prerequisite: CMPT 461.

What course (courses), if any, is being dropped from the calendar if this course is approved:
None.

2. *Scheduling*

How frequently will the course be offered? **Once every two years.**

Semester in which the course will first be offered: **Spring 1995**

Which of your present faculty would be available to make the proposed offering possible?

D. Fracchia

3. *Objectives of the Course*

This course introduces students to the field of scientific visualization. It stresses the importance and necessity of visualization, and presents the current approaches and tools for developing visualization systems. Students will gain valuable knowledge and experience by applying the lectures to an actual problem/data in another area or discipline (such as Geography, Physics, Engineering, etc.). This may involve the pairing of students with other faculty/students.

4. *Budgetary and Space Requirements (for information only)*

What additional resources will be required in the following areas:

Faculty	None
Staff	None
Library	See attached course outline.
Audio Visual	None
Space	None
Equipment	None

5. *Approval*

Date:

Oct. 19, 1993



Department Chairman

Dean

Chair, SCUS

SCHOOL OF COMPUTING SCIENCE
CMPT 468 — Scientific Visualization
Course Outline

Course Outline:

The topics covered by this course are listed below. Noted chapters are from the required textbook.

1. Introduction

- Review of basics (CMPT 361), GL, FORMS, Hoops, overview. (Instructor discretion.)

2. Solid Modelling

- Chapter 12.
- boolean operations, instancing, sweep representations, boundary representations, spatial-partitioning, CSG.

3. Curves and Surfaces

- Chapter 11.
- parametric cubic curves (Hermite, Bézier, B-spline, ctb-spline), bicubic surfaces (Hermite, Bézier, B-spline - including NURBS).

4. Fractals and Particle Systems

- Chapters 20.3, 20.4, 20.5.
- fractal curves, surfaces and terrain models, L-systems, particle systems.

5. Advanced Rendering Techniques

- Chapters 13, 14.7, 16, 18.11.5, 20.1.2.
- colour spaces (basic, CIE, reproduction), advanced lighting models (Cook-Torrance, Torrance-Sparrow), raytracing, radiosity, lighting effects, texture mapping, stereoscopy.

6. Animation

- Chapters 20.7, 20.8, 20.9, 21.
- keyframe interpolation, kinematics, dynamics (physically-based), goal-directed, constraint-based, figure animation, morphing, antialiasing, motion blur.

7. Post-Production Techniques

- Chapter 17.
- filtering, image processing, transformations, compositing, special effects.

8. Research Topics

- Chapter 20.
- virtual reality, human figure animation, CAD, scientific visualization, etc.

An instructor may use his/her own discretion as to the amount of time spent on each topic, as well as to the choice of research topics covered. Several areas warrant the use of other materials (articles, books, etc.) to supplement the textbook, such as: CIE colour space, fractals, animation, and research topics.

Text:

Foley, J. D., Van Dam, A., Feiner, S. K., and Hughes, J. F.; *Computer Graphics Principles and Practice* (2nd Edition); Addison-Wesley Publishing Company, Reading, MA, 1990.

Suggested References:

Rogers, D. F.; *Procedural Elements for Computer Graphics* (2nd Edition); McGraw-Hill, New York, 1985.

Rogers, D. F. and Adams, J. A.; *Mathematical Elements for Computer Graphics* (2nd Edition); McGraw-Hill, New York, 1990.

Taylor, W.; *The Geometry of Computer Graphics*; Wadsworth and Brooks/Cole, Pacific Grove, Calif., 1992.

Watt, A.; *Fundamentals of Three-Dimensional Computer Graphics*; Addison-Wesley Publishing Company, Wokingham, England, 1989.

Vince, J.; *3-D Computer Animation*; Addison-Wesley Publishing Company, Wokingham, England, 1992.

IEEE Computer Graphics and Applications (Journal).

ACM Transactions on Graphics (Journal).

ACM SIGGRAPH Computer Graphics (Conference Proceedings).

**SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM**

1. *Calendar Information*

Department: **Computing Science**

Abbreviation Code: **CMPT** Course Number: **469** Credit Hours: **3** Vector: **3-0-0**

Title of Course: **Special Topics in Computer Graphics**

Calendar Description of Course:

Current topics in Computer Graphics depending on faculty and student interest.

Nature of Course:

Lecture/Laboratory

Prerequisites (or special instructions):

CMPT 461.

What course (courses), if any, is being dropped from the calendar if this course is approved:

None.

2. *Scheduling*

How frequently will the course be offered? **Occasional.**

Semester in which the course will first be offered: **Unknown.**

Which of your present faculty would be available to make the proposed offering possible?

T. Calvert, J. Dill, D. Fracchia

3. *Objectives of the Course*

This course introduces students to specialized topics in computer graphics. In most cases, such topics will build upon those discussed in previous graphics classes, or of prime interest to faculty (such as current research topics).

4. *Budgetary and Space Requirements* (for information only)

What additional resources will be required in the following areas:

Faculty	None
Staff	None
Library	None
Audio Visual	None
Space	None
Equipment	None

5. *Approval*

Date: Oct. 19, 1993 _____



Department Chairman

Dean

Chair, SCUS

**SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM**

1. *Calendar Information*

Department: **Computing Science**

Abbreviation Code: **CMPT** Course Number: **480** Credit Hours: **3** Vector: **3-0-0**

Title of Course: **Foundations of Programming Languages**

Calendar Description of Course:

Theoretical foundations of programming language semantics. Topics will typically include abstract syntax, lambda calculus. fixpoint theory, denotational semantics, axiomatic semantics, type theory, algebraic specifications.

Nature of Course:

Lecture

Prerequisites (or special instructions):

CMPT 383

What course (courses), if any, is being dropped from the calendar if this course is approved:

None

2. *Scheduling*

How frequently will the course be offered? **Once per year, concurrently with CMPT 730.**

Semester in which the course will first be offered: **Spring 1995**

Which of your present faculty would be available to make the proposed offering possible?

F. W. Burton, R. D. Cameron

3. *Objectives of the Course*

This course is intended to introduce students to the fundamental theoretical tools used to describe programming language semantics. It is an undergraduate version of the existing graduate course CMPT 730, primarily intended for honors undergraduate students.

4. *Budgetary and Space Requirements* (for information only)

What additional resources will be required in the following areas:

Faculty	None
Staff	None
Library	See attached outline
Audio Visual	None
Space	None
Equipment	None

5. *Approval*

Date: Oct. 19, 1993 _____

Arthur Lubinetman

Department Chairman

Dean

Chair, SCUS

SCHOOL OF COMPUTING SCIENCE
CMPT 480 — Foundations of Programming Languages
Course Outline

This course is intended to introduce students to the fundamental theoretical tools used to describe programming language semantics. It is an undergraduate version of the existing graduate course CMPT 730, primarily intended for honors undergraduate students.

Outline:

1. Introduction and abstract syntax.
2. Operational semantics.
3. The lambda calculus.
4. Denotational semantics, including domains and fixpoint theory.
5. Type theory.
6. Axiomatic Semantics.
7. Algebraic specification of abstract data types.

Grading Scheme:

Programming Assignments: 40%. Midterm Examination: 20%. Final Examination: 40%.

Text: Nielson, H. R. and Nielson, F., *Semantics with Applications: A Formal Introduction*, John Wiley and Sons, 1992.

Reference Journals:

1. *Acta Informatica*
2. *Communications of the ACM*
3. *Computing Surveys*
4. *ACM Transactions on Programming Languages and Systems*

Reference Books:

1. Gordon, M. J. C., *Programming Language Theory and its Implementation*, Prentice-Hall, 1988.
2. Manna, Z., *Mathematical Theory of Computation*, McGraw-Hill, 1974.
3. Meyer, B., *Introduction to the Theory of Programming Languages*, Prentice Hall, 1990.
4. Pagan, F. G., *Formal Specification of Programming Languages*, Prentice Hall, 1981.
5. Stoy, J. *Denotational Semantics: The Scott-Strachey Approach to programming Language Semantics*, MIT Press 1977.

**SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM**

1. *Calendar Information*

Department: **Computing Science**

Abbreviation Code: **CMPT** Course Number: **481** Credit Hours: **3** Vector: **3-0-0**

Title of Course: **Functional Programming**

Calendar Description of Course:

The functional style of programming will be examined in the context of a modern functional language such as Haskell. Topics will include lazy evaluation and infinite data structures, higher order functions, pattern matching, program transformation and verification, and polymorphic types.

Nature of Course:

Lecture

Prerequisites (or special instructions):

CMPT 383

What course (courses), if any, is being dropped from the calendar if this course is approved:
None, but the Special Topics course CMPT 489 will be offered less frequently.

2. *Scheduling*

How frequently will the course be offered? **Approximately once per year.**

Semester in which the course will first be offered: **Fall 1994**

Which of your present faculty would be available to make the proposed offering possible?

F. W. Burton

3. *Objectives of the Course*

This course is intended to introduce students to the concepts and practices of functional programming.

4. *Budgetary and Space Requirements* (for information only)

What additional resources will be required in the following areas:

Faculty

Staff **None**

Library **See attached outline.**

Audio Visual **None**

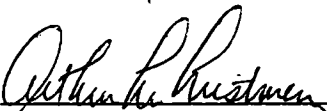
Space **None**

Equipment **None**

5. *Approval*

Date:

Oct. 19, 1993



Department Chairman

Dean

Chair, SCUS

SCHOOL OF COMPUTING SCIENCE
CMPT 481 — Functional Programming
Course Outline

The functional style of programming will be examined in the context of a modern functional language such as Haskell. Topics will include lazy evaluation and infinite data structures, higher order functions, pattern matching, program transformation and verification, and polymorphic types.

Outline:

1. Introduction to functional programming and overview of the Haskell programming language.
2. Data types: Basic data types, lists, algebraic data types, type classes and simple function types.
3. Expressions, functions and programs: Operators and expressions. Pattern matching and case analysis. Modules and input and output.
4. More data types: Function types, polymorphism and type inference.
5. Recursion and higher order functions.
6. Lazy evaluation and infinite data structures.
7. Examples.
8. Efficiency: Time and Space.

Grading Scheme:

Programming Assignments: 40%. Midterm Examination: 20%. Final Examination: 40%.

Text: Bird, R. and Wadler, P., *Introduction to Functional Programming*, Prentice Hall, 1988.

Reference Journals:

1. *ACM Transactions on Programming Languages and Systems*
2. *Communications of the ACM*
3. *Computing Surveys*
4. *Journal of Functional Programming*

Reference Books:

1. Field, A. J., *Functional programming*, Addison-Wesley, 1988.
2. Peyton Jones, S. L., *The implementation of functional programming languages*, Prentice-Hall, 1987.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. *Calendar Information*

Department: **Computing Science**

Abbreviation Code: **CMPT** Course Number: **487** Credit Hours: **3** Vector: **3-0-0**

Title of Course: **Software Engineering Tools and Environments**

Calendar Description of Course:

The design and construction of software engineering tools and environments is examined as well as the effects of their use in the software lifecycle. Topics include design tools, language-based editors, tools for measurement, analysis, testing and documentation, program transformation and manipulation systems, configuration and version control tools, and software development and maintenance environments.

Nature of Course:

Seminar/Laboratory

Prerequisites (or special instructions):

CMPT 275, 383 and 384.

What course (courses), if any, is being dropped from the calendar if this course is approved:
None, but offerings of CMPT 489 are reduced.

2. *Scheduling*

How frequently will the course be offered? **Once every two years.**

Semester in which the course will first be offered: **Spring 1995**

Which of your present faculty would be available to make the proposed offering possible?

R. D. Cameron

3. *Objectives of the Course*

This course has two broad objectives. The first is to review issues in software engineering and consider how software engineering problems may be addressed using present and foreseeable tools and technology. The second is to introduce students to methods for the design and construction of such tools and environments.

4. *Budgetary and Space Requirements* (for information only)


What additional resources will be required in the following areas:

Faculty	None
Staff	None
Library	See attached course outline.
Audio Visual	None
Space	None
Equipment	None

5. *Approval*

Date:

Oct. 19, 1993



Department Chairman

Dean

Chair, SCUS

SCHOOL OF COMPUTING SCIENCE
CMPT 487 — Software Engineering Tools and Environments

This course focusses on tools and technologies that can be used to automate various activities in the design, construction, testing and maintenance of software.

Topics will typically include:

1. Overview of software life cycle activities and possibilities for automation.
2. Introduction to language-based software tools: abstract syntax trees and metaprogramming.
3. Instrumentation tools. Applications in performance measurement, debugging and test data evaluation.
4. Program modification tools. Program restructuring. Source-to-source translation. Program-specific metaprogramming.
5. Application generators.
6. Interactive program manipulation tools. Language-based editing. Program transformation systems.
7. Configuration control tools. Dependency graphs in software construction. Make files. Makemake tools. Version control systems.
8. Design tools (CASE). Design recovery.
9. Documentation tools. Literate programming.
10. Integrated programming environments. Software engineering databases.
11. Language properties and software tool construction. Future prospects for languages and environments.

Course materials: assigned and reference reading will be drawn largely from articles published in relevant academic journals and conferences.

1. ACM Letters on Programming Languages and Systems.
2. ACM SIGPLAN Conference on Programming Language Design and Implementation.
3. ACM SIGSOFT Symposium on Software Development Environments.
4. ACM Transactions on Programming Languages and Systems.
5. ACM Transactions on Software Engineering and Methodology.
6. IEEE Transactions on Software Engineering.
7. IEE Software Engineering Journal.
8. Software—Practice and Experience.

School of Engineering Science

SCUS Reference: SCUS 93 - 35
SCAP Reference: SCAP 93 - 41b

- i) Changes to Biomedical Engineering Stream
- ii) Changes to Automation Engineering Option
- iii) New courses:
 - ENSC 310-4 Introduction to Mechanical Design
 - ENSC 365-4 Introduction to Electro-Mechanical Sensors and Actuators
- iv) Revision to Engineering Physics Option
- v) Change to B.A.Sc. Program Calendar entry
- vi) Change to B.A. Sc. Requirements

Course deletions: Ensc 436 + Ensc 480

ITEM I.

**SIMON FRASER UNIVERSITY
SCHOOL OF ENGINEERING SCIENCE**

REVISED BIOMEDICAL ENGINEERING

1. CURRENT CALENDAR ENTRY:

See description under Applied Sciences -Engineering Science:
Biomedical Engineering (Electronics) Option (Page 74)

2. PROPOSED NEW CALENDAR ENTRY: (Revised Sept. 8/93)

BIOMEDICAL ENGINEERING STREAM

Biomedical Engineering is concerned with the wide range of engineering problems encountered in medical and surgical treatment, in the interactions of humans and machines in a variety of environments, in medical instrumentation, and in the understanding of biomechanics.

The Biomedical Engineering stream, being interdisciplinary in nature, will consist of a basic undergraduate Engineering degree in one of the existing options, plus additional biomedical-related courses at the undergraduate level. These requirements will form the foundation to enhance the students' background before pursuing graduate training in Biomedical Engineering.

- Students should fulfill the course requirements for one of the existing options:

Electronics Engineering, Engineering Physics, Systems, or
Computer Engineering

- As well, the student will be required to take the following courses:

Compulsory: BISC 101, BICH 221, KIN 205, and (one of) KIN 305/306

In addition to the above compulsory courses, two additional upper division courses will be required from the biomedical area, to be approved by the School of Engineering Science. A list of eligible courses will be available from the Departmental Assistant in the School of Engineering Science.

It is recommended that students choose from the above courses for their science electives in their undergraduate option.

- Students who want to pursue a M.A.Sc. degree can coordinate their undergraduate proposal and thesis (ENSC 498 and 499) with their M.A.Sc. proposal, thereby satisfying both requirements. Contact the Departmental Assistant for further details.

REVISED BIOMEDICAL ENGINEERING

3. RATIONALE:

It was felt that the current Biomedical Engineering undergraduate program could not satisfy both the requirements of an undergraduate Engineering degree and the necessary background in the biomedical field. We have therefore combined the undergraduate Bachelor degree in Engineering with additional courses in the field of biomedical engineering to satisfy the interdisciplinary nature of the combined degree. This foundation will be utilized to allow the students to undertake graduate training in biomedical engineering.

ITEM II

SCHOOL OF ENGINEERING SCIENCE
SIMON FRASER UNIVERSITY

MEMO

To: Shawn Stapleton, Chair, UCC
From: Systems Group (formerly 'Automation Group')
Date: 20 September 1993
Subject: Proposal for a Revised Automation Option

We would like to propose the calendar changes described below. Although we have defined the changes on a semester-by-semester basis, it will be evident that their cumulative effect is to redefine and rename the former 'Automation' option.

1. Current entry:

[Footnote 1 to 'Engineering Science Common Core'; the footnote describes the first Science elective, taken in Semester 3].

- (1) For Electronics Engineering and Engineering Physics, PHYS 221-3 is a required prerequisite and should be taken here. For Automation Engineering MATH 262-4 should be taken here.

Proposed new entry:

- (1) For Electronics Engineering, Engineering Physics, and Systems, PHYS 221-3 is a required prerequisite and should be taken here.

Rationale

A new course, ENSC 310, Introduction to Mechanical Design, has been designed specifically to prepare students for later courses in robotics and manipulators. This allows the first science elective to be used for a physics course in electromagnetics, which provides essential background knowledge for subsequent work in integrating electrical and mechanical systems.

2. Current entry:

Automation Engineering Option

The Automation Engineering option provides a broad systems background for those interested in a career in manufacturing. Effective and efficient manufacturing systems require a balanced blend of mechanical/electronic/computing machines with skilled personnel. Generally all sectors of the manufacturing industry are encompassed in the scope of this option.

Proposed new entry:

Systems Option

The Systems option prepares students for careers involving the design and integration of computer-controlled machines and devices, and provides a foundation for graduate study in robotics and mechatronic systems. Students will acquire the capability to integrate knowledge from electronic engineering, mechanical engineering, and computer engineering into the fundamental design process. It is a focused program that includes the study of mechanical structures and mechanisms, robotics, electromechanical sensors and actuators, control engineering, and real-time systems. Students can use electives and directed study courses to tailor their curriculum to specific interests and goals.

Rationale

We have noted that graduates designated as "Automation engineers" are not as readily absorbed into industry. The new title and description of the option, developed after discussions with employers, students and graduates of our program, reflect a refocused curriculum that will better address the needs of our students and industry.

3. Current entry:

Semester 5

CMPT 305-3 Computer Simulation and Modelling
ENSC 105-1 Engineering Communications V
ENSC 301-3 Engineering Economics
ENSC 330-4 Engineering Materials
ENSC 370-4 Transducers and Embedded Systems
ENSC 382-4 Linear Systems
STAT 330-3 Linear Models in Applied Statistics

Proposed new entry:

Semester 5

ENSC 105-1 Engineering Communications V
ENSC 301-3 Engineering Economics
ENSC 330-4 Engineering Materials
ENSC 365-4 Introduction to Electromechanical Sensors and Actuators
ENSC 370-4 Transducers and Embedded Systems
ENSC 382-4 Linear Systems

Rationale

With the shift in emphasis away from automation of industrial processes, the course on computer simulation and modelling should become an elective rather than a required course. The statistics course also becomes elective, to make space for the introduction of ENSC 310. A new course, ENSC 365, is introduced to provide a background in electrical machines, sensors and actuators.

4. Current entry:

Semester 6

ENSC 106-1 Engineering Communications VI
ENSC 385-4 Real-Time Systems
ENSC 436-4 Manufacturing Processes
ENSC 480-4 Industrial Engineering
PHYS 244-3 Thermal Physics
Scie II-3 Science Elective 2

Proposed new entry:

Semester 6

ENSC 106-1 Engineering Communications VI
ENSC 310-4 Introduction to Mechanical Design
ENSC 385-4 Real-Time Systems
ENSC 423-4 Modern Control Systems
PHYS 244-3 Thermal Physics
Scie II-3 Science Elective 2

Rationale

ENSC 436 and ENSC 480 are eliminated; neither course has ever attracted more than 6 students, and, given the shift in emphasis of the option, there is no reason for retaining them.

5. Current entry:

Semester 7

Ensc I-4 First Engineering Science Elective
ENSC 107-1 Engineering Communications VII
ENSC 300-3 Engineering Design and Management
ENSC 423-4 Modern Control Systems
ENSC 439-4 Computer-Aided Design and Manufacturing
ENSC 498-3 Engineering Science Thesis Proposal

Proposed new entry:

Semester 7

Ensc I-4 First Engineering Science Elective
ENSC 107-1 Engineering Communications VII
ENSC 300-3 Engineering Design and Management
ENSC 438-4 Introduction to Robotics
ENSC 439-4 Computer-Aided Design and Manufacturing
ENSC 498-3 Engineering Science Thesis Proposal

Rationale

ENSC-438 becomes a core course, which serves to integrate previous material on control and electromechanical system design.

6. Current entry:

Semester 8

Cmpl III-3 Third Complementary Studies Elective
Ensc II-4 Second Engineering Science Elective⁽²⁾
Ensc III-4 Third Engineering Science Elective⁽²⁾
ENSC 108-0 Engineering Communications VIII
ENSC 499-9 Engineering Science Undergraduate Thesis

Proposed new entry:

Semester 8

Cmpl III-3 Third Complementary Studies Elective
Ensc II-4 Second Engineering Science Elective
Ensc III-4 Third Engineering Science Elective
ENSC 108-0 Engineering Communications VIII
ENSC 492-2 Special Project Laboratory
ENSC 499-9 Engineering Science Undergraduate Thesis

Rationale

The restrictions on the choice of the electives have been removed, allowing the student to chose from any engineering science course.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

ITEM III

NEW COURSE PROPOSAL FORM

Department: Engineering Science

1. Calendar Information

Abbreviation Code: ENSC Course Number: 310

Credit Hours: 4 Vector: 3-0-2

Title of Course: Introduction to Mechanical Design

Calendar Description of Course:

This course presents the elements and principles involved in design and analysis of basic mechanical structures and mechanisms. Mechanical elements such as gears, cams and bearings and fundamental relationships between the forces and corresponding motion or deflection are investigated through examples and experiments. This background can then be used in the design, analysis and development of computer controlled machines such as robotic devices.

Nature of Course Lecture and Laboratory

Prerequisites (or special instructions):

PHYS 120-3 , MATH 310-3

What course (courses), if any, is being dropped from the calendar if this course is approved:

The required elective for the Systems option (MATH 262-4) can be dropped from the common core.

2. Scheduling

How frequently will the course be offered? Once a Year

Semester in which the course will first be offered? Fall of 1994

Which of your present faculty would be available to make the proposed offering possible? Shahram Payandeh, J. Jones, J. Dill, K. Gupta, B. Gruver

3. Objectives of the Course

Within past two years it was observed that students enrolling ENSC 438 (Introduction to Robotics) lack some of the basic understanding of the design and analysis of mechanical elements such as gears and bearings and of the relationships between the forces exerted on the mechanisms and corresponding motion and/or deflection of the links. This new course covers some of this fundamental background through analysis of various engineering mechanisms which can then be extended to more general purpose computer controlled machines.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty 0

Staff 0

Library No Additional reference books are required

Audio Visual 0

Space 0

Equipment 0

5. Approval

Date: _____

[Signature]
Department Chairman

Dean

Chairman, SCUS

Department: Engineering Sc.

1. Calendar Information

Abbreviation Code: ENSC Course Number: 365

Credit Hours: 4 Vector: 3-0-2

Title of Course: Introduction to Electro-Mechanical Sensors and Actuators

Calendar Description of Course:

This course provides an introduction to sensors and actuators for electromechanical, computer-controlled machines and devices. Topics include operating principles, design considerations, and applications of analog sensors, digital transducers, stepper motors, continuous-drive actuators, and drive system electronics. Component integration and design considerations are studied through examples selected from applications of machine tools, mechatronics, precision machines, robotics, aerospace systems, and ground and (see over)

Nature of Course

Prerequisites (or special instructions):

ENSC 280

What course (courses), if any, is being dropped from the calendar if this course is approved: none

2. Scheduling

How frequently will the course be offered? Once a year.

Semester in which the course will first be offered? Fall, 1994

Which of your present faculty would be available to make the proposed offering possible? W.A. Gruver, J. Jones, S. Payandeh and A. Rawicz

3. Objectives of the Course

This course introduces control instrumentation needed for the design and integration of computer-controlled machines and devices. It is intended to build on material learned in ENSC 280 (linear systems I), complement ENSC 370 (embedded systems project course), and provide a foundation for advanced systems topics including ENSC 423 (modern control) and ENSC 438 (robotics). It will also provide valuable background for those students in related areas such as Engineering Physics & Biomedical Engineering.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

- Faculty. 0
- Staff 0
- Library 0
- Audio Visual 0
- Space 0
- Equipment 0

5. Approval

Date: _____

J.K. Oweb
Department Chairman

Dean

Chairman, SCUS

SCHOOL OF ENGINEERING SCIENCE

SIMON FRASER UNIVERSITY

ITEM IV

REVISION TO ENGINEERING PHYSICS

1. **CURRENT CALENDAR ENTRY:**

See description under Applied Sciences - Engineering Science (Page 74) as follows:

Semester Eight

Cmpl III-3 third complementary studies elective
Ensc II-4 second Engineering Science elective
ENSC 108-0 Engineering Communications VIII
ENSC 453-4 Semiconductor Device Engineering
ENSC 499-9 Engineering Science Undergraduate Thesis
(20 semester hours)

2. **PROPOSED NEW CALENDAR ENTRY:** (Revised April 21, 1993)

Change ENSC 453 in the Engineering Physics Option to Ensc III-4 and include ENSC 453 as an Elective Option.

Semester Eight

Cmpl III-3 third complementary studies elective
Ensc II-4 second Engineering Science elective(1)
Ensc III-4 third Engineering Science elective(1)
ENSC 108-0 Engineering Communications VIII
ENSC 499-9 Engineering Science Undergraduate Thesis
(20 semester hours)

(1) Chosen from:
ENSC 330-4 ENSC 426-4 ENSC 485-4
ENSC 423-4 ENSC 429-4 ENSC 495-4
ENSC 425-4 ENSC 453-4

3. **RATIONALE:**

It was felt that ENSC 453 was not a fundamental course in the Physics Option and therefore should be made an elective.

ITEM V.

SCHOOL OF ENGINEERING SCIENCE

EDITORIAL CHANGE TO B.A.Sc. PROGRAM

1.A CURRENT CALENDAR ENTRY

See description under Applied Sciences - Engineering Science (Page 72) as follows:

B.A.Sc. PROGRAM

The School of Engineering Science began offering courses in September, 1983. The overall plan for the school is to have three major areas of concentration. They are:

Core A - Computing, microelectronics and communications

Core B - Industrial automation, control and robotics and computer-aided design and manufacturing

Core C - Chemical and biochemical processing and biotechnology

At present, Core A and Core B are operational. Core C will be phased in over the next few years.

2.A PROPOSED NEW ENTRY

The School of Engineering Science began offering courses in September, 1983. We have four major areas of concentration where the Faculty members' research strengths are inter-related with the undergraduate curriculum. Students should select one of the following options:

- Electronics Engineering Option
- Computer Engineering Option
- Engineering Physics Option
- Systems Option

We also have a Biomedical Engineering Stream, for preparing students to pursue either graduate training or work in the interdisciplinary field of Engineering as applied to the Medical Sciences. This stream should be combined with one of the four areas of concentration.

3.A RATIONALE

The calendar description is out-dated; we no longer have the three separate cores. This has led to a number of students being confused about our program.

EDITORIAL CHANGE TO B.A.Sc. REQUIREMENTS

1.B CURRENT CALENDAR ENTRY

See description under Applied Sciences - Engineering Science (Page 72) as follows:

B.A.Sc. REQUIREMENTS

A specialized program of study must be completed in one of five options: electronics engineering, computer engineering, engineering physics, biomedical engineering and automation engineering.

2.B PROPOSED NEW ENTRY

A specialized program of study must be completed in one of the four existing options: systems, electronics engineering, computer engineering and engineering physics.

3.B RATIONALE

The calendar description will now reflect the curriculum changes in the automation option and the biomedical option..

MEMORANDUM

93-35

W.A.C. Bennett Library, Simon Fraser University
Burnaby, British Columbia, Canada V5A 1S6

Date: 27 October, 1993 (REVISED)
From: Ralph Stanton (Collections Librarian)
To: Dr. S. Stapleton, Chairman Undergraduate Curriculum
Committee, School of Engineering Science (4371)
Re: Library Course Assessment of new courses in
Engineering Science

I have assessed the Library's ability to support the following new undergraduate courses in Engineering Science, here are the results. Bibliographic checking was done in October when use was high.

Two courses now in the calendar are being dropped, they are ENSC 436 Manufacturing Processes and ENSC 480 Industrial Engineering.

Book Prices:

The average price of books in this field is \$119 (BNA93-p.29).

Since the reading lists for both courses are very short, each title becomes more important for the student. We have therefore asked to duplicate existing holdings where there is evidence of good use.

Serials

We have not identified any serial title which should be added for either course. However, we would like assurance from the Department that no new serials are needed since it is certain that we will have funds to add serials titles after this assessment has been approved.

ENSC 310-4 Introduction to Mechanical Design

This course will be offered first in 94-3 and once a year after that. The enrollment is about 10 students.

There are three items on the reading list of which all in the catalogue, one is in use and we would like to purchase an added copy for \$119. The Department has requested that 3 additional texts be purchased for \$357.

45

Comparison to B.C. Universities

A list of subject heading was drawn up and compared to the holdings of UBC and U-Vic Libraries as follows:

	U-Vic*	UBC*	SFU
Kinematics	12	22	9
Machinery, Dynamics of	6	12	6
Machinery, Kinematics of	13	18	19
Mechanics Applied	27	78	61
Statics	16	37	14
Strength of Materials	31	113	60
	---	---	---
Totals	105	280	169

* UBC has 700,000 pre 1978 titles which are not yet listed in its electronic catalogue, U-VIC has 500,000. SFU has none.

AMIGOS Comparison

Our holdings (in selected Library of Congress call numbers corresponding to subject headings given above) were compared with a peer group of large academic libraries for books published over a ten year period based upon the 80% of titles most frequently cited. Lists of the titles retrieved are appended, an asterisk after the call number indicates we hold the title.

	Peer Group	SFU Holdings	Gap
QA871 (Kinematics)	1	1	0
TJ175 (Machinery, Dynamics of)	8	4	4
TA350 (Mechanics Applied)	17	5	12
TA351 (Statics)	2	0	2
TA405 (Strength of Materials)	22	5	17
	---	---	---
Totals	50	15	35

The Department has pointed out that further resources are available in LC classifications TJ211 (Robotics) and QA845 (Dynamics). Since the enrollment is small we think there is no need to add recurring now. Addition courses in this field would require additional resources.

Summary of Costs:

One time:	
Added copy	\$119
Monographs not in the catalogue	\$357

Total	\$476

THE ONE TIME COST ASSOCIATED WITH THIS COURSE IS \$476. THERE ARE NO RECURRING COSTS ASSOCIATED WITH THIS COURSE.

ENSC 365-4 Introduction to Electro-Mechanical Sensors and Actuators

This course will be offered first in 94-3 and once a year after that. The enrollment is about 10 students.

There are three items on the reading list of which two are not in the catalogue and should be purchased for \$238. One is in the catalogue and on loan and should have an added copy purchased for \$119. The Department has requested the acquisition of one additional text for \$119.

Comparison to UBC

A composite list of subject heading was drawn up and compared to the holdings of UBC Library as follows:

	U-Vic*	UBC*	SFU
Actuators	1	4	3
Automatic Controls	71	125	124
Detectors	6	21	20
Measuring Instruments	9	21	11
Power Electronics	28	20	6
Transducers	17	24	23
	---	---	---
Totals	132	215	187

* UBC has 700,000 pre 1978 titles which are not yet listed in its electronic catalogue, U-VIC has 500,000. SFU has none.

AMIGOS Comparison

Our holdings (in selected Library of Congress call numbers corresponding to subject headings given above) were compared with a peer group of large academic libraries for books

published over a ten year period based upon the 80% of titles most frequently cited. Lists of the titles retrieved are appended.

	Peer Group	SFU Holdings	Gap
TJ223 (Actuators)	22	16	6
TJ213 (Automatic Controls)	41	26	15
TK7872 (Detectors)	85	50	35
TA165 (Measuring Instruments)	9	21	11
TK7881 (Power Electronics)	23	6	17
	---	---	--
	180	119	84

The tables reveal significant gaps in the subjects *Detectors* and *Measuring Instruments*. Additional gaps appear in *Power Electronics* and *Automatic Controls*. On account of the deletion of ENSC 436 and ENSC 480 we have agreed with the Department to delete the BNA Subject Descriptor 66028880 *Plant Engineering* in lieu of adding a recurring cost to this assessment. The Library expects to add a new Subject Descriptor upon the advice of the Department and our supplier BNA.

Summary of Costs:

One time:	
Monographs not in the catalogue	\$238
Added copies of monographs	\$119
Requested text	\$119

Total	\$476

THE ONE TIME COST ASSOCIATED WITH THIS COURSE IS \$476. THERE IS NO RECURRING COST ASSOCIATED WITH THIS COURSE.

Costs associated with this course are agreed to in a phone conversation with Dr. Stapleton on 27/10/93.

Please contact me if you have any questions or problems regarding these assessments.



RS

c.c. Sharon Thomas
encl. 2

Simon Fraser University
School of Engineering Science

MEMORANDUM

TO: Parveen Bawa, Associate Dean
Faculty of Applied Sciences

FROM: J.K. Cavers, Director
School of Engineering Science

DATE: October 27, 1993

SUBJECT: Library Resources for New Courses

With respect to our proposed new courses ENSC 310 and 365, Engineering Science will negotiate with the library and will meet the costs. This is provided that they do not exceed the current estimates of \$250 per course for startup and about \$500 per course per year afterwards. It is my belief that the \$500 annual cost should be waived, because we are cancelling two other courses to accommodate the two new ones, and are therefore saving an equivalent amount per year.



cc: S. Stapleton

JKC:lcs