

SIMON FRASER UNIVERSITY

S. 405

MEMORANDUM

Members of Senate

From Academic Planning Committee

Subject Modification of Summer Semester

Date August 27, 1970

On July 6, 1970, S.T. Stratton, Acting Dean of Education placed before Senate a proposal relating to modification of the summer semester at Simon Fraser University. At its meeting of July 6, 1970, Senate moved that the proposal be referred to the Academic Planning Committee, and that the Academic Planning Committee report back to Senate on its deliberations in accordance with previous instructions within 30 days with recommendations and priorities based upon consideration of all academic programs currently before the Academic Planning Committee.

The Academic Planning Committee has considered the proposal and submits the following report for your review. The report is in three parts. Part I contains the major conclusions and recommendations of the Committee. Part II represents a critique of the proposal placed before Senate. In addition, in order to adequately assess the merits of the proposal, it was necessary for the Committee to make a number of implicit assumptions explicit and, further, to identify and comment upon the operational issues that would be raised by the implementation of the proposal in the form proposed. Part III contains an assessment of several alternative motions which were considered by the Committee.

Part I

Recommendations

In evaluating the proposal, the Committee sought to judge it in the context of the following criteria:

1. is there an identifiable demand for the program?
2. are we duplicating a service provided elsewhere?
3. the nature and extent of a University commitment to the proposed program.
4. the merit of this proposal relative to other new program proposals received by the Committee.

The program proposed could accommodate those regular students of the University who attend to either accelerate their program or to catch up; at the same time, it could also accommodate those with regular employment outside the University seeking advanced degrees. There is obviously a significant body of Professional Development Centre graduates who have not completed their degree programs. Presumably, these individuals will at some point desire to obtain their degrees. At this time, the aforementioned bloc of Professional Development Centre graduates represent the only identifiable demand for the proposed program; all other projections of sources of enrollment are largely speculative.

The existence of an eight-week summer session at the University of British Columbia is acknowledged. However, under current conditions it is very difficult for graduates of the S.F.U. Professional Development Program to complete their requirements for degrees from S.F.U. by taking U.B.C. summer session courses. There are several reasons for this. First, on the recommendation of the Faculty of Education, no S.F.U. credit is given for education courses taken at U.B.C. Second, a student seeking to transfer credit from

another institution to S.F.U. must have the approval of his department and the Senate Committee on Admissions and Standings. As a general policy, the Committee has refused to grant S.F.U. credit for upper division work taken at another institution. Thus, implementation of the proposed program would not duplicate an existing program in terms of accommodating the needs of graduates of the University's Professional Development Program.

It has been suggested that by establishing its own summer half-term S.F.U. would provide an educational opportunity to many in the lower mainland area who either are not attracted to the course offerings at U.B.C. or, probably more important, find it inconvenient to travel the distance involved to the U.B.C. campus. This may well be the case. On the other hand, the result of implementation of this program may well be to shift the demand preferences between the two institutions rather than enlarge the total pool of enrollees. On this issue, we simply do not know what the result will be.

To date, this University has made little effort to elicit from or respond to the needs of the broader community of which it is a part. The Committee believes that at least a partial implementation of this proposed program would represent a commendable step in this direction.

The implications for the University resulting from implementation of this proposal are subsequently described. In brief, we strongly believe that without a major commitment to this program on the part of most departments of the University, it will not serve well many of those students who might opt to enroll in it. That is to say, without broad departmental participation, there is little chance of an enrollment sufficient to justify the implementation of this program. Assuming departmental commitment to the program, we note in the appendices to these recommendations the possible effects on the existing trimester operation resulting from shifts in the semester teaching preferences of faculty. Given the possibility of these effects, we suggest that Senate give consideration to the extent to which the University's commitment to the

trimester operation ought to be continued. Finally, there are the problems of administrative accommodation of the program and the financial implications resulting therefrom. It is our belief that the program can be accommodated within the existing administrative structure of the University, but that the accommodation will require a time and money commitment of existing staff of considerable magnitude.

In summary, our major findings are:

1. full or partial implementation of this proposal would be a commendable step toward responding to the needs of the wider community of which Simon Fraser University is a part.
2. at the present time, there is no substantive evidence of demand for a May/June summer half term. The case for a July/August summer half term is largely based on the approximately 1,000 graduates of the Professional Development Program who have not completed their baccalaureate degrees. The demand from the non-University community for a July/August summer half term is, at this time, speculative.
3. without broad departmental participation, the opportunity to accelerate or complete degree programs will be severely constrained; concomitantly, there will be little chance of an enrollment sufficient to justify the full implementation of this program.
4. the Deans of Arts and Science have indicated that only limited support exists in their faculties for implementation of this proposal; specifically, three out of thirteen departments in the Faculty of Arts and two out of four departments in the Faculty of Science.

On the basis of these findings and relative to the other new program proposals received by the Committee, we are prepared to recommend the following:

1. that the Faculty of Education be authorized to implement a minimum program of eight-week courses to run during the July/August portion of the summer semester.
2. that departments in the Arts and Science faculties willing to participate in the program be authorized to do so. In each case, the option to participate to be left to the department.
3. that the recommendations regarding instructors for the half-term courses originate with the department offering the course.
4. that the average class size of those courses offered during the summer half-term be 22 students with no class to be offered with less than 14 students.
5. that all direct charges of the program not be assessed against the existing resources of the participating departments but instead be assessed against the new program monies of the University.
6. that the total number of course offerings reflect the financial constraints on the program approved by the Board of Governors upon recommendation of the Academic Planning Committee.
7. that responsibility for developing the operating plan for implementation of this proposed program be vested with the Vice-President Academic who will seek the approvals of the Board of Governors and the Senate for those items requiring their approval.
8. that the operation of the program be reviewed annually by the Academic Planning Committee and an evaluation report submitted to Senate.
9. that after five years of operation, Senate review the program and agree to either its continuance or discontinuance.

PART I.I

A Proposal to Modify the Summer Semester

Summary of the Proposal

The summary set forth below is based upon the motion placed before Senate at its meeting of July 6, 1970 by S. T. Stratton, Acting Dean of Education and the proposal of July 18, 1970 submitted by Professor John F. Ellis for consideration by the University's Academic Planning Committee:

To incorporate within the existing summer semester, two two-month periods of study within either of which a student can complete Senate-approved courses for full credit providing that the hours of instruction and other requirements of the courses so offered are equivalent to those in effect in the normal four-month semester; such a program to commence with the 1971 summer semester.

Stated Rationale for the Proposal

1. to enable students who do not need or wish to undertake a full semester of studies to complete courses in eight weeks.
2. to enable students who are unable to attend the University for a full summer semester (school and college teachers and other groups) to undertake courses in eight weeks.
3. to enable departments to broaden course offerings without adding faculty.

Critique of the Stated Rationale

If the decision of the University's Senate is that eight-week courses can be offered with no diminishment in the academic quality of such courses, a very compelling reason for offering such courses is to enable students who are unable to attend the University for a full summer semester

an opportunity to do so for a shorter period. Approximately 800 students without degrees have graduated from the Professional Development Program and entered into teaching positions. Because the primary and secondary school year in B.C. overlaps the University's summer semester, the only alternative for those teachers who wish to complete their degrees at S.F.U. is to take a leave of absence or resign their positions. The implementation of a July-August summer session at S.F.U. would provide a more viable alternative to these individuals. In so stating, we recognize that the existence of the summer session at U.B.C. enables those graduates without degrees of the S.F.U. Professional Development Program, to complete their degree programs.

The S.F.U. Faculty of Science has recently become interested in developing channels of communication between science teachers and the University. While travelling lectures and workshops can certainly improve the knowledge which teachers have of the science faculty at this University, a summer session designed to allow teachers to take science courses would greatly foster this process of communication. In addition, many science teachers who have taken course after course at the U.B.C. summer session may welcome the opportunity to attend S.F.U. and to sample course offerings here.

Furthermore, the option to enroll in an eight-week as opposed to a sixteen-week session may well encourage greater participation in the academic program of the University by the adult community in the lower mainland area. The enrollment in the University of British Columbia summer session has been 5,664, 5,627 and 5,141 in 1968, 1969 and 1970 respectively. In each of those years, approximately half of the students have been those with regular employment outside the University while the other half has consisted of regular students of the University working primarily towards a B.A., B.Sc. or B.Ed. degree. The experience of the University of Michigan with a program very similar to that proposed for S.F.U. is that students enrolled in the first of the two summer half terms are drawn from those present in the preceding fall and spring terms who attend to either accelerate their program or to catch up; on the other hand, the students in the second of the two summer half terms are predominantly those with regular employment outside the University who are seeking advanced degrees.

If the introduction of two summer half terms generates a significant increase in enrollment, one benefit will be to reduce the overall operating cost per student - a benefit of no small importance to S.F.U., when its current overall operating cost per student is compared with that of the Universities of British Columbia and Victoria.

As proposed, departmental course offerings would be increased to the extent that S.F.U. faculty opt to earn, during one of the two summer half terms, the stipend associated with teaching during their research semester, and visiting faculty can be employed to teach the courses to be offered. However, one of the rationales for the establishment of the research semester was that faculty needed a period for "mental refurbishing" in which, free from teaching and other administrative obligations, they could think, write and do research. If this rationale continues to have validity, then the proposed modification permitting faculty to maintain a full time teaching load for twelve months of the year would appear to have some serious drawbacks. At the same time, however, it is well known that many faculty are currently undertaking various kinds of non-research assignments, including teaching, during their research semesters. In the absence of a historical posture in which research semesters have been used solely for this purpose, the serious drawbacks referred to above are somewhat mitigated. Furthermore, resolution of the issue of whether faculty need a four-month research semester as opposed to some other alternative could also modify our aforementioned objections.

The adoption of an honorarium approach may shift the teaching preference patterns of faculty to one involving the fall-spring semesters with the result that departments may be faced with too many faculty desiring to teach in the fall and spring semesters and an insufficient number in the sixteen-week courses of the summer semester. Assuming that as a matter of policy, the University desires to maintain the sixteen-week session, steps will have to be taken to ensure that adoption of this proposal does not lead either to increasing the number of courses with small enrollments or to the discontinuance of the sixteen-week summer course offerings.

While the proposed modification would provide for a broadening of the University's course offerings, it is questionable whether in all cases this is desirable. Of the University's current undergraduate course offerings, 30% have enrollments of less than 10 students. To extend University offerings without at the same time establishing minimum enrollment requirements cannot be justified. Furthermore, the broadening of the University's course offerings could take the form of duplication of the same courses in the eight-

and sixteen-week sessions. From either the viewpoint of students who desire to maximize the course offering options or from the perspective of resource allocation, such duplication cannot be justified.

While broadening of course offerings has considerable merit, it rejects the alternative possibility of reducing the total number of faculty while leaving unchanged or reducing the total number of course offerings. Obviously, any successful effort to constrain the number of courses with low enrollment will result in unused faculty effort. Given this situation, one alternative is to create new courses expected to generate greater student interest than those phased out; the other alternative is to reduce the total number of faculty required to mount the academic program of the University. Both alternatives are viable and, therefore, worthy of consideration.

Implications of the Stated Proposal

In order to provide the basis for a thorough appraisal of the merits of the proposal, it was necessary for us to examine the effect of the proposal on various facets of the University's operation. Our attempt has been to identify the nature of the issue and in the absence of recommendations on these items from the authors of the motion and proposal respectively, to provide our own for Senate's consideration. The implications have been subdivided into three categories: academic, cost, administrative.

Academic Implications

1. Distribution of Faculty Teaching Effort

A stated rationale for the proposal is to enable departments to increase course offerings with no increase in faculty. This is to be achieved, in part, by having faculty who teach in the fall and spring semesters undertake for a stipend the offering of courses during the two summer semesters. Several issues arise in

this regard. First, should limits be imposed on the frequency with which faculty can teach under the stipend arrangement in the summer half terms? The need for mental refurbishing and opportunity for research argue strongly for limits on the frequency of teaching under the stipend arrangement in the summer half-terms. Our recommendation is that faculty either be permitted to teach for stipend in one but not both of the two half-terms in any calendar year or not more than two of the four eight-week sessions in a two year period.

A related issue is whether or not a faculty member should be permitted to undertake a teaching load equivalent to the expected teaching load during a sixteen-week semester during one of the summer half-terms in lieu of teaching during one of the regular sixteen-week sessions thereby fulfilling his two out of three semester calendar year teaching obligation to the University. Two factors militate against this proposal. First, no broadening of the range of departmental course offerings would be achieved. Conversely, a broadening of departmental course offerings could only be achieved by adding faculty with a consequent upward increase in the cost of mounting the academic program. Second, faculty would fulfill their teaching commitments to the University in six months rather than the eight now required under the existing system with a consequent further disruption in the committee structure on which much of the administration of the University is based. For these reasons, our recommendation is that faculty not be permitted to utilize one of the two summer half-terms in lieu of one of the regular sixteen-week semesters in fulfilling their University teaching obligations.

A final issue is whether or not a faculty member should be permitted to teach over the two summer half-terms a course load equivalent to that which he would be expected to teach during a regular sixteen-week semester. Our recommendation is that no such shifting be permitted unless the replacement in the fall or spring semester is of visiting status. We believe that requests for permanent faculty on the basis of need determined during the summer semester should not be considered

2. Departmental Participation in Modified Summer Semester Program

The adoption of two summer half-terms will not facilitate student efforts to either accelerate their programs, do make-up work or complete degrees unless there is a broad range of course offerings across the University community. This suggests that the participation of many departments is desirable if the aforementioned objectives are to be achieved. At the same time, we recognize that:

- a. the time-tabling of entry into an 8-week participation program will be very awkward.
- b. the motion placed before Senate made participation optional
- c. study may indicate that a certain minimum of departments and courses could satisfy the majority of student needs.
- d. departments that might say "no" at the moment if not forced to participate may well say "yes" at a later date if it becomes advantageous to them to do so.

For these reasons, we are not prepared to recommend that all departments be required to participate in the program. At the same time, however, we are of the opinion that without broad departmental participation, opportunity for students to fulfill any of the objectives set forth at the beginning of this section or for the University to anticipate any significant increase in enrollment are severely constrained.

In addition to the issue of departmental participation, efforts will have to be made to insure that mutually compatible courses are placed in the same summer half-terms, e.g., it will be of little avail to spread the courses required by public school teachers over both summer half-terms if it is only possible for teachers to enroll in the second of the half-terms.

3. Teaching of Courses

Our recommendation reflects that contained in the Ellis proposal to the Academic Planning Committee, i.e., courses may be taught by either regular faculty on research semester or by visiting faculty.

4. Equivalency of Course Requirements in the Eight-Week Sessions
To Those in the Regular Semesters.

To the maximum extent possible, we believe that contact hours and all other requirements of courses offered in either of the two eight-week sessions ought to be equivalent to those in effect in the normal four-month semester. If such is the case, we recommend that separate Senate approval for offering the course during the summer semester not be required. If on the other hand, a course to be offered during one of the summer sessions will deviate significantly from the form in which it is offered during the fall or spring semesters, then we recommend that separate Senate approval be required. Furthermore, any special course designed to take particular advantage of the summer half-term should also require Senate approval.

Cost Implication

1. Faculty Stipends for Eight-Week Summer Session Courses

Honoraria can be paid on the basis of rank, course, credit hour or contact hour. Our belief is that payment ought to relate to the amount of contact with students and the level of experience of the individual teaching the course. On this basis, neither course nor credit hour meets the above criteria. Our recommendation, therefore, is as follows:

<u>Rank</u>	<u>Honoraria/contact hour</u>
Professor	
Associate Professor	
Assistant Professor	
Instructor	

Furthermore, we recommend that honoraria be paid only for those courses in which formal instruction is offered on a regular basis, and that persons who are hired to teach summer session courses

not holding university appointments, e.g., teachers and school superintendents, be paid at one of the two lower levels of honoraria. Last, we recommend that as regards visiting Professors, teaching in the summer half-terms, they be entitled to one return air fare toward their moving expenses.

2. Student Fees

We do not believe that there is room in the summer half-terms for substantial deviation from the fee schedule per credit hour established for the regular University semesters. Our rationale is simply that a course now offered in the regular sixteen-week semester which is converted to an eight-week course will be essentially the same course and therefore ought to reflect the fee structure which applies to that course during the normal semester operation. Our recommendation, therefore, is that fees per credit hour in the summer half-terms reflect those now in existence during the regular semesters.

3. Direct Cost Implications

The direct cost implications resulting from implementation of the proposal will vary depending on the way in which it is implemented. Assuming that the two summer half terms are additive to the regular sixteen-week summer semester, introduction of the modified summer semester can be expected, at least initially, to result in an increase in the total cost of operating the academic program. This will occur because with the same number of faculty as under the existing trimester operation, stipends will have to be paid to S.F.U. and visiting faculty to teach during the proposed two summer half-terms. Alternatively, if the two summer half-terms are in lieu of the regular sixteen-week summer semester, additional costs will be incurred only to the extent that stipends are paid for the offering of courses which are in addition to those normally offered during the summer sixteen-week period. The same cost analysis applies also to the third option, namely that two summer half-terms be added to the regular sixteen-week semester and that the total offering of courses spread over the three periods be equivalent to those currently offered during the sixteen-week summer semester.

In sum, in the short term there will be additional direct costs associated with the introduction of two summer half-terms with their own complement of courses where they are added to the full complement of courses offered under the existing sixteen-week summer semester. Under either of the other two options, increased direct costs will be a function of the extent to which additional courses above those normally provided during the existing summer semester are offered.

Over the longer term, cost savings will be achieved only if the academic program under the proposed modifications of the summer semester can be mounted with less faculty than that required to offer the existing three-semester program. The savings over the long term will thus be a function of growth in student enrollment, faculty expansion and/or replacement of existing faculty. At S.F.U., faculty attrition has consistently been around 5% per year. Thus, if this average is maintained, the opportunity to hold or significantly reduce total direct costs appears slight.

4. Indirect Cost Implications

Implementation of the proposal would pose a number of issues to be resolved in the following administrative areas of the University: admissions, registration, course scheduling, examination scheduling, fees, residences, bookstore, health services, traffic and parking, and the issuance and recall of library cards. In addition, substantial changes will be required in academic and administrative policies, procedures, records, computer programs and schedules. The format of a number of forms will require changes, while the frequency and complexity of the reports will increase considerably, e.g., class lists, transcripts, enrolment statistics, etc.

It is extremely difficult to put a price tag on these areas. The costs involved reflect primarily the time of existing staff required to resolve the problems associated with implementation of

teaching responsibilities during one of the two eight-week sessions. Where a faculty member chooses to teach in both summer half-terms in lieu of one of the regular semesters, we recommend that the normal accrual toward sabbatical leave apply.

11. Faculty Fringe Benefits

Because the stipend for services rendered during the summer half-terms is above and beyond the salary paid to faculty for fulfillment of their normal University obligations, it is our recommendation that no University benefits accompany the stipend payment. Deductions for social insurance and income tax will be made in accordance with established University policy.

Where a faculty member chooses to teach in both summer half-terms in lieu of one of the regular semesters, we recommend that the normal fringe benefits apply.

12. Other

Implementation of the proposal would require consideration of the following:

A. Fees

- 1.
- 2.
- 3.

- a.
- b.
- c.

B. Residence

C. Bookstore

D. Other Areas

Summary

In the following section, several alternative proposals are described and the advantages and disadvantages of each are identified. Before proceeding to the next section, it is appropriate at this point to highlight the major advantages and disadvantages which have emerged from our analysis of this proposal.

Advantages

1. enables students who do not need or wish to undertake a full semester of studies to complete credit courses in eight weeks.
2. provides an opportunity for those with regular employment outside the University to seek advanced degrees.
3. increases the number of options open to faculty relative to use of their time during their research semester without imposing any constraints on their scheduling of research and teaching semesters.
4. increases student flexibility to schedule course work around employment opportunities.
5. offers the opportunity of either broadening the number of course offerings or reducing the total number of faculty required.
6. presumably, those students currently enrolled in the regular summer semester will be retained; combined with those students now able to attend because of the addition of two eight-week sessions, the overall effect ought to be one of significantly increased summer enrollment.
6. possible phasing out of the sixteen-week summer semester.

Disadvantages

1. possible phasing out of the sixteen-week summer semester.
2. without adequate controls, could lead to significant increase in the number of courses with small enrollments.
3. involves a major restructuring of the University's academic program in the absence of empirical evidence relating to the effect on enrollment.
4. costs are likely to be significant involving both faculty honoraria and the development and conversion costs involving

University course offerings, policies, procedures, records, forms, etc.

5. departments will have to schedule faculty and course offerings five times a year rather than three.

6. duplicates an existing program at the University of British Columbia which has so far been able to accommodate all students who wish to apply.

Part III

Alternative Motions

The proposed summer semester modification would lead to the establishment of two summer half-terms in addition to the regular summer semester. In addition, there were several other alternative modifications of the summer semester which were considered. They included the following:

1. two summer half-terms only
2. one 16-week summer semester and one summer half-term only
3. one summer half-term only

The proposed mode of operation and the advantages and disadvantages of each are identified below:

1. Two Summer Half-Terms Only

- A. Mode of Operation

A two summer half-term teaching load would be the equivalent of one full-time teaching load in either the fall or spring semesters. Stipends to be paid to visiting faculty teaching one or the other of the summer half-terms and to permanent faculty who had taught in the fall and spring semesters or who taught in the spring semester and was scheduled to teach in the fall semester.

- B. Advantages

1. would enable students who do not need or wish to undertake a full semester of studies to complete courses in eight weeks.

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- B. Advantages

1. would enable students who do not need or wish to undertake a full semester of studies to complete courses in eight weeks.

2. would enable students who are unable to attend the University for a full summer semester to complete courses in an eight-week period.
3. would retain the existing trimester operation.
4. presumably, those students currently enrolled in the regular summer semester would be retained; combined with those students now able to attend because of an eight-week session, the overall effect ought to be one of significantly increased summer enrollment.
5. would provide departments with the option of offering courses under either a sixteen- or eight-week arrangement.
6. would not constrain faculty flexibility relative to teaching/research semesters.
7. in the absence of any substantive data on which to base enrollment projections or faculty and student preferences, it is a more prudent approach than to proceed with the development of one sixteen- and two eight-week sessions.

C. Disadvantages

1. departments would have to schedule courses and faculty four times a year rather than the present three.
2. would require the development, modification and revision of many University policies, procedures, records and machine programs.
3. cost of implementation

3. One Summer Half-Term Only

A. Mode of Operation

All courses to be on a stipend basis.

B. Advantages

1. would provide for greater continuity in the committee structure of the University, because all faculty would be required to teach during the fall and spring semesters.

2. would require fewer faculty to mount the academic program and thus provide for a lower overall operating cost.
3. would reduce the faculty and course scheduling problems faced by departments relative to those arising under the trimester operation.
4. would enable students who do not need or wish to undertake a full semester of studies to complete courses in eight weeks.
5. would enable students who are unable to attend the University for a full summer semester to complete courses in an eight-week period.

C. Disadvantages

1. would mean less than full time use of the University facilities.
2. would constrain faculty flexibility in terms of research semesters since all would have to teach during the fall and spring semesters.
3. would presumably have an adverse effect on summer semester enrollments. Since faculty will be required to teach in both the fall and spring semesters, the number of course offerings will be dependent upon the number of permanent faculty desiring to earn the additional stipend and visiting faculty who are attracted for the same reason. Under these conditions, it is not likely that the number of courses offered will be equivalent to those now offered under the existing summer semester. With curtailment of course offerings, overall enrollment is also likely to be curtailed.
4. student flexibility to either accelerate their program or to schedule course work around employment opportunities would be severely constrained.

5. would mean elimination of the third regular semester under the trimester operation.
6. would require conversion of all courses to be taught in the summer half-term to an eight-week basis.
7. could well force the elimination of some course offerings during the summer semester because of an inability to convert them from sixteen- to eight-week courses.
8. would require the development, modification and revision of many University policies, procedures, records and machine programs.

Computing Science Program - Faculty of Science

The following is the result of a study of a proposed introduction of serious computer science work into the undergraduate program of the University. It is envisaged that graduate work would start later.

As a starting point the recent (March 1968) proposals of the A.C.M.¹ were used, together with the older recommendations of the C.U.P.M.² It should be noted that the former document supercedes earlier ACM proposals and takes into account the CUPM document.

The next few pages show the ACM proposals in diagramatic form and the proposed action in respect of these proposals.

1. Curriculum 68. Recommendations for Academic Programs in Computer Science. A report of the ACM Curriculum Committee on Computer Science.

Communications of the Association for Computing Machinery, 11 (1968) 151-196.

2. Recommendations on the Undergraduate Mathematics Program for Work in Computing. Committee on the Undergraduate Program in Mathematics, May, 1964.

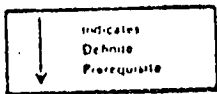
EQUIVALENCE OF CUPM COURSES AND PRESENT MATHEMATICS DEPARTMENT COURSES

The following table is an assessment in general terms of the equivalence of the CUPM courses quoted in the ACM Curriculum with present Mathematics Department courses. The CUPM courses are given in the publication: A General Curriculum in Mathematics for Colleges. A Report to The Mathematical Association of America. Committee on the Undergraduate Program in Mathematics, 1965. Naturally the equivalence is not exact.

CUPM	Math. Dept.
M1	113, 114
M2	213
M2P	483
M3	232
M4	214
M5	411, some 412
M6	432
M7	485

Note: M2, M4 are best considered as a unit.

THE CORE COURSES OF THE PROPOSED UNDERGRADUATE PROGRAM

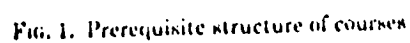


B indicates a Basic Computer Science Course
 I indicates an Intermediate Computer Science Course
 A indicates an Advanced Computer Science Course
 M indicates a CoPM Mathematics Course

↓ Indicates
Desirable
Prerequisite

Fig. 1. Prerequisite structure of courses

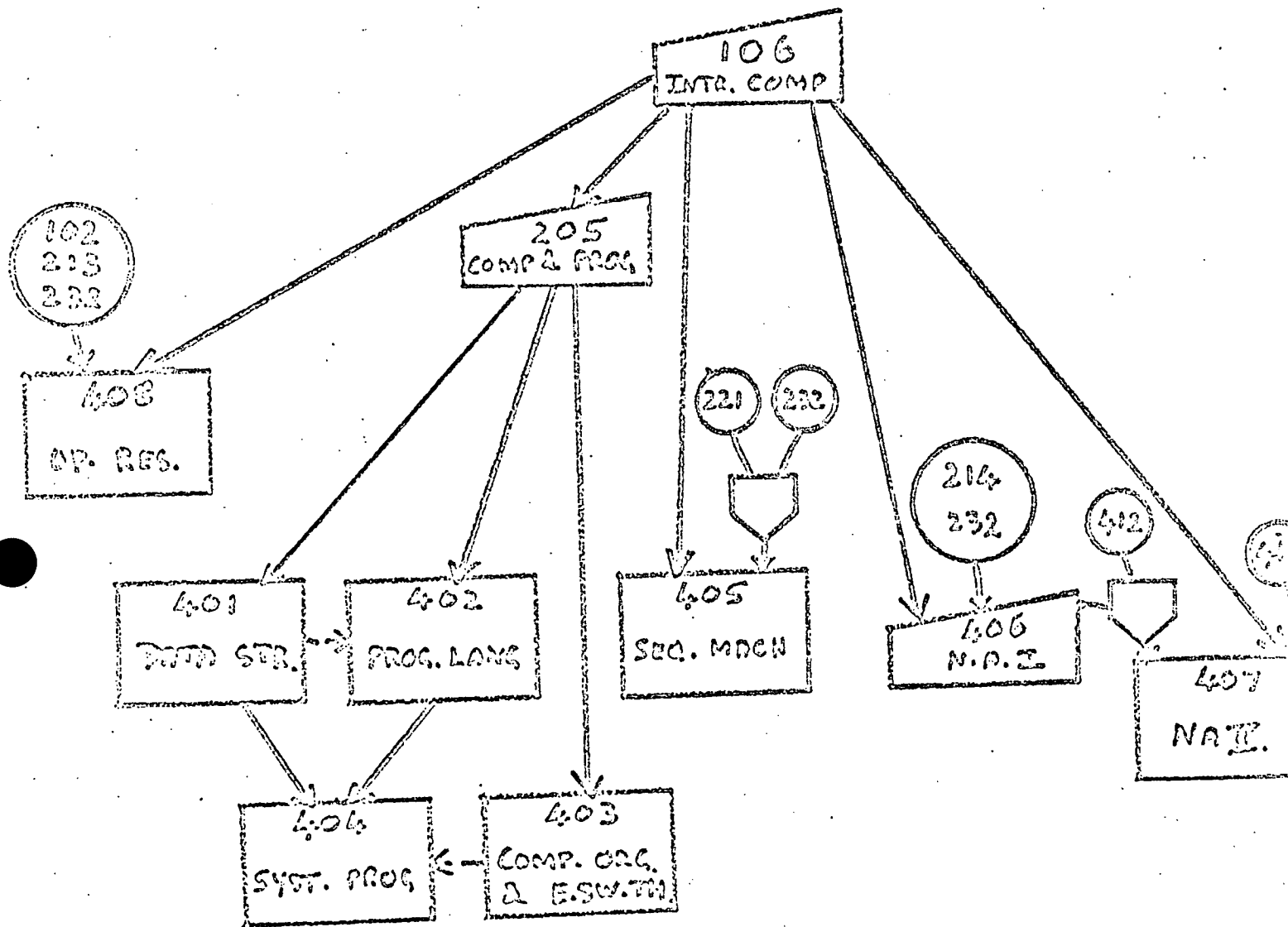
THE COST COURSES OF THE PROPOSED UNDERGRADUATE PROGRAM



COMPUTER SCIENCE COURSES

16

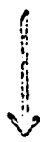
SHOWING PREREQUISITES
BASED ON PRESENT MATH PROGRAM



"at least one of"



Prereq



Desirable
pre- or
co-req.

New
Course

Repl
Course

Pres
Course

Notes: (a) 106, 205, 406 replace 105, 487, 488 resp.

(b) Some changes in prerequisites will occur with

FACULTY REQUIREMENTS ETC.

In order to implement the suggested programs with normal trimester operation and with enrollments as specified for courses offered in the Fall Semester and approximately one-half enrollment in Summer Semester, it will be necessary to have about 8 members of faculty, 5 one-semester teaching assistants, 1 programmer, 1 key punch operator, and a clerk typist. We have at present 2 members of faculty and about 3 one-semester teaching assistants engaged in the program and some programmer help. The justification for these figures is as follows:

<u>Course</u>	<u>Units</u>	<u>Times/Yr.</u>	<u>Enrollment</u> <u>(Fall&Sp.)</u>	<u>Lectures*</u>	<u>Fac.Tut.*</u>	<u>T.A.Tut.*</u>
106	3	3	150	9		15
205	3	3	90	9		9
401	4	1½	45	6	4½	
402	4	1½	45	6	4½	
403	4	1½	45	6	4½	
404	4	1½	30	6	3	
405	4	1½	45	6	4½	
406	3	1½	45	4½	4½	
407	3	1½	30	4½	3	
408	3	1½	45	4½	4½	
				61	33	24

Total faculty load 94½ hrs.

12 faculty

Total T.A. load 24 hours

5 T.A.'s

* These are faculty or T.A. weekly semester contact hours per year.

[ACM Course B1]

106-3 Introduction to Computing

Introduction to the concepts of algorithm and flowchart. Their relation to the structure of a computer. Use of a high level programming language for elementary problem solving.

(3-1-0)

Note: This course follows in rough outlines the ideas covered in B1. It replaces our course Mathematics 105-2. The high level language used will probably at the present time be FORTRAN though PL I may be introduced at some later stage. Items 8 and 10 in B1 will receive less detailed attention than is suggested. More attention will be paid to flowcharting and problem analysis.

[ACM Course B2]

205-3 Computers and Programming

Internal structure of a computer system and machine-oriented programming. Theory of selected programming techniques. Introduction to theorem of advanced software and advanced hardware. (3-1-0)

Prerequisite - Mathematics 106-3.

Note: This course follows in general outline course B2 with additional emphasis on the use of assembler language. The danger that the last part of the B2 course could be handwaving is to be avoided.

[ACM Course B3]

Comments on ACM Course B3 Introduction to Discrete Structures.

There is perhaps no need to introduce this course at the moment, but it, or something like it, may be found to be essential later, dependent on the mathematical background of the students we get. There are many topics of interest and of importance here for science students and for some arts students. In particular this relates to the graph theory work. It will be noticed that the course includes computer applications of the topics covered and not just their theory.

The omission of the course will mean that we will have to introduce any of the topics that should have been covered there when they are needed in later courses. This is not a particularly satisfactory position but is perhaps sensible at the moment if University expansion is limited.

Some of the theoretical work of B3 is covered in the new Pure Maths I course.

We would naturally consider mounting the course on request if special funds were provided.

[ACM Course B4]

Comments on ACM Course B4 Numerical Calculus.

A good course for people going no further in computing science but one which for budgetary reasons we would possibly have to leave out at present. Material in it could be omitted or covered in I8/9. (Numerical Analysis I,II).

[ACM Course I1]

401-4 Data Structures

Concepts of data. Theory and applications of several data organizations. Storage systems and structures.

(4-1-0)

Prerequisite : Mathematics 205-3.

Note: This course follows essentially Course I1 of the ACM curriculum. It has been upgraded to a 4 credit course so that the graph theory part of the omitted course, B3, could be included. This could appropriately be done in part 4 of the syllabus. The course content is stated to be more than could be normally given in a one-semester course. This is another reason for upgrading to 4 units. In this course, as in many others of the proposed 400 level courses, the eventual content will to some extent have to be determined by experience. The ACM statement that: the instructor should carefully select material which gives the student a broad introduction to the subject but which fits together pedagogically seems significant since there is a real danger that the course could develop into being a catalogue type collection of facts. If, however, this danger is borne in mind, the course could form and should form an essential introduction to later work.

[ACM Course I2 (see also I5)]

402-4 Programming Languages

Systematic approach to the study of programming languages. Introduction to assembler and translating systems.

(4-1-0)

Prerequisite - Mathematics 205-3. It is desirable, though not essential, that Mathematics 401-4 be taken prior to or concurrent with Mathematics 402-4.

Note: This course essentially follows I2, but has part of I5 added into it. It is not considered appropriate at this stage to recommend the introduction on a full course of compiler construction. The other courses being suggested are considered to be more important in the first instance. It may well happen that in the future this course is split along the lines suggested by ACM. We feel, however, that this would best be done in the light of experience gained here and not done immediately. The co-requisite 401-4 has been added partly because of the complete omission of B3, but more because it is felt that a detailed knowledge of data structures, while not essential for a full study of programming languages, is nevertheless a help. It becomes particularly desirable if we go far into the compiler construction aspect of the course. The course is essentially an extension of the software aspects of the course 205-3.

[ACM Course I3 (see also I6)]

403-4 Computer Organization and Elementary Switching Theory

Hardware organization of computer systems. Logical design and elements of digital computer systems. Theoretical foundations and mathematical techniques concerned with the design of logical circuits. (4-1-0)

Prerequisite - Mathematics 205-3.

Note: In the same way as 402-4 is an extension of the software part of 205-3, the present course is an extension of the hardware part of that course. It is considered as a combination of I3 with parts of I6. It is not proposed at this time to give I6 in full.

[ACM Course I4]

404-4 Systems Programming

Software organization of computer systems. Multi-programming and multiprocessing systems. A particular system is shown for central study. (4-1-0)

Prerequisite - Mathematics 401-4 and 402-4. It is recommended that a student take Mathematics 403-4 prior to or concurrent with this course.

Note: This course is intended as being essentially based on Course I4 of the ACM proposals. This means that with 401, 402 and 403 it forms the main "computer science" part of the computer science option. The problems which arrive in multi-accessing, multiprogramming and multiprocessing are emphasized in the course which should be a serious one. It will be noticed that in the ACM description it states that: there is considerably more material listed than can normally be covered in one semester so that careful selection of topics should be made or the course extended to two semesters. This is the justification for making the course 4 credit rather than 3.

[ACM Course I5]

Comments on ACM Course I5 Compiler Construction

It is proposed that this course be omitted in the first instance, primarily for budget reasons. It is suggested that part of the course be included with I2 and this has been taken into account in the description of 402-4 and the comments on that course.

[ACM Course I6]

Comments on ACM Course I6 Switching Theory

This course has certain aspects which might be more appropriate to study in physics. Whether it could be offered will to some extent depend on the qualifications of persons recruited into the computer science section of the Department. At this stage we feel that it would be best if part of the course were taken into I3 and the remainder omitted. We would still retain the flexibility to introduce the remainder of the course if it were found necessary or desirable at a later stage. These facts have been taken into account in the description of and comments on 403-4.

[ACM I7 (see also A7)]

405-4 Sequential Machines

Theory of finite automata and sequential machines with extension to an introduction to the study of recursive (computable) functions. (4-1-0)

Prerequisite : Mathematics 106-3 and at least one of Mathematics 231-2 or 232-3.

Note: This course has been upgraded to a 4 unit course for a specific reason. The Mathematics Department has an active group in mathematical logic and it would be appropriate both from the computer science and the mathematical logic points of view if advantage was taken of that fact. Accordingly the elementary part of the graduate course A7, namely the introduction of the subject of computability using Turing machines and similar methods has been added to Course I7. The complete course (405-4) is essentially of pure mathematics type and could draw as its audience pure mathematicians with an interest in logic as well as persons whose primary interest is in computer science.

[ACM Course I8]

406-3 Numerical Analysis I

Theoretical and practical study of numerical methods appropriate for high speed digital computer solution of a variety of mathematical problems. This study will include ones taken from the following general areas: solution of linear equations, interpolation and approximation theory, ordinary differential equations. (3-1-0)

Prerequisite - Mathematics 106-3, 214-3 and 232-3.

Note: This course and 407-3 correspond to Courses I8 and I9 respectively of the ACM curriculum. They also correspond to Courses 6 and 7 respectively of the CUPM curriculum.

Detailed prerequisite requirements and course content may need some modification as implications of the intermeshing of the courses with the methods and differential equations courses become apparent. At present it would, however, seem that the courses could be essentially independent as far as duplicate credit is concerned and rather in fact they are complementary to each other.

[ACM Course I9]

407-3 Numerical Analysis II

Similar to Numerical Analysis I with particular reference to topics arising in the study of linear algebra and of ordinary and partial differential equations.

(3-1-0)

Prerequisite - Mathematics 106-3, 411-4 and at least one of 406-3 or 412-4.

Note: See Note on 406-3.

[Not in ACM Recommendation]

408-3 Operations Research

Mathematical theory of optimization methods used in operations research. Illustrative examples. (3-1-0)

Prerequisites .. Mathematics 102-3, 106-3, 213-3, and 232-3.

Note: Prerequisites to this course will probably be varied with the implementation of changes in the statistics courses. The course is intended to cover mathematical aspects of operations research. It is realized that there is an operations research course within the Economics Department. On the other hand as is the case with statistics, there is work here which should be dealt with by mathematicians. It would be intended that the course, as with other computer science courses, would make use of the computer. I see no reason why the course should be 5 units as is the case with the economics course. If it were to be a 5-unit course it would be quite out of line with the other courses offered by the Mathematics Department.

SIMON FRASER UNIVERSITY

MEMORANDUM

Dr. Chase

Academic Planner

Subject Computing Science Program

From Dr. B.L. Funt

Dean of Science

Date 9 February, 1970

Dr. Jewell's comments are very well taken and, indeed, reservations he has shared by many members of the Faculty of Science. It was for this reason that the Faculty indicated in the strongest possible terms that we must first seek a senior computing scientist and then have him responsible for the academic staffing and the detailed curriculum preparation of the Computing Science Program.

Last year and even this year, there has been a great deal of pressure on me, as Dean, to institute a program in a piece-meal fashion. I have continued to resist this and know that I have the formal backing of the Faculty on this matter. My intention is to mount a good and well delineated program in Computing Science.

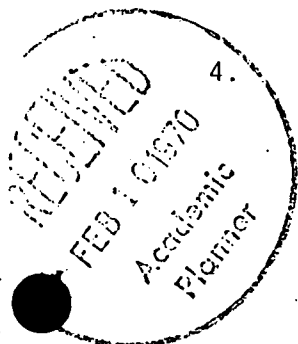
Nevertheless, one cannot frame a proposal for a new program without designating, at least in general perspective, the type of program which is envisaged. A considerable amount of work was done by the Mathematics Department in preparing the Computing Science outlines and these are based upon the recommendations of the Curriculum Committee of the major computing science organizations in the United States. At the time of the preparation of our academic outline, we were describing essentially the undergraduate curriculum program recommended and utilized in the majority of North American universities. I have no doubt that shifts and trends in such a program are continually under way and Mr. Jewell's comments are certainly persuasive.

I see the development of the Computing Science Program in the following sequence:

1. Approval of the program by the University and a commitment over a number of years sufficient to fund a first-rate program.
2. The recruitment of a first-rate individual who can head the program within the Department of Mathematics.
3. A detailed designation of the curriculum and its approval by Faculty and the hiring of suitable academic staff.
4. A decision as to whether the program should or should not remain within the Department of Mathematics will be made within the first several years after the full implementation of the program.

B.L. Funt

c.c. T.R. Jewell



SILVER FRASER UNIVERSITY

MEMORANDUM

Dr. John Chase

Academic Planner

Subject Computer Science Program

From T.R. Jewell

Director - Computing Centre

Date 19th January 1970

I have reviewed the material you have provided me on the proposed academic program in the Computer Sciences and I have the following comments to make:

The curriculum as proposed is strongly flavoured by Mathematics which I suppose is to be expected in consideration of the origin of the proposal. I feel that in view of the need to train in computer techniques students who are majoring in other disciplines, particularly the sciences, these courses are adequate. In this sense I would regard them in the same light as the service courses in Mathematics which are offered to other departments. With respect to these course offerings providing the basis of a major in Computer Science they would probably be adequate if all we are interested in producing are students whose aim is to go onto graduate school to continue their study in Computer Sciences, or who plan to seek specialized employment in industry. In the latter case they would be confronted with a limited number of opportunities primarily with the computer manufacturers in a sales support role or, possibly, in a research environment. In Canada the opportunities are extremely limited since there are relatively few positions in sales support which require individuals with a purely mathematical or theoretical training in the Computer Sciences, and only two manufacturers of computer equipment to my knowledge operate research facilities in Canada. They could find employment as programmers in many branches of industry, but they are best equipped to enter into a scientifically or academically oriented programming field whereas the demand at the present time is primarily for programmers who are trained to handle business applications. In this respect the technical schools appear to be doing a good job in B.C. so they are capable of filling the need for this type of programmer. Also with the more frequent introduction of high level, user oriented languages the need for business programmers as we know them today is becoming less and less critical. The demand is slowly but surely shifting for individuals who are trained as systems specialists, both in computer application areas and with respect to computer operations. With the exception of the introductory courses and those concerned with system programming and operations research this particular program does not address itself to this need.

The trend is towards the introduction of large scale computer systems which will eventually replace the need for the smaller, in-house systems characteristic of the industry today. This trend will be sustained primarily by economic pressures, but also by the need to have access to systems capable of storing and processing large amounts of information. Once our business institutions can be assured of an acceptable level of reliability and security in using a shared computer facility the choice of using in-house facilities or a computer utility service to satisfy data processing and information needs will be a relatively easy one, since it is an established fact that the utility service is capable of providing a cheaper and more complete service.

The computer utility creates the need for individuals trained in the management and operation of the hardware and software associated with large complex facilities. In order to service its customers effectively it must have in its employ individuals who are trained in the techniques of systems design in a broad spectrum of application areas. A great deal of emphasis will be placed upon communication theory and information technology because of the need to interface effectively the human with the machine. Individuals trained in these areas will replace the programmer because the development of higher level languages will establish a common means of direct communication between man and machine thus eliminating the need for the programmer as the intermediary. The problems which will arise will be associated with establishing a satisfactory interface. The programmer, i.e. the person who writes and tests code, will not cease to exist altogether, but he will gradually disappear as an employee of the user and now be confined to working for the computer utility or the manufacturer of hardware and/or software. He will be the person who is concerned with the development of user oriented languages and therefore must be well trained in the more theoretical aspects of the computer sciences. If I appear to be contradicting myself here, I am not really, because the need for this type of individual will be almost insignificant compared to the demand for graduates who can operate and manage the system hardware and software and who can design the systems which will make use of those resources. I would think that the Computer Science programs which already exist in Canadian Universities today are more than adequate to supply the demand for the 'programmer' of the future, but they will fall far short of meeting the demand for the systems specialists if present curricula continue unchanged.

I have confined my comments up to this point to the type of undergraduate training which I feel is necessary. However, I believe there is a far greater need in the computer industry today, one which will unquestionably increase in the future, for individuals having had intensive training in systems management. Such a program which would not be concerned exclusively with the computer, would necessarily be

heavily computer oriented as is consistent with the emphasis being placed upon computer technology in the business world. I visualize a program with objectives closely paralleling those of most MBA offerings which accept individuals with undergraduate training in a variety of disciplines and give them specialized training in management techniques. The evolution of the computer utility which will impact every segment of our society has and will continue to create the need for individuals who are both trained computer scientists and competent managers. I am not aware of any institution which has consciously developed a graduate program to meet this demand. Most of our business leaders today recognize the importance of computer technology to the general well being of their respective industries, and they also recognize the lack of competent management of computer facilities and applications. The majority of individuals holding responsible positions in the area of computer management have had little or no formal training in either management or computer technology, primarily because at the time they were progressing into positions of responsibility no such training was available. The deficiencies lie mainly in the area of management skills and it is the lack of same that you will find at the heart of most problems encountered by organizations implementing computer applications.

In summary, I would suggest that serious thought be given to developing a satisfactory undergraduate service program in the Computer Sciences and a graduate program in Computer Administration. I am convinced from my knowledge of the industry, and I am sure that further investigation would bear this out, that the degree of support forthcoming from industry and government for the graduate program would be substantial. I also think that Simon Fraser which has made no serious commitment to the computer sciences at this point, is in a unique position to embark upon this kind of program and therefore make a significant contribution to whatever role the computer is to assume ultimately in our society.

Ross.