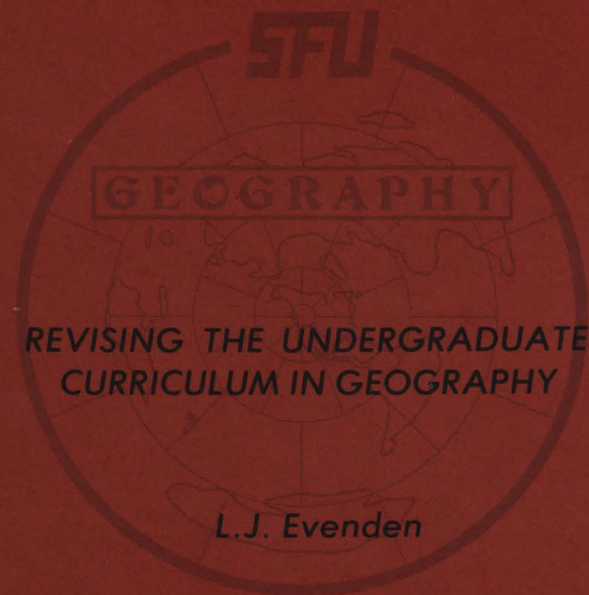


**DEPARTMENT
OF GEOGRAPHY
DISCUSSION
PAPER SERIES**



**SIMON FRASER
UNIVERSITY**

BURNABY BRITISH COLUMBIA, CANADA

**REVISING THE UNDERGRADUATE CURRICULUM
IN GEOGRAPHY
THE SIMON FRASER UNIVERSITY EXPERIENCE**

L.J. Evenden

(Appendix J by R.B. Sagar)

**Department of Geography
Simon Fraser University**

DISCUSSION PAPER NO. 23

August, 1988

Disclaimer: Discussion Papers are prepared or edited by Department members for circulation to interested individuals. Their contents should not be quoted or cited in published work without the consent of the author. Comments are invited.

TABLE OF CONTENTS

	Page
Acknowledgements	ii
List of Tables	iii
List of Figures	iii
List of Appendices	iii
Revising the Undergraduate Curriculum in Geography: The Simon Fraser University Experience	1

ACKNOWLEDGEMENTS

The curriculum revision carried out between late 1985 and the end of 1987 could not have been accomplished without the co-operation, assistance and participation of all members of the Department, including student representatives. Seventeen formal presentations were made to the Undergraduate Studies Committee, and the members of the Committee itself went 'the extra mile' on more than one occasion. The Department Chairman, Dr. Roger Hayter, kept the pressure turned up, offering keen opinions at every stage of discussion. Professor Sagar, co-chairman of the Committee during this period, read an earlier draft of this paper and, as current Committee Chairman, has compiled the new Advising Handbook which appears here as Appendix J. The Department Assistant, Ida Curtis, who understands the operation of the curriculum in a way that nobody else does, and who keeps the records of the undergraduate program, kept us on the right track in the interests of students. The office staff, Mary Ward, Gwen Fernandes, Rosemary Bakker and Barbara Martin responded to deadline crises with much grace and good humour, and Margaret Wheat, with equal grace, drew the figures. Beyond the Department, Associate Dean of Arts Dr. Evan Alderson, Chairman of the Faculty of Arts Curriculum Committee, went out of his way to be of direct assistance, and shepherded the revisions through some critical stages of university level discussion. Faculty of Arts Administrative Assistant Sheila Roberts gave sound practical advice on the operation of the Geography curriculum within the university context. Dr. Robert Frindt, Chairman of the Faculty of Science Curriculum Committee, expedited discussion of the revisions as they affected the B.Sc. Associate Vice President for Academic Affairs, Dr. Ross Saunders, Chairman of the Senate Sub-committee on Academic Planning, gave careful and correct attention to the proposals, and carried the revised program forward to Senate. The original curriculum was established under the guidance of the founding Head of the Department of Geography, Professor A. MacPherson. The fundamental structure of this first program is still apparent here. The many student reactions to the program over the years, aside from those comments made directly by representatives, contributed collectively to create the set of impressions from which the Committee and Department proceeded in their discussions. The interactions implied in this are the foundation for much of the work of the Department and of the discipline.

LIST OF TABLES

- | | |
|-------------------------------------|---|
| 1. Courses and Faculty, 1965 - 1988 | 3 |
|-------------------------------------|---|

LIST OF FIGURES

- | | |
|--|----|
| 1. Growth in Numbers of Courses and Faculty | 3 |
| 2. The Early Curriculum | 7 |
| 3. The 1973-74 Revisions | 7 |
| 4. The Curriculum of the early 1980s | 10 |
| 5. Course Development, mid 1970s through early 1980s | 11 |
| 6. The 1985-87 Revisions | 14 |

LIST OF APPENDICES

- | | |
|--|----|
| A. Curriculum Changes 1965-88 | 19 |
| B. Programs, Diplomas and Certificates with
Participation from Geography | 24 |
| C. Enrolment Proportions: Department /Arts,
Department/University, and Arts/University | 26 |
| D. Faculty Complement, 1965-87 | 28 |
| E. Background for Department Discussion of Curriculum
Review, October 30, 1986 | 30 |
| F. Extract from Minutes of the Undergraduate Studies
Committee Meeting, November 15, 1985 | 38 |

G. Extract from Minutes of the Department Meeting, September 17, 1987: Motions to adopt the revisions	40
H. Selected Documents presented to the University Senate: General Statement and Credit Hour Analysis	44
I. Problems in the Undergraduate Curriculum in Geography: Abstract of paper presented to the 1986 Annual Meeting of the Canadian Association of Geographers, Western Division, University of Alberta	47
J. Advising Handbook for Students of Geography (compiled by Professor R. B. Sagar)	49
K. Extracts from the 1988-89 Simon Fraser University Calendar, showing regulations of the Faculty of Arts, Faculty of Science and the Department of Geography	89

REVISING THE UNDERGRADUATE CURRICULUM IN GEOGRAPHY: The Simon Fraser University Experience

**L.J. Evenden
Department of Geography
Simon Fraser University**

In this paper I shall attempt to describe the purposes, approaches and results of an exercise in restructuring the undergraduate curriculum in the Department of Geography at Simon Fraser University. To do this I shall first sketch out a few of the conditions giving rise to this effort. The contribution is that of a case study, but because the department is one of the largest in Canada, and because its whole development lies within the memories of those who came to it in its earliest days, there is the opportunity to reflect on a generation of curriculum development. By implication, the curricular experience of this department may also serve to gauge developments in the discipline as a whole.

Background

Simon Fraser University was one of several new universities founded in Canada during the 1960s. A provincially commissioned report into higher education, the Macdonald Report, recommended that a wholly new university be created in the lower mainland of British Columbia with the purpose of relieving the growing pressures on the University of British Columbia. Geography had been very solidly established at UBC, and so it was perhaps just a normal expectation that it should be one of the founding disciplines and departments in the new SFU. The department and subject have indeed flourished, although growth has levelled off in the last few years as new programs elsewhere in the university have been established. Throughout the 23 years of its activity, the department has grown to have about 25 faculty, depending on how you count them, about 250 majors, 90 minors, 7 or 8 Honours students, and a graduate complement of 35 to 45. At the undergraduate level it offers the B.A., B.Sc. and B.Ed. degrees, and at the graduate level the M.A., M.Sc. and Ph.D. Within the university it offers joint degrees with other subjects, and participates in a variety of ways with other programs. But the key to any department's existence is the undergraduate program; further, the way in which the group of disciplinary scholars defines and manages its program provides important evidence of how the subject may be evolving in its quest for knowledge and in its duty to communicate its understanding.

Curriculum Development and Increase in Numbers of Faculty

In the first year, 1965-66, six courses were offered, all at the lower levels. (Table 1, Figure 1) During that year the first five faculty members were appointed and they planned the structure and outlined the courses to be added for the next year. Thus in 1966-67 a full program of 34 courses was in place and the complement of faculty doubled to ten. Growth in the numbers of faculty cannot be separated from growth in the curriculum, however, for pressures arising from increased numbers of students, and the desire to provide as full a coverage of the discipline as possible, gave impetus to the department's growth. It became the practice not only to appoint individuals to 'cover' certain areas of the curriculum, but also to ask that each new appointee assist in developing the curriculum by suggesting a new course to reflect his or her own special interest. Faculty numbers continued to increase during the next decade, although the rate began to fall off as a fairly full complement of sub-disciplinary specialties came to be represented and as student demand levelled off. Thus faculty numbers doubled to about 20 by 1977-78 and the number of courses nearly doubled to 66. At present, after another decade, the faculty count rests at about 24, although the number teaching in any given semester does not exceed 20 and the full-time equivalent at the time of the commencement of the revision was 18.75. Prior to the recent curricular changes the number of courses stood at 73. It has now risen to 76.

The Early Curriculum

The early curriculum was developed hierarchically. It was considered that a student should proceed through Geography from an overview introductory course to second year courses which introduced the major systematic sub-areas of the discipline, to specialized courses in the third year, and finally to integrative courses (and some more specialized courses) in the fourth year. (Figure 2) The view of the subject thus espoused was that a holistic outlook should be demonstrated to the student, a traditional concern of the subject, as well as providing for systematic instruction in the various specialties. It was thought that the holistic approach should be apparent both at the beginning and conclusion of the degree.

In addition to the approaches to be followed, it was considered important to develop a thrust to give the department a special identity in its early years and to develop instruction in the areas of immediate concern in the

Courses and Faculty Data

	Faculty	Lower Level	Upper Level	Total Courses	Courses given
1965	5	6	0	6	5
1966	10	7	28	34	14
1967	13	7	33	40	38
1968	16	7	35	42	44
1969	17	7	39	46	66
1970	17	7	39	46	63
1971	18	8	40	48	74
1972	18	8	41	49	78
1973	17	14	43	57	75
1974	17	14	44	58	85
1975	18	14	49	63	89
1976	19	14	49	63	93
1977	21	14	52	66	88
1978	21	14	52	66	93
1979	21	14	54	68	99
1980	22	14	54	68	95
1981	23	14	55	69	80
1982	25	12	57	69	84
1983	25	12	61	73	91
1984	26	12	61	73	84
1985	26	12	61	73	79
1986	26	12	61	73	81
1987	24	11	60	71	75
1988	24	16	60	76	78

Table 1 Courses and Faculty, 1965 - 1988

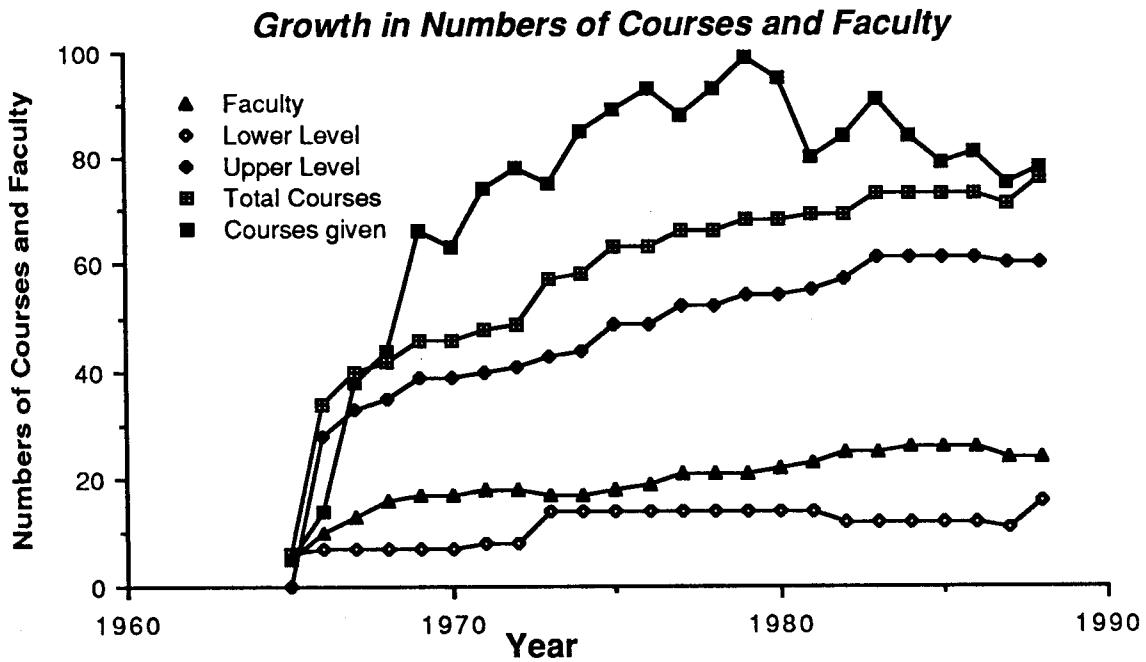


Figure 1 Growth in Numbers of Courses and Faculty

life of the province. Thus the argument was advanced that cultural geography should be emphasized in the initial stages of department building and that an interest should be taken in the resource geography of western Canada, especially British Columbia; in this latter focus cultural geography would be complemented automatically by physical and economic geographical concerns.

This became the practical organizing principle in developing the curriculum. It was rooted in the conviction that the development of theory was confined to physical, economic and cultural geography, and that whatever geography had to offer would be found to depend in some way upon these three areas of concern. Thus students were to be required to pass through courses in each of these three areas during their second year, and to select a proportion of their third year courses from a narrow list representing these three 'streams'. The term 'streaming' was used to identify the curricular patterning thus developed. In summary, the pattern of required courses was: an overview of the subject and a regional course in the first year, these representing systematic and regional approaches to a holistic view of the discipline. These courses qualified students to enter the second year which comprised courses in physical, economic and social/cultural geography. These in turn led to a series of courses in the third year, over which students could exercise some selection control.

The third year comprised a conventional list of physical courses, namely geomorphology, climatology and biogeography; a list of economic courses organized around the idea of progressive development, from primary activities through secondary to tertiary; and a similarly organized list of cultural courses, from prehistoric through transitional to contemporary societies. In the fourth year further specialization was provided for, as were integrative courses. A final requirement was that a regional course was to be taken in the fourth year. Provision was made for technique and methods courses, and a series of systematics which stood in uneasy relation to the three streams were gradually added, such as population, political and transportation. But it was in the second and third year courses that the three streams were most readily identified, and it was here that the various revisions would have their greatest impact.

Emerging Problems and Approaches to Curricular Reform: the 1970s

Minor curriculum revisions occasionally have been undertaken in response

to developments in Geography and to changes in the wider university pattern of departmental development and course offerings. Before the current revision the most important single set of changes was effected in 1973-74 when the number of lower level, that is first and second year courses, was increased from 8 to 14. (Appendix A) The experience of having to make these changes also identified the important point that it is in the lower levels that the battle for Geography in the university context is won or lost.

The particular causes for change at this stage included the levelling off of enrolments in the mandatory first year course in General Geography at a time when the university's intake continued to increase and new programs were being developed. While the intent of this course might have been clear when it was established in the mid 1960s, the course came to be seen as too encompassing in subject matter, requiring a form of committee instruction, yet as a requirement it was viewed as too restrictive by students who wished to study certain aspects of Geography without going through the hoops of a mandatory introductory course. Student opinion was taken seriously, for students were now entering university with improved high school training in Geography as a result of high school curricular changes in the late 1960s; further, the age profile of students was changing as increased numbers of mature students were entering the university, and the reactions of these students to the program in Geography were thoughtful and well worth consideration. Thus Geography 101, as the course was generally known, came to be seen as failing to provide for the general knowledge interests of the student body at large. This meant that it also 'lost some ground' in competing with the offerings of other departments and, in consequence, its role as a course which attracted students into Geography was felt to be put in jeopardy.

Beyond this immediate issue, however, lies the question of how large a place should Geography occupy in a modern university. In a new university, such as SFU in the 1960s and early 1970s, any founding department would be almost certain to lose enrolments in the face of the establishment of other programs. The department was involved in bringing into existence other programs, most notably the Master's program in Natural Resources Management, an interdisciplinary program now located in the Faculty of Applied Sciences; and over the years its members have helped either to found or to take part in the work of several other units, such as the programs in Canadian Studies and Latin American Studies, some other area studies programs now in abeyance, the Institute for Quaternary Research,

the Art Gallery and the program in Fine Arts. (Appendix B) These developments did not have any noticeable effect on undergraduate enrolments in Geography, but they have involved faculty members in additional teaching, joint appointments and committee work. Geography's contribution in the university is valued, valuable, and must be made, but it must also be controlled in order to maintain the consistency and strength of its own program. The problem has always been that in a university which is faced with constant demands for expansion while simultaneously working with shrinking funds, the departmental responses throughout the institution must be to attempt more with less, and to maintain a consistently high or improving standard. In the case of Geography, because of the particular talents and commitments of its faculty members, the need to balance the necessary wider commitment with the more narrowly departmental and disciplinary one is a persistent problem. Perhaps it cannot be otherwise, for its position as the core environmental discipline implies that Geography's character is formed not only by its subject matter but also in the tensions between comparatively narrow analytical pursuits and the development of broader integrative perspectives.

These issues will be familiar in most universities, but in the early 1970s it became clear at SFU that something had to be done about the lower levels courses. The solution was found in diversifying the entrance possibilities by putting the three 'stream' courses of the second year down into the first year, and making these mandatory for intending majors; in making the General Geography course optional; by introducing an optional Geology course (later to be required of Geography Majors pursuing the B.Sc. when that degree was established) and a general interest course on Technocratic Society. Cartography, required for majors, remained in the first year, but could be taken by anybody because there was no pre-requisite. The regional course remained mandatory but was put up to the second year and was given a pre-requisite, but only to the extent that the course had to be taken in the second or subsequent semesters of study. There was no substantive pre-requisite. Further, the content of the regional course, 'North America', was changed to 'Canada'. (A decade later, in 1984-85, the provincial Ministry of Education began to require this course of all intending elementary school teachers.) The effect of all this was to open seven gates to Geography in the first year, in place of the one opening there had been before. (Figure 3) The huge enrolments of 450+ were never seen again in a single first year course, but the total number of students taking introductory courses in Geography was restored to a very healthy level, even higher than before, and has remained so ever since.

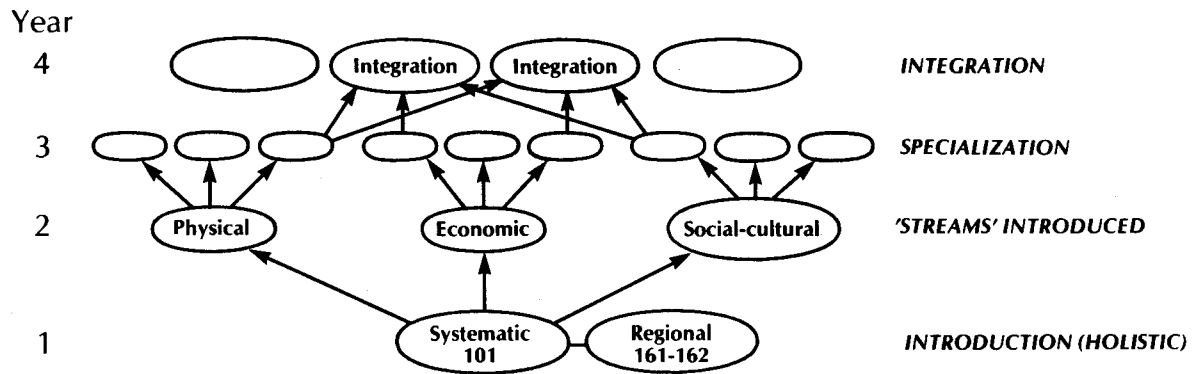
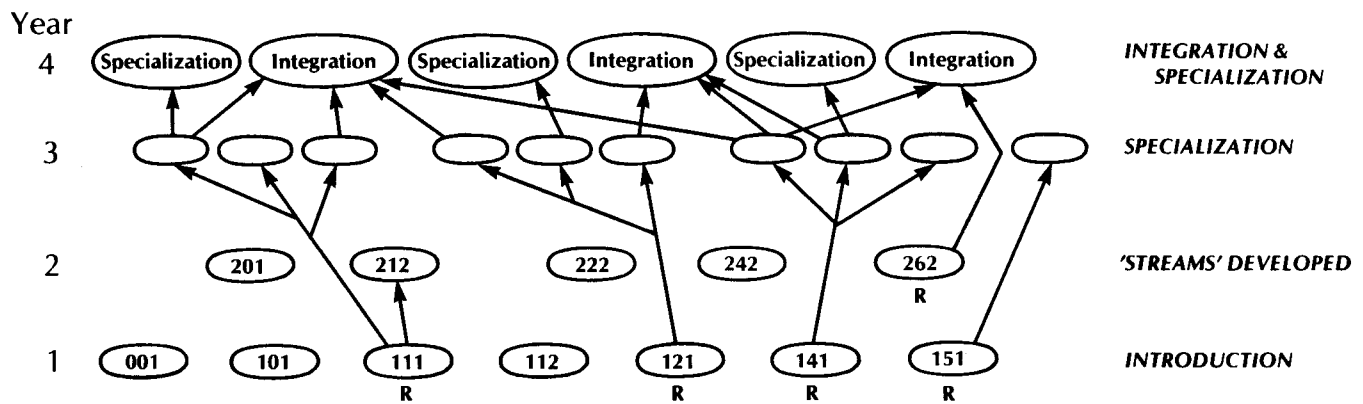


FIG.2 : THE EARLY CURRICULUM - SCHEMATIC



- R - Required of Majors, Minors and Honors students
- 001 - Technocratic society
- 101 - General geography
- 111 - Physical geography
- 112 - Geology
- 121 - Economic geography
- 141 - Social geography
- 151 - Cartography
- 201 - Geographic thought
- 212 - Natural hazards
- 222 - Issues in economic geography
- 242 - Social space
- 262 - Regional

FIG. 3: 1973-74 REVISIONS - SCHEMATIC

Certain individual courses might well reach over 200 at present, and the annual enrolment in the first year exceeds 1,000.

The removal of courses from the second year left a vacuum, and while this posed certain problems it also provided the opportunity to add some badly needed depth to the lower levels. Thus new courses were added in quantitative methods and the history of geographic thought, while other courses were introduced in which practical concerns and applications could be discussed from the perspectives of the three 'streams'. In retrospect, it appears that the conviction was weak that these were essential courses, for none was made prerequisite to the advanced systematics of the third year, which still required their earlier prerequisites, now positioned in the first year. It did not take students long to realize that the second year was not apparently important to their progress, and with one or two exceptions the second year courses came to be infrequently offered and, in consequence, poorly enrolled. Indeed, in a later curricular adjustment, two of them were removed to the third year. The problem of the second year remained for over a decade.

While enrolments, the character of entry courses, and the need to include methods courses gave impetus to the lower level revisions in 1973-74, the upper levels program was augmented at this time by two courses which expressed the links between Geography and other disciplines. Thus Human Microgeography was added in the third year, confirming a link between behavioural geography and psychology, and taught by a faculty member whose background was in environmental psychology. Further, a fourth year seminar was added on the Landscape in Science, Art, Music and Literature, a course taught by a committee from three departments. This course appears to have been well ahead of its time, and there is now a Canadian Association of Geographers specialty group formed around the themes covered in it.

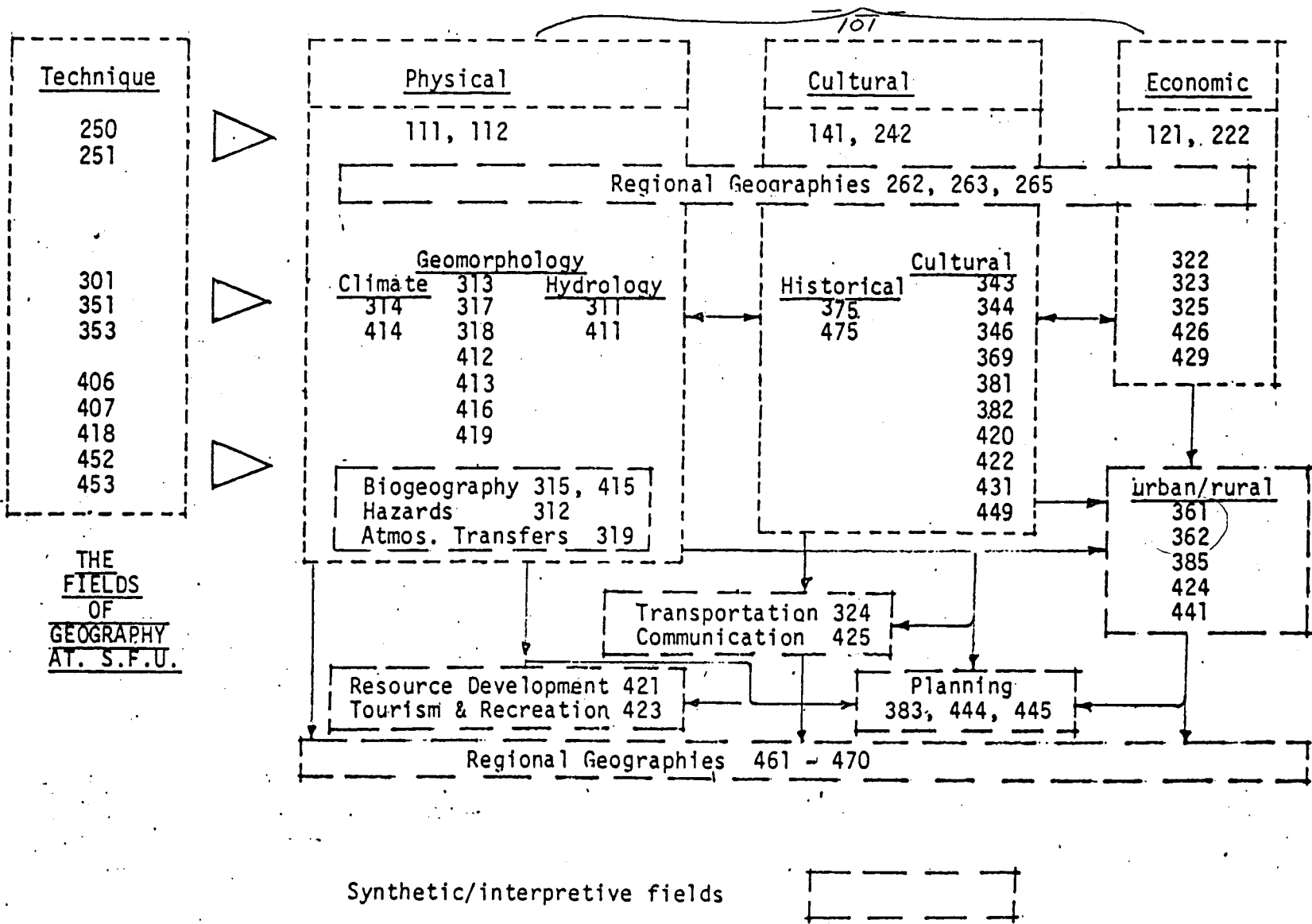
A major initiative was taken during the latter half of the decade with the establishment of the B.Sc. Program in Geography. By this time the physical side of the department had been strengthened considerably, and this new expansion of curriculum, complemented by an M.Sc. program and degree, established Geography in the Faculty of Science. B.Sc. Majors must fulfill all Science requirements and thus have more prescribed hours than do Majors in Arts; but in this the conviction remains that a broad education is important and in consequence a number of electives are provided for in human geography and arts subjects. The B.Sc. program now accounts for

about ten per cent of the number of Majors in Geography.

During the late 1970s, and moving into the early 1980s, growth was incremental, both consolidating the existing program and extending it along new lines of specialization. These changes affected principally the third and fourth years and were made possible by the steady maintenance and growth in numbers of undergraduate majors in the department. Thus were added courses in sedimentology, hydrology, hydrometeorology, quaternary geology and geomorphology, and mass transfer in the biosphere; urban geography, regional planning, agricultural geography, rural planning, industrial organization and location, aerial photography, theoretical and computer assisted cartography, remote sensing, historical geography and tourism. Most of the senior level regional courses were sacrificed for these gains. Some internal rearrangements of course positions in the program were effected.

A Point Concerning Course Credit

With only one or two minor exceptions, all courses in the first three years carried three semester credit hours, the equivalent of a one term or half year course at other institutions. But the fourth year courses all carried five credit hours, considered to be the equivalent of a full year. This carried the implication that there was less choice available to students in the fourth year, and it did not go unnoticed that a full semester's work seemed to be much more onerous if five three-credit courses were taken than if three five-credit courses were attempted. In an era of part time work, emphasis on grade point averages and comparisons with course experience in other departments, the conviction grew that to reduce the number of credit hours allocated to fourth year courses would provide for greater flexibility and choice in course selection, a point already demonstrated by curriculum revisions in other departments. But the Faculty of Arts calculates teaching loads on the basis of an assumed eight 'contact hours' per week in class, a point worked out in the early years of the university when all departments hewed to a three-plus-five credit hour load of teaching. To change all courses to three credit hours might well increase flexibility of choice to students, but it would certainly provide other problems of administration. And it was clear that not all students would be delighted to have to take a larger number of courses. Certainly there was no unanimity on this point among faculty members. Thus any revisions to the program based upon substantive issues in Geography would have to be reconciled to an administrative framework



THE
FIELDS
OF
GEOGRAPHY
AT S.F.U.

Table 1

Figure 4 The Curriculum of the Early 1980s (See Appendix E, Section I:2)
 Source: Report of the President's Advisory Commission on University Planning, SFU, 1984. (Geography section by E.J. Hickin.)

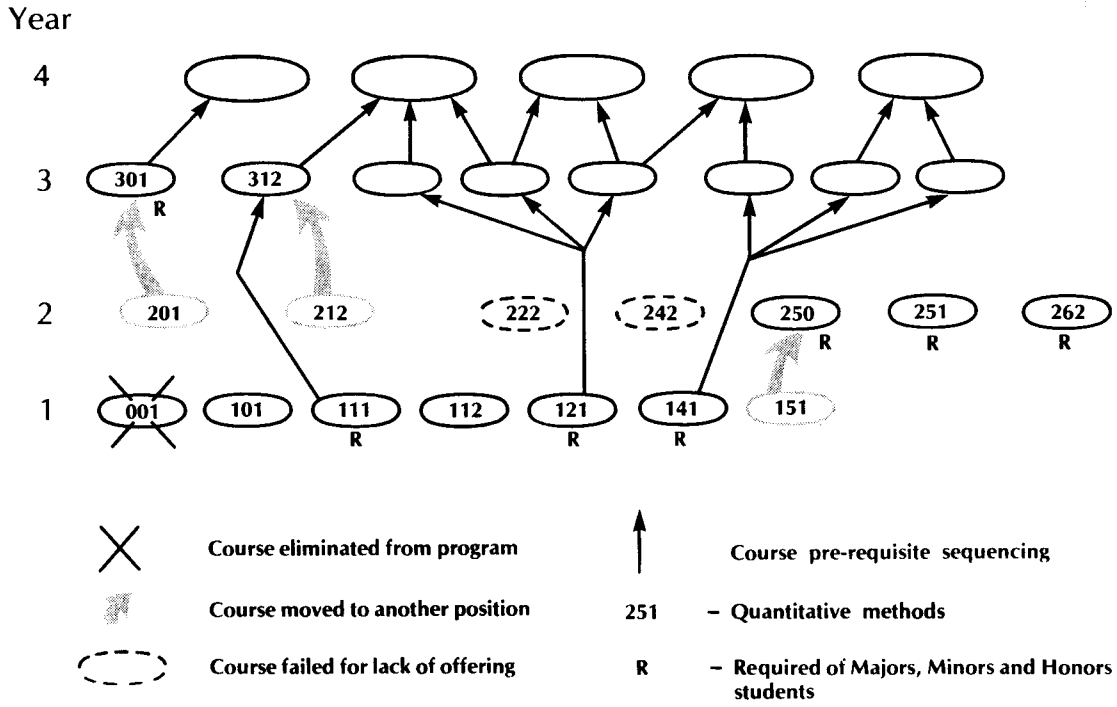


FIG. 5: PATTERN OF COURSE DEVELOPMENT, MID 1970's THROUGH EARLY 1980's, - SCHEMATIC

based on student course selection and on the allocation of teaching duties.

Thus the program came to the early 1980s with its clear approach to Geography having been made less clear by the accumulation of numerous changes of varying significance, not the least of which was simply the growth of the department. But the department itself only reflected the growth and development of the discipline and some review of how the discipline was represented in the curriculum seemed to be in order. At that very moment, however, the university was caught up in having to respond to the provincial government's restraint program on all public spending, imposed with sudden finality, and in an acrimonious atmosphere. First, a university-wide review was instituted in which each academic unit was required to indicate its unique contribution to scholarly work and to education. From this came the justifications to cancel several programs and to reorganize others. A concept of 'job marketability' of the degrees in the various disciplines became part of the context of discussion for university planning, and in this the large and popular professionally-oriented units such as Business Administration, Criminology and Computing Science gained influence as well as large numbers of students. Geography, under the chairmanship of Dr. Hickin, emerged from this review in good condition, but the curriculum problems outlined here had not gone away. In the department the impact of financial restraints, the first retirements and the uncertain prospects of obtaining replacement faculty, all came together to force a comprehensive reappraisal of the existing state of affairs. With the election of a new chairman, Dr. Hayter, the Undergraduate Studies Committee was instructed to look into the structure of the degree programs with a view to recommending changes.

Revising the Undergraduate Curriculum in Geography: 1985-87

As if the context as described were not problematical enough, the Faculty of Arts instituted its own reforms at this time. These involved administrative changes, the development of a Program in the Liberal Arts and the alteration of faculty-wide requirements for degree completions. Fortunately the Faculties of Science and Education were stable through this period, for departmental changes had to conform with their regulations concerning the B.Sc. and B.Ed. in Geography. But the Arts Faculty aspirations came to include the development of a pattern of courses from all departments which could lead to a student's acquiring a

Certificate in Liberal Arts. Thus any proposed changes in Geography had to be adapted to the changes taking place on the uncertain ground of a Faculty of Arts in transition. Some of our changes reflected this. Suffice it to say that the university as a whole, and the Faculty of Arts in particular, are jealous of the concept that students should be broadly educated as well as trained in a specific discipline. Thus the number of requirements for a Major, Minor or Honors degree has to be kept in check, and in the event the department's recommendations were modified to the extent that one course requirement had to be dropped.

Further, at the same time, the provincial Ministry of Education commissioned a full two year review of the Geography 12 curriculum, an action which was perhaps to be expected given the institution of province-wide examinations a year or two before. And in British Columbia there is the requirement that the universities and regional community colleges, most of which teach Geography programs transferable to the first two years in the universities, 'articulate' on course content and transfer equivalency. The universities have a leading role to play in this but it would be a foolish department which ignored the good will of colleagues throughout the province, who encourage their students to study Geography at one of the three public universities. The system has grown to be one with a high degree of province-wide integration among the academic programs in the colleges and the first two years of university, the implication being that any changes in the lower level courses requires discussion well beyond the boundaries of the department.

Changes in the Lower Levels, Years One and Two

Dissatisfaction with the second year was widespread. Two courses (201 and 212) had earlier been removed to the third year, and another (222) was forfeit because of infrequent offering. (Figure 5) Thus a gap appeared at a level in which, it was felt, key training and knowledge should be provided. By 1985 introductory cartography, statistical methods and the Canada regional course were all that held this level together, and these courses did not provide any clear link between the first and third years. Indeed, the Canada course, now substantially supported by enrolments of Education students, could not sustain a second year level of instruction because many of the students had no background in Geography, the simple requirement of having completed 15 credit hours being an insufficient pre-requisite. Further, the first year itself, while still representing the 'streams' and still maintaining the flow of students into the department,

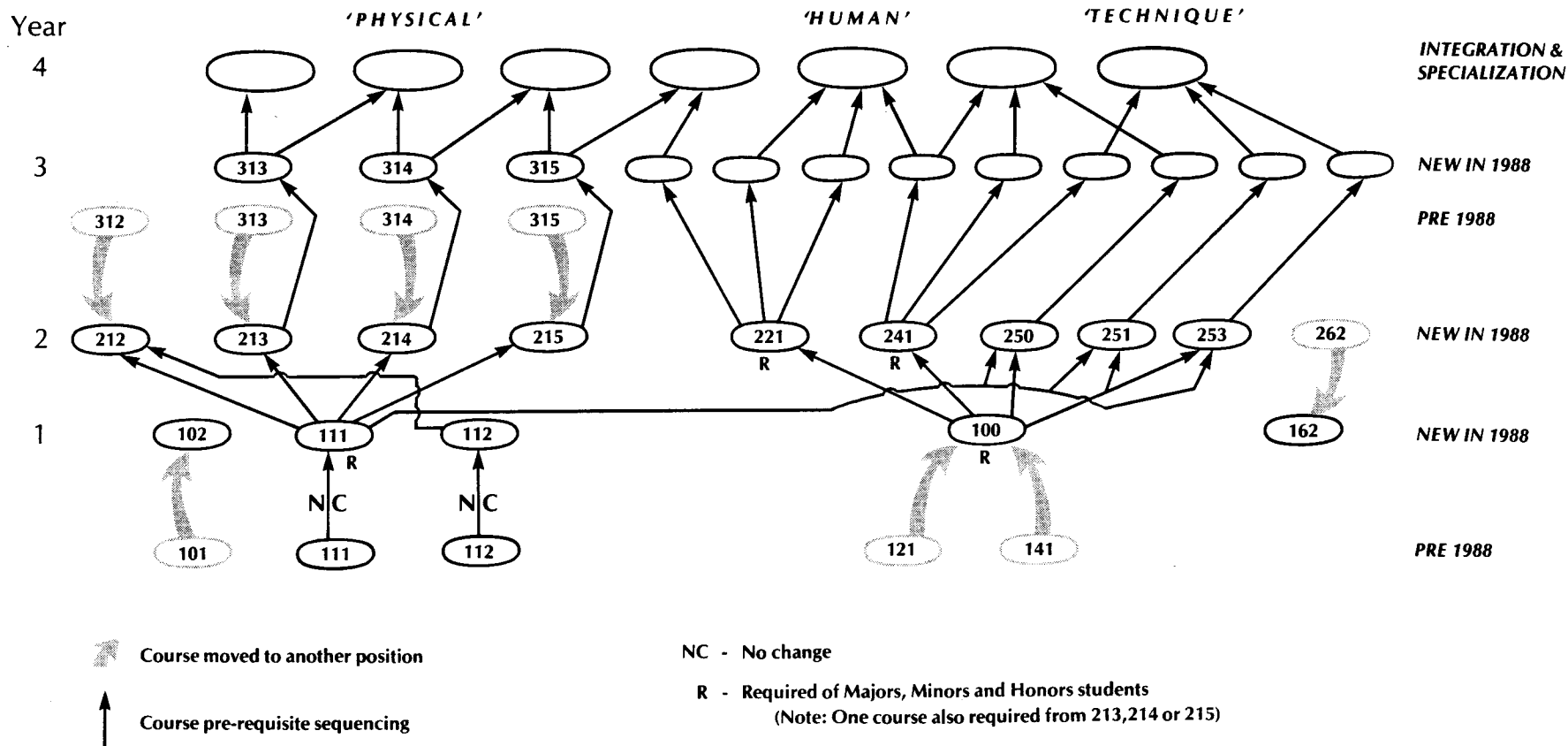


FIG. 6: PATTERN OF 1988 REVISION - SCHEMATIC

seemed stale and in need of reconceptualization. But new courses could not be added without the sacrifice of existing courses, or without agreement as to who might teach them. In the end the first year physical courses remained unchanged while social and economic geography were recast as an inclusive introductory Human Geography, required of Majors and Minors, and an issue-oriented optional course to deal with global problems from a geographical perspective. (Figure 6) The Canada regional course was removed from the second year to the first, continues in its role for teacher training, and serves as a general interest course. The General Geography course, the first to be offered in the university's first year, by Professor MacPherson, the founding Head, was offered for the last time in the summer of 1988, appropriately enough by MacPherson in, as it happened, his last semester before retirement and the last semester of the unrevised curriculum.

However, the broad approach is maintained in the second year with the removal from the third year of a course on the problems of 'natural hazards', that is, Geography 312 was returned to its original status as 212, the Faculty's Liberal Arts program providing the rationale beyond the department that was lacking before. Third year physical courses were reallocated to the second year, strengthening the systematic approach in the lower levels and releasing space in the third and fourth years for more advanced physical courses, something which fits the B.Sc. aspirations well. Arts majors are required to take one course in upper level physical geography. In this requirement there is no loss of instruction in physical geography for arts students because existing third year physical courses are now recast in the second year. B.Sc. students similarly have some restrictions about their selection of non-physical courses, partly because of the greater number of requirements through the Faculty of Science, but with the university's concern that students have some control over the selection of options, more physical courses cannot be required of them.

First year economic and social geography are now removed to the second year, made more rigorous and systematic, and thus revert to their original roles of linking the first and third years, showing the way to greater specialization. Cartography, statistical methods, and aerial photographic interpretation now form a group of technical courses, and the regional course on British Columbia and another regional course, whose subject area can vary, complete the second year.

A student Major in Geography must take a minimum of 18 credit hours of

prescribed courses at the lower levels, but may take more on an optional basis from Geography offerings. The department also encourages students to select cognate subjects to complete the first two years.

This may seem like a long way around to arrive at something which, in its structure, bears striking similarity to the original program of two decades ago. But there is now in substance an expanded and reorganized set of lower levels courses. Further, the consistency and development of the subject is shown and accounted for, and the department's conceptualization of three streams has been preserved, albeit in modified form. This has been achieved while simultaneously coping with the growth pangs of the university and department, while adapting to new substantive developments in the field, and to new initiatives in the university. In short, our position has been completely re-thought.

Changes in the Upper Levels, Years Three and Four

Two principal changes were introduced in the upper levels, changes which shape the whole program. The first was the drawing together into one general group all the courses in third year human geography, thus collapsing, at this level, the streams of economic and social/cultural into one. This was made necessary because it proved impossible within a limited number of requirements to prescribe what students should take in these streams. The effect is to provide greater flexibility of choice for students. Some regret this consolidation because it appears to violate the idea that theory is to be found mainly within the 'streams'. But the reality was that a fourth category of courses had grown over the years, simply called "Other", comprising a group of courses rather than forming a stream. In fact this came to be the most numerous category in the third year offerings. Not all subscribed to the idea that theory was **not** to be found in these "Other" courses, and thus some members of the department were content to have them treated as equals with those required in the streams. The single exception was in the retention as mandatory of the third year course on methodology and geographical ideas. The revised 'streams' are now simply the broad traditional categories of physical and human geography and these carry through the fourth year.

In addition, a new group of technique courses was introduced, providing a sequence in Cartography, Geographic Information Systems, Remote Sensing, Digital Cartography and Digital Image Processing, and in Field Techniques. And a course in Latin American Regional Development was

introduced, based on the interests of a new faculty member, thus recovering a small portion of lost ground in the regional offerings. Most other courses have been retained more or less intact, although changes were made to titles, prerequisites and position as to level of offering. Overall, an attempt was made to align courses in sequences of development so that a course at one level could be clearly related to courses at other levels. This is reflected in an Advising Handbook distributed to Majors and Minors in Geography. (Appendix J)

The other major structural change was the reassignment of course credit values. Had the department chosen to assign a value of three credit hours for all fourth year courses, flexibility of choice would certainly have been enhanced as discussed above. But the amount of time spent in Geography courses would have been reduced by twenty-five per cent in a sequence of one course taken in the third year and followed by one in the fourth. (Six hours rather than eight.) Further, although the assignment of teaching loads is commonly two courses per semester, a consistent pattern of this being equivalent to only six contact or credit hours rather than the Faculty of Arts norm of eight hours would undoubtedly have been penalized at some date, the fact of six hours being the norm in the Faculty of Science notwithstanding. In the end the compromise solution was to follow the precedent of several other departments in assigning four credit hours to all courses in the third and fourth years, with the exception of courses in field techniques and one 'readings' course. Thus the teaching assignment ($4+4=8$) is automatically met at the upper levels and the student expectation of differential work loads depending on the pattern of courses selected will be minimized. It might be noted that student representatives to the Undergraduate Studies Committee favoured this change in credit hour assignment. In the new system, integrative courses as well as more advanced specializations are still offered in the fourth year.

The Geography Program in the Faculty of Science was modified in accordance with the changes outlined above. The B.Sc. degree requirements are generally more prescriptive than they are for the B.A., emphasizing physical geography and a series of courses in mathematics and science subjects. The general intent of the degree was not altered in discussions concerning the recent revisions, and the principal changes accounted for the changing credit values of upper levels courses, the shift in level of certain courses in the physical stream, and the requiring or offering of some of the new courses being added to the program, such as in

Geographic Information Systems.

The effect of all the changes, it is hoped, is to clarify the department statement of requirements for those taking degrees in Geography. Even though the circumstances of the university, high school education and regional college offerings are now more complex than they were twenty years ago, and even though the department is as big as it has ever been, with all the special interests of research that this implies for courses, it appears that this consolidation has been achieved. One small bit of evidence, perhaps not wholly appropriate, is that the entry for the 1988-89 Calendar occupies only sixty column centimeters as compared with the 1987-88 entry of seventy-five column centimeters. This should at least render the Calendar easier to read and understand! The other quantitative comparison to make is that although the effect of the changes is to reduce the credit hour offerings from 293 to 282, in fact three new courses have been added.

Geography, as reflected in the curriculum, retains the traditions of an integrative approach familiar to many, and of a basic categorization into physical and human geography, useful in pedagogical practice. It retains but modifies the traditional departmental position that there are three essential streams of theoretically-oriented sub-fields, but gives equal position and weight to courses not included in the three streams as these were defined in the pre-existing program. It provides for students to follow certain interests to higher levels of development by sequencing courses, introduces new technical courses, patterns the courses in such a way that they meet university and Faculty requirements in Arts, Science and Education, and retains the size and scope of the program as a whole within the university.

APPENDIX A

CURRICULUM CHANGES 1965-88

CURRICULUM CHANGES 1965 - 88

Year	Crses by cr hr	Sub crses	Crses	Sub cr hrs	Cred hrs	Reg crs+hrs	Comments
1965-66	LL 6 x 3 = 18	6	6	18	18	2 - 6	First year of offerings - lower level only.
1966-67	LL 6 x 3 = 18 UL 26 x 5 = 130 1 1 x 2 = 2 1 1 x 3 = 3	6 28	34	18 135	153	2 - 6 8 - 40	Cartography given as modules in supervised lab as part of each lower level course
1967-68	LL 7 x 3 = 21 UL 15 x 3 = 45 a 16 x 5 = 80 a 1 x 2 = 2 a 1 x 4 = 4	7 33	40	21 131	152	2 - 6 8 - 40	Separate cartography course introduced, 200 level
1968-69	LL 7 x 3 = 21 UL 16 x 3 = 48 a 16 x 5 = 80 a 2 x 2 = 4 a 1 x 4 = 4	7 35	42	21 136	157	2 - 6 9 - 45	
1969-70	LL 7 x 3 = 21 UL 15 x 3 = 45 a 21 x 5 = 105 a 2 x 2 = 4 a 1 x 4 = 4	7 39	46	21 158	179	2 - 6 9 - 45	Pleistocene course moved from 300 to 400 level, and thus gained 2 credit hours
1970-71	LL 7 x 3 = 21 UL 15 x 3 = 45 a 21 x 5 = 105 a 2 x 2 = 4 a 1 x 4 = 4	7 39	46	21 158	179	2 - 6 9 - 45	

Crses by cr hr = Courses by credit hour
 Sub crses = sub total number of courses
 Crses = total number of courses

Sub cr hrs = sub total number of credit hours
 Cred hrs = total number of credit hours
 Reg crs + hrs = regional courses and hours

LL = lower levels
 UL = upper levels

CURRICULUM CHANGES 1965 - 88

Year	Crses by cr hr	Sub crses	Crses	Sub cr hrs	Cred hrs	Reg crs+hr	Comments
1971-72	LL 8 x 3 = 24 UL 15 x 3 = 45 a 22 x 5 = 110 a 2 x 2 = 4 a 1 x 4 = 4	8 40	48	24 163	187	2 - 6 9 - 45	Added: 001-Geog of Technocratic Society; 400 level -theoretical and computer cartography
1972-73	LL 8 x 3 = 24 UL 16 x 3 = 48 a 22 x 5 = 110 a 2 x 2 = 4 a 1 x 4 = 4	8 41	49	24 166	190	2 - 6 9 - 45	Added: 300 level - soils geography
1973-74	LL 14 x 3 = 42 UL 17 x 3 = 51 a 23 x 5 = 115 a 2 x 2 = 4 a 1 x 4 = 4	14 43	57	42 174	216	2 - 6 9 - 45	Added: 300 lev 'human microgeog'; 400 lev 'Landscape in Sci, Art, Music & Literature'. Changes: only 'Canada' specified in LL reg; other left as 'selected', & moved from 100 to 200 level;
1974-75	LL 14 x 3 = 42 a 18 x 3 = 54 a 23 x 5 = 115 a 2 x 2 = 4 a 1 x 4 = 4	14 44	58	42 177	219	2 - 6 9 - 45	Added: 'Sedimentology and Past Environments'
1975-76	LL 14 x 3 = 42 UL 20 x 3 = 60 a 25 x 5 = 125 a 2 x 2 = 4 a 1 x 4 = 4 a 1 x 15 = 15	14 49	63	42 208	250	2 - 6 6 - 30	Added: 2 'urban' courses; 'field studies'; 'individual program'. 3 regional courses dropped, and one given as 'selected' region. Space in program for new courses thus released.
1976-77	LL 14 x 3 = 42 UL 20 x 3 = 60 a 25 x 5 = 125 a 2 x 2 = 4 a 1 x 4 = 4 a 1 x 15 = 15	14 49	63	42 208	250	2 - 6 6 - 30	

CURRICULUM CHANGES 1965 - 88

Year	Crses by cr hr	Sub crses	Crses	Sub cr hrs	Cred hrs	Reg crs+hr	Comments
1977-78	LL 14 x 3 = 42 UL 20 x 3 = 60 a 28 x 5 = 140 a 2 x 2 = 4 a 1 x 4 = 4 a 1 x 15 = 15	14 52	66	42 223	265	2 - 6 7 - 35	Added: 400 lev 'Terrain evaluation; 'regional planning'; regional on 'Western Canada'
1978-79	LL 14 x 3 = 42 UL 20 x 3 = 60 a 28 x 5 = 140 a 2 x 2 = 4 a 1 x 4 = 4 a 1 x 15 = 15	14 52	66	42 223	265	2 - 6 7 - 35	Cut: 'Prehistoric societies'; Added: 'Contemporary industrial societies'
1979-80	LL 14 x 3 = 42 UL 21 x 3 = 63 a 29 x 5 = 145 a 2 x 2 = 4 a 1 x 4 = 4 a 1 x 15 = 15	14 54	68	42 231	273	2 - 6 7 - 35	Added: 300 level 'Agricultural geography'
1980-81	LL 14 x 3 = 42 UL 22 x 3 = 66 a 28 x 5 = 140 a 2 x 2 = 4 a 1 x 4 = 4 a 1 x 15 = 15	14 54	68	42 229	271	2 - 6 7 - 35	Regional planning I switched to 300 level for loss of 2 credit hours; regional planning II remains at 400 level
1981-82	LL 14 x 3 = 42 UL 23 x 3 = 69 a 28 x 5 = 140 a 2 x 2 = 4 a 1 x 4 = 4 a 1 x 15 = 15	14 55	69	42 232	274	2 - 6 7 - 35	Added: 300 level 'mass transfer in biosphere', connecting with program in biology
1982-83	LL 12 x 3 = 36 UL 25 x 3 = 75 a 28 x 5 = 140 a 2 x 2 = 4 a 1 x 4 = 4 a 1 x 15 = 15	12 57	69	36 238	274	2 - 6 7 - 35	Dropped: 001 Technocratic Societies. Added: Aerial photography. Changed: Natural Hazards raised from 200 to 300 level

CURRICULUM CHANGES 1965 - 88

Year	Crses by cr hr	Sub crses	Crses	Sub cr hrs	Cred hrs	Reg crs+hrs	Comments
1983-84	LL 12 x 3 = 36 a 27 x 3 = 81 a 31 x 5 = 155 a 1 x 2 = 2 a 1 x 4 = 4 a 1 x 15 = 15	12 61	73	36 257	293	3 - 9 7 - 35	Added: 200 lev Geog of BC; 300 lev 'Hydrology'; 400 lev Geog of Tourism; 400 lev 'models in hydrometeorology'. Changed: 200 and 400 lev courses in methods combined to 1 300 lev compulsory
1984-85	LL 12 x 3 = 36 UL 27 x 3 = 81 a 31 x 5 = 155 a 1 x 2 = 2 a 1 x 4 = 4 a 1 x 15 = 15	12 61	73	36 257	293	3 - 9 5 - 25	Dropped: 400 lev 'Western Europe' and 'Latin America' regionals. Added: 'quaternary geology' and 'remote sensing'. No net change in hours of program.
1985-86	LL 12 x 3 = 36 UL 27 x 3 = 81 a 31 x 5 = 155 a 1 x 2 = 2 a 1 x 4 = 4 a 1 x 15 = 15	12 61	73	36 257	293	3 - 9 5 - 25	
1986-87	LL 12 x 3 = 36 UL 27 x 3 = 81 a 31 x 5 = 155 a 1 x 2 = 2 a 1 x 4 = 4 a 1 x 15 = 15	12 61	73	36 257	293	3 - 9 5 - 25	
1987-88	LL 11 x 3 = 33 UL 27 x 3 = 81 a 30 x 5 = 150 a 1 x 2 = 2 a 1 x 4 = 4 a 1 x 15 = 15	11 60	71	33 252	285	3 - 9 5 - 25	Dropped: 200 lev 'Issues in economic geography' and 400 lev 'communications'.
1988-89	LL 16 x 3 = 48 a 57 x 4 = 228 a 3 x 2 = 6	16 60	76	48 234	282	3 - 9 6 - 30	Major revision of program. Latin America course restored at 400 level.

APPENDIX B

**PROGRAMS, DIPLOMAS AND CERTIFICATES
WITH PARTICIPATION FROM GEOGRAPHY**

**PROGRAMS, DIPLOMAS AND CERTIFICATES WITH PARTICIPATION
FROM GEOGRAPHY**

African and Middle Eastern Studies

Applied Physiology

British Columbia Studies

Canadian Studies

Community Development

Environmental Education

Environmental Toxicology

Ethnic Relations

Fine and Performing Arts

Gerontology

Latin American Studies

Natural Resources Management

Public History

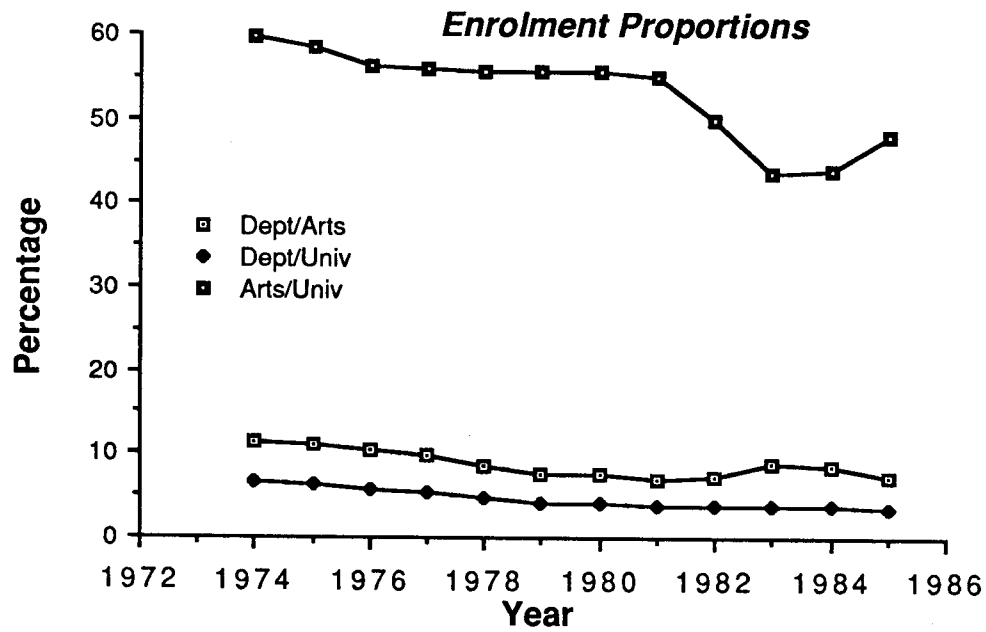
Quaternary Studies

APPENDIX C

**ENROLMENT PROPORTIONS: DEPARTMENT/
ARTS, DEPARTMENT/UNIVERSITY, ARTS/
UNIVERSITY**

Enrolment Proportions

Year	Dept/Arts	Dept/Univ	Arts/Univ
1974	11.3	6.7	59.7
1975	10.9	6.4	58.5
1976	10.4	5.8	56.2
1977	9.8	5.5	55.8
1978	8.4	4.7	55.5
1979	7.6	4.2	55.5
1980	7.5	4.2	55.5
1981	7.0	3.8	55.0
1982	7.4	3.7	50.0
1983	8.7	3.8	43.6
1984	8.5	3.8	44.0
1985	7.2	3.5	47.9



APPENDIX D

FACULTY COMPLEMENT, 1965-87

FACULTY COMPLEMENT 1965 - 87

Year	Number	Degrees	Ph.D.s	Universities
1965-66	5	9	0	6
1966-67	10	20	2	15
1967-68	13 (1 vis)	27	4	20
1975-76	18 (1 dn)	45	15	33
1968-69	16	27	8	27
1969-70	17	40	10	31
1970-71	17	40	11	32
1971-72	18	43	12	32
1972-73	18 (1 vis)	44	13	32
1973-74	17 (1 dn)	42	13	30
1974-75	17 (1 dn)	43	14	30
1976-77	19 (1 vis)	48	16	34
1977-78	21 (1 dn)	55	17	42
1978-79	21 (1 dn)	55	17	42
1979-80	21 (1 dn)	55	17	42
1980-81	22 (1 dn + 1 jnt appt)	58	18	44
1981-82	23 (1 dn + 1 jnt appt)	60	18	45
1982-83	25 (1 dn, 3 jnt apt, 1 emer, 1 assoc)	65	19	49
1983-84	25 (1 dn, 3 jnt apt, 1 emer, 1 assoc, 1 progdir)	65	21	49
1984-85	26 (1 dn, 3 jnt apt, 2 emer, 1 progdir, 1 dntndir)	69	22	52
1985-86	26 (1 dn, 3 jnt apt, 2 emer, 1 progdir, 1 dntndir)	69	22	52
1986-87	24 (1 dn, 1 jnt apt, 2 emer, 1 progdir, 1 dntndir)	63	20	48

Degrees - total number of degrees held by faculty members
 Ph.D.s - number held by faculty members
 Universities - number of universities represented in faculty education

dn = dean
 jnt appt = joint appointment
 emer = professor emeritus
 assoc = associate member of department
 progdir = program director outside department
 dntndir = director of downtown campus and programs
 vis = visiting professor

APPENDIX E

**BACKGROUND FOR DEPARTMENT DISCUSSION
OF CURRICULUM REVIEW, OCTOBER 30TH, 1986**

BACKGROUND FOR DEPARTMENT DISCUSSION OF CURRICULUM REVIEW October 30, 1986

I INTRODUCTION

1. The Task

1.0 In 85-3 the UGSC was charged with evaluating our curriculum with a view to proposing changes as might be appropriate. Six points were identified by the chairman as requiring specific attention. These were:

- a) lower level requirements - number of courses, options, course groupings
- b) Geography 301 as a requirement
- c) upper level division requirements
- d) upper level division structure
- e) calendar titles and descriptions
- f) addition/deletion of courses

(Appendix 1)

It was clear to the committee that to approach all of these points would require a comprehensive review of the whole curriculum. Thus much of the committee's time has been spent in a searching discussion of the program. Some of the development of this discussion is contained in the appendices.

1.1 Department members were invited to submit contributions either in writing or by attending committee meetings. About 16 or 17 such contributions were made. (Appendix 2) There has also been much informal discussion of curricular matters outside the committee, with some of the results of this being transmitted back for consideration.

2 Point of Departure: the present program

The accompanying diagram from the PACUP report of March, 1984, and authored by Ted Hickin, summarizes our present program. The salient features are: the dominance of the three 'streams' - physical, social/cultural and economic, with "technique", regional and synthetic/interpretive courses being shown in separate boxes. Requirements ensure breadth as well as allowing for specialization. All this is clearly presented in the PACUP report and is familiar in the department.

Photocopies of the present program in geography, and the new Faculty of Arts regulations, both taken from the new 1987/88 Calendar, are included here for reference.

3 General Approach

Our general approach has been to analyze the existing program for its good and bad points, and to try to implement any suggestions that have been made. The attempt has been to put these into a coherent order. There will be a further stage of requesting any changes in titles and new course

descriptions.

SUBJECT, PROGRAM, UNIVERSITY, STUDENT

Background

2.0 The curriculum touches on all aspects of the subject and most aspects of the department. Thus the issues cannot be discussed in isolation. Unlike the drafting of the first program in 1965-66, we cannot now start with a clean slate. The program has evolved with faculty turnover and shifts in faculty interests. (PACUP, p. 19) Not only do we have a program in place, and one which is demonstrably successful, but there are now contextual circumstances which will constrain any course of action we might choose. Some of these are discussed below.

2.1 The Subject

(a) Our obligation to the subject is of cardinal importance. There have been changes in emphasis and methods during the last two decades. How have we recognized and handled these in the curriculum?

(b) How do we regard geography's position in relation to the wider university curriculum?

(c) It is arguable that there has been a change in the public perception of what geography is and so of what its responsibilities are in society. How do we respond to this apprehension?

2.2 The Program

(a) Reflecting the shifts in emphasis and expansions of subject matter that have occurred over the years, there is some sentiment that any curriculum revision should aim to consolidate and even to simplify our program. Some of the former has been achieved, and in so doing the program has been made more intelligible. Some courses have been suggested for deletion while others, as proposed by faculty, have been added. During the time of the committee's work the question of a co-op program, along the lines of what is in place in Victoria and Waterloo, has come up through the Faculty of Arts. Geography has expressed an interest in this but the stage of development of this Faculty proposal is such that there is no immediate impact on the present departmental curriculum revision.

(b) We are not alone in our discussion. In the last half decade the professional geographical literature in North America has perhaps carried more discussion of curricular matters than at any time in the past generation. There is widespread concern that geography be well-developed at all levels of instruction. This is expressed in the general public's increasing awareness of the need for geographic instruction, as seen in the press and in the increasing activity of education authorities. Lastly, we have three social developments of such force that geography must respond both in theoretical formulation and in practice, in both physical and human research traditions. These are environmental degradation - for which understanding of causes, processes and effects must be sought; dynamics

of human settlement - the socio-economic order, livelihood and values; and the emergence and refinement of the "technological imperative" - which enters in varying degree into all life. One may add to or modify the vocabulary of this, but the point is that geography is uniquely situated in the array of disciplines to address these issues and to make a distinctive contribution.

2.3 University Context

(a) The most immediate development within the university, to which our program must respond, is the modification of 'breadth requirements' in the Faculty of Arts. The traditional Group requirements have been replaced with a requirement that all Arts students must sample from across a range of at least five departments. This creates a little more flexibility for students, especially as to courses contributing to a general education in addition to their majors and minors. But it also means that we shall feel some impact in our own first and second year courses. It is possible, for example, that some enrolment might shift out of first year physical, which counted as a laboratory science under the old regulations, and into our lower levels non-physical courses. This speculation has been kept in mind in the present proposals. We might also note that Geography has placed 12 courses on the "permanent" list of courses approved by the Faculty for all students to sample, and this might have an impact on the patterns of enrolment.

(b) The university intends to establish an earth sciences department at some point in the future. How this might affect our curriculum cannot now be known.

2.4 The Student

Quite apart from subject and university issues, students must be able to see Geography both as an area of special interest (the Major or Honours degrees) and as a broad education. Thus the role of Geography in knowledge is highlighted in the individual degree program of each student. For all students, including those who choose Geography as a Minor, or merely choose one or two courses, the relationship of Geography to all other subjects chosen for study will constitute the degree of knowledge integration that can be achieved with Geography. Each student thus represents what this university has to offer. What is the place of Geography in this?

CURRICULUM

3.0 The Problem

(a) In light of all the foregoing it would appear that the approach to the original charge (1.0 above) must start further back, even from 'first principles'. Thus a few major points underlying the review discussion are:

1. Geography as a discipline - in the service of knowledge, the university and society.
2. Geography as a field of study for a university degree - in the service of

the individual student -

- (i) as a background to post-graduate study
- (ii) as a specialist (Honours) degree
- (iii) as an emphasis in study (Major degree)
- (iv) as a contribution to the general education of students majoring in other disciplines.

(b) In practice the curricular concerns implied here must all be met simultaneously in the program. Further, because we offer three degrees in Geography (B.A., B.Sc. and B.Ed.) the claims on our students by subject matter and Faculty regulation can be quite diversified. Thus it is necessary that our degree programs have a common base and points of contact while providing for appropriate specialization. The general problem then becomes:

1. structuring the program in order to provide for the various degrees
2. to provide coherence and yet to preserve flexibility
3. to contribute to the broad educational aims of the university
4. to develop in students some of the characteristics accepted as goals in earlier committee discussion. (Minutes, UGSC, November 15, 1985)

(c) In practical terms these issues must be approached in light of the interests and capabilities of the tenured and tenure-track faculty.

1. What courses would faculty like to offer in addition to or in place of existing courses?
2. Can these be placed into a comprehensive framework which does justice to the discipline?
3. Can courses be offered at an appropriate rate of frequency?

3.1 Point of Departure: the existing program

The accompanying diagram, authored by Ted Hickin, from the report of the President's Advisory Committee on University Affairs (PACUP) of March, 1984, summarizes our present program. The salient features are: the dominance of the three 'streams' - physical, social/cultural and economic, with "technique", regional and synthetic/interpretive courses being shown in separate boxes. Requirements ensure breadth as well as allowing for specialization. All this is clearly presented in the PACUP report and is familiar in the department.

The clearest expression of streams is to be seen in the Division A (third year) courses, and in the requirement that first year courses in physical, economic and social/cultural be taken by Majors and Minors. When Geography 301 was introduced the streams were stripped of their descriptive labels and numbered as "sections" instead. Thus 301 stands alone as Section I. Physical, economic and social/cultural became Sections II, III and IV respectively, while the "Other" category became Section V. Given that 301 became a required course, this re-labelling serves a useful purpose in spelling out how course selections must be patterned. But it papers over a nagging problem that courses in Section V have no necessary relation to each other within the curriculum although they do in substance and methods of study. As a practical matter the department has simply lived with this failure of categorization.

3.2 Modifications: Stage I

Discussion as to how to modify the structure of the program passed through a first stage to the second stage which constitutes the proposal to the department. In the first stage the suggestion was made that we reorganize the streams into Natural Sciences, Social Sciences and Humanities. This met with some approval at the time, and we might note that it is a common disciplinary arrangement and fits, up to a point, the academic organization within the university. The problems associated with this scheme, when we attempted to work with it, were that advising students on the patterns of their courses appeared to become more complicated, and the Humanities section was short of potential courses. Further, 141 (Social Geography) fits uneasily under Humanities. Its title and historical intent would suggest that it belongs under Social Sciences. In recent years, with the use of the Jordan and Rowntree text, the course has become implicitly more cultural than social, and even within the social sciences its focus has thus been ambiguous. Thus this scheme was rejected in favour of a 're-think', eventually resulting in the proposals presented here.

3.3 Modifications: Stage II

The essential structural changes as presented are:

1. The 'streaming' of courses into Sections labelled A-Physical Geography, B-Human Geography, C-Technique and Special, D-Regional/Synthetic.
2. The 200 level comes to life again under this new arrangement, after a number of years with only regional and technique courses occupying this position. The effect of this is to improve the streaming through pre-requisites, without undue restriction on the freedom to choose courses.
3. Geog 111 and 112 remain the same, but complementary 200 level courses are introduced. Geog 121 and 141 are made more advanced and removed to the 200 level, while 101 remains and is complemented by a new 100 level Human geography course, tentatively called Problems of World Regions. It is anticipated that these first year courses will be chosen by non-geography students to fulfill their breadth requirements as per the new Faculty of Arts regulations.
4. Geog 262 (Canada) is always well subscribed but is necessarily taught at a very elementary level. This is especially important as it is taken by large numbers of intending teachers who complain that they don't have enough background in Geography to make effective use of this course. It seems appropriate to make this a first year course.
5. Geog 212 is returned to its original level at the second year. It is anticipated that this will be taken as a general interest course. Given geography's central position in environmental issues, this course should be promoted for the many students interested in such matters but who do not major in Geography.

6. At the upper levels, physical courses succeed each other in a clear and structured way. Human geography courses are placed into one comprehensive group for purposes of course selection by students. It is possible in this arrangement to eliminate the "Other" category of founding courses (Section V), and thus to recognize their identity within the subject. Sequencing of the streams of courses, as they have been identified up to now, will be seen through pre-requisites and a handbook for students.

7. A series of new courses are introduced around the cartographic and technical foci of the subject. These would appear to be in 'demand' for technical jobs and could be important in any development of a co-op program.

8. Regional courses are deferred to the 400 level and, because there is some awareness of a heightened interest in these courses, two new ones are introduced, namely European and Asian Regions. Further, as it seems silly not to offer any instruction at all on the United States, some move in that direction seems warranted. But there was also some feeling that we should not introduce too many new courses, and so the suggestion is to mount a North America course to expand and replace the present Canada course at this level. This decision was made in light of the existence of the 100 level course on Canada.

9. It is suggested that Geog 301 be shifted to the 400 level and, rather than being required of all Majors and Honours students, it now be required of Honours students and optional for Majors.

10. The numbering scheme has been modified to incorporate the new changes and to 'tidy up' numbers in order to reflect the logic of the course sequences. For example, in the present calendar, Geog 385 (Introduction to Agricultural Geography) is succeeded by Geog 445 (Rural Planning), both taught by John Pierce. The numbers are now suggested to be 385 and 485.

11. Virtually all courses at the 300 and 400 levels are shown as carrying 4 credit hours. In a sequence of two courses between these levels, this means that the total amount of time and credit is the same but one hour is shifted from the 400 to the 300 level. To use John Pierce's courses as an example again, Geog 385 gains one hour while 485 loses one hour.

12. The required credits for the B.A. in Geography are increased at the lower level from 15 hours to 18 hours out of the university's prescribed 60 hours. This is the same for Majors, Minors and Honours students. At the upper levels the requirements are increased for B.A. majors from 30 to 34 hours, and for B.Sc. majors from 30 to 34 hours, out of the total of 60. Honours students take Geog 401, 491 (Honours Essay) and one other course (4 credit hours) at the 300 or 400 level, making a total of the required 132 hours.

3.4 Comment

Two courses (222 and 425) were recently dropped, according to university regulation, because they were offered too infrequently. 407 and 475 were threatened. The shortage of faculty has made it difficult to offer these

51

courses as frequently as they should be offered, and so the proposed changes are put forward with the idea in mind that we need to have a program which can be covered by existing faculty. Changes due to retirements and replacements will have to be considered at the appropriate moments.

There are 73 courses in the present calendar. The proposed structure has 77 courses, but these are more coherently grouped and carry a more uniform system of credits. Thus, for example, the 15 credit hour Readings course has been eliminated. Similarly, the Individual Program, which was never used, has been dropped. In fact the proposed program results in a 7 credit hour net loss. The effect overall is to broaden and deepen the curriculum, to tailor the pattern of courses to the faculty's ability to mount the program as a whole, to cut away wasteful parts of the program, but to stay at about the same position in terms of course commitment.

We work on a figure of about 18.75 teaching faculty, and this gives an overall ratio of 4 courses each. This compares with UBC's 101 courses for 23 apparently active faculty, although in both departments there are some with administrative responsibilities which might affect such a calculation. During 1985-86 we mounted 84 courses and regularly must employ sessional lecturers to cover our commitments, even for basic courses. We seem to have reached the limit of our ability to offer a full program without increasing the number of faculty.

3.5 General Approach

Our general approach has been to analyze the existing program for its good and bad points, and to try to implement any suggestions that have been made. The attempt has been to put these into a coherent order. There will be a further stage of requesting any changes in titles and new course descriptions.

APPENDIX F

**EXTRACT FROM MINUTES OF THE UNDERGRADUATE
STUDIES COMMITTEE MEETING, NOVEMBER 15, 1985:
The Geography Graduate**

**EXTRACT FROM MINUTES OF THE UNDERGRADUATE STUDIES
COMMITTEE, November 15th, 1985**

E.M. Gibson provided a general statement of qualities which should be characteristic of the geography graduate. These are:

-flexibility (of mind and, presumably, of ability to adapt in situations of divergent tendency)

-ability to integrate (that is, to make coherent, issues of apparent diversity)

-awareness of the intellectual traditions from which study towards the degree derives

-trained capability in field work (this would result from instruction at all levels of concern, specialized by topic, but integrated by studying topics in locational/place contexts)

-ability to communicate orally (in group situations, to develop those distinctive capabilities which are a concern of the educational philosophy underlying the tutorial system)

-some course orientation towards the 'job market'. (This may or may not be the same as 'applied geography'.)

APPENDIX G

**EXTRACT FROM MINUTES OF THE DEPARTMENT
MEETING, SEPTEMBER 17, 1987: MOTIONS TO
ADOPT THE REVISIONS**

EXTRACT FROM MINUTES OF THE DEPARTMENT MEETING, SEPTEMBER 17, 1987, CALLED TO VOTE ON THE RECOMMENDATIONS OF THE UNDERGRADUATE STUDIES COMMITTEE REGARDING CHANGES TO THE CURRICULUM

Moved and seconded

"that the courses be grouped into four sections: A - Physical, B - Human, C - Geographic Techniques and Special Requirements, and D - Regions."

Carried 15/3/2

"that Geography 101 become a general introduction to human geography and be required of all Majors."

Carried 17/1/2

(In the event the course was numbered Geography 100.)

"that Geography 102, focussing on contemporary world problems from a geographical perspective, be introduced. It would be optional for Majors and designed to serve as a general course for the university."

Carried 18/1/1

"that Geography 262 be reassigned to the first year as Geography 162."

Carried 18/0/1

"that Geography 111 and 112 remain as they are, with 111 being required of all Majors and 112 being optional."

Carried 16/1/2

"that Geography 213, 214 and 215 be introduced with Geography 111 as a pre-requisite for each."

Carried 17/0/2

"that Geography 121 and 141 be reassigned as 221 and 241, both requiring 101 (i.e. 100) as a pre-requisite."

Carried 17/0/1

"that Geography 312 be reassigned to the second year as 212, and that it be placed in the Human section."

Carried 17/1/1

"that Geography 353 be reassigned to the second year as 253."

Carried 15/1/2

"that BA Majors be required to take either 250 or 251." Defeated 6/10/3

"that Geography 250 be required and 251 optional for BA Majors." (motion from the floor to replace previous one)

Defeated 4/8/4

"that Geography 250 and 251 be required for BA Majors." (motion from the floor) Carried 7/3/6

[Post meeting note: this motion increased the minimum requirements to 21 hours, deemed excessive by the Faculty of Arts. By agreement the department accepted the original recommendation of the Undergraduate Studies Committee, that 250 or 251 be required. Students may, of course, elect to take both.]

"that B.Sc. Majors have a choice of either 250 or 253 as a required course." Carried 11/1/3

(Geography 250 to be dropped as a pre-requisite to 253, in view of the latter's reassignment from 353. First year physical and human courses become the new pre-requisites.)

"that all 300 and 400 level courses, with the exception of the two field technique courses, carry 4 credit hours." Carried 14/4/1

"that Geography 453 be reassigned as 353." Carried 17/0/2

"that 3 new courses be introduced in the cartographic and information systems section, Geography 354 (Analytical Cartography), 355 (Geographic Information Systems), and 356 (Cognitive Cartography)." Carried 16/0/3

"that 2 new courses (2 credit hours each) in methods be introduced, Geography 358 (Physical) and 359 (Human)." Carried 15/2/2

"that Geography 346 be reassigned to the 400 level." Carried 15/0/1

"that Geography 301 be assigned to the 400 level, to be optional for Majors and required for Honors." Defeated (by tie)
8/8/2

(301 to remain required for Majors and Honors)

"that Geography 319 be reassigned to the 400 level." Carried 17/0/1

"that Geography 462 (Canada) be renamed Canada and the United States." Carried 18/0/0

"that Geography 450 (Cartographic Workshop) be introduced." Carried 16/0/2

"that Geography 453 (Digital Image Processing) be introduced."

Carried 17/0/1

"that a 400 level regional course, Latin America, be introduced."

Carried 16/0/0

"that Geography 424 and Geography 431 not be deleted from the program."

Carried 16/0/0

"that Geography 499 be dropped from the program."

Carried 14/1/1

"that B.Sc. students be required, at the 300 level, to take 3 courses from section A (physical), 1 course from B (human), and 1 from C (techniques)."

Carried 10/0/4

"that B.Sc. students be required, at the 400 level, to take 2 courses from A, plus 8 credit hours."

Carried 11/0/3

ADJOURNMENT

APPENDIX H

**SELECTED DOCUMENTS PRESENTED TO THE
UNIVERSITY SENATE: GENERAL STATEMENT
AND CREDIT HOUR ANALYSIS**

DEPARTMENT OF GEOGRAPHY CURRICULUM REVIEW

GENERAL STATEMENT

A. This revision was prompted by a number of circumstances. First, the present program has been in effect, with some modifications, since 1966. It has been an excellent program. But during the past two decades the discipline has evolved in a variety of ways which have been reflected in the curriculum by a series of incremental changes. The accumulation of these has resulted in some imbalances and lack of clarity. Thus the feeling has grown that the structure of the program itself should be re-examined.

Second, during the last six years the department has suffered the loss through retirement of four senior faculty members. One more such loss will be felt next year, and one faculty member resigned from the university. There have been four replacements. This turnover, along with the evolving interests of the continuing faculty, represent the particulars of the generally changing complexion of the discipline as they apply in this department. The re-shaping of courses, the proposals for new courses and the elimination of others, along with the prospect of changes in coming years, combine to suggest the need to provide a curriculum structure capable of accommodating the development of the program for the foreseeable future. To this end the proposals modify the sub-disciplinary groupings of courses in addition to proposing courses for addition and deletion.

Third, it is anticipated that the collective action in the Faculty of Arts to change its breadth requirements will have an impact on the lower level courses. Proposals for the first and second years respond in part to this new context.

Fourth, the department also belongs to the Faculty of Science, offering the B.Sc., and any changes must therefore reflect the contexts of two Faculties and their requirements while at the same time the geography program must be maintained and developed coherently.

B. The most important general changes are:

1. The fleshing out of the second year offerings. The incorporation of second year courses much more systematically into the 'streams' of courses provides for the more effective operation of the pre-requisite structure.
2. The proposal for changes in the first year human geography requirements is that the courses be of a more general character, leaving the beginnings of sub-disciplines to the second year.
3. At the upper levels, the human geography courses have been placed into a comprehensive grouping, rather than the more specialized groups that are used at present. This allows for more freedom of course selection.
4. A 'technical' stream has been introduced, and new courses are proposed in this. The department is uniquely situated to develop this stream, having unusually good technical facilities for it and faculty who specialize in this rapidly developing branch of the discipline. In particular, this stream emphasizes computer-assisted cartography, aerial photography and digital image processing.
5. It is proposed that all upper levels courses, with three minor exceptions, carry four credit hours. The present system of three and five credits has been criticized by faculty and students alike. The use of four credits across the board is generally agreed to allow for the same amount of instruction time in a sequence of 300 and 400 level courses while eliminating differential expectations regarding work loads.
6. The size and scope of the overall program, as proposed, remains almost identical with the present program.

CREDIT HOUR ANALYSIS: present calendar

Year 1	5 courses @ 3 credit hours	= 15 hrs
Year 11	7 courses @ 3 credit hours	= 21 hrs
Sub Total	12 courses	= 36 hrs
Year 111	26 courses @ 3 credit hours	= 78 hrs
Year 1V	1 course @ 2 credit hours = 2 hrs	
	1 course @ 3 credit hours = 3 hrs	
	1 course @ 4 credit hours = 4 hrs	
	31 courses @ 5 credit hours = 155 hrs	
	1 course @ 15 credit hours = 15 hrs	
Sub Total	61 courses	=179 hrs =257 hrs
ALL LEVELS	73 COURSES	293 HRS

Note: These calculations include Geography 222-3 and 425-5 which were dropped in late 1986.

CREDIT HOUR ANALYSIS: proposed

Year I	5 courses @ 3 credit hours	= 15 hrs
Year II	11 courses @ 3 credit hours	= 33 hrs
Sub total	16 courses	= 48 hours
Year III	24 courses @ 4 credit hours	= 96 hrs
	2 courses @ 2 credit hours	= 4 hrs
Year IV	33 courses @ 4 credit hours	= 132 hrs
	1 course @ 2 credit hours	= 2 hrs
Sub Total	60 courses	= 234 hours
Total courses, all levels: 16+60 = 76		= 76 courses
Total credit hours, all levels: 48+234 = 282		= 282 hours

The effect of the proposed changes, in terms of the size and scope of the program in Geography, is to lose 11 credit hours but to gain 3 courses.

APPENDIX I

**PROBLEMS IN THE UNDERGRADUATE
CURRICULUM IN GEOGRAPHY: Abstract of paper
presented at the Annual Meeting of the Western
Division of the Canadian Association of
Geographers, University of Alberta, 1986**

PROBLEMS IN THE UNDERGRADUATE CURRICULUM IN GEOGRAPHY

L.J. Evenden, Simon Fraser University

Abstract of paper presented at the Annual Meeting of the Western Division of the Canadian Association of Geographers, University of Alberta, 1986

The geography curriculum has recently become a matter of concern and attention at all levels of education. This paper raises selected issues focussing on the broad question of what geographical education might attempt to accomplish. The three principal points are:

1. Integration: Broadly based knowledge is essential to geography, but to bring together this knowledge in geographical frameworks should be an aim of the curriculum. In principle this can be attempted at all levels of geographical sophistication. Various concepts, in addition to the traditional notion of 'region', are useful in the endeavour.
2. Environments and political realms: The rise of environmental science programs is at least partly in response to issues of 'environmental crisis'. This is a 'charged atmosphere' in which geography is a central subject. Issues of objective enquiry and social urgency must be kept in focus.
3. Geography and concepts of the future: The future may be largely unknowable but its creation is part of present and past human activity. Is the 'design' for the future merely a projection of past trends, or is it a set of goals and intended results? How this is perceived will affect the relevance of curricular approaches.

(Abstract published in: Jackson, E.L., (ed.) Current Research by Western Canadian Geographers: the University of Alberta Papers, 1986. Occasional Papers in Geography of the Western Division of the Canadian Association of Geographers, B.C. Geographical Series, No. 44, Vancouver, Tantalus Research, 1987. Page 172.)

APPENDIX J

ADVISING HANDBOOK FOR STUDENTS OF GEOGRAPHY
(compiled by R.B. Sagar)

WHY STUDY GEOGRAPHY?

Geography is the core environmental discipline. It is the study of how people interact with physical and human environments. Its broad concerns include such questions as:

Are the world's climates changing?

Are the world's populations changing too fast?

How do societies value, use and preserve their resources?

Why do some regions show dynamic growth, others stagnate and decline?

What cultural historical values affect public behaviour and policies?

How can maps be drawn by computer, and geographic information be analyzed?

Geographers are broadly educated and a wide variety of careers is open to them. Some careers currently pursued by Simon Fraser University graduates are:

Teacher

Diplomat

Museum curator

Overseas development specialist

District planner

Location analyst

Park planner

Urban planner

Pricing analyst

Cartographer

Remote sensing specialist

Systems development consultant

Census analyst

Hydrogeologist

Environmental consultant

Terrain analyst

The Geography Program at Simon Fraser University

The program ensures that all aspects of the discipline are encountered. It provides for a chosen emphasis and specialization within two major streams - *human and physical*. In addition, a group of courses on geographic techniques and on various regions of the world are offered; these courses demonstrate how the human and physical streams may be interrelated.

Human Geography may be simply divided into Cultural-historical and Economic areas.

Cultural-Historical Geography emphasizes the spatial and environmental bases of societies as they have historically evolved, regional expressions of culture in terms of values, tastes, social behaviour, the built environment and historic geographies of Canada. Canada, Europe and Latin America are given special emphasis within the context of cultural-historical geography. The goal of cultural-historical geography is to provide the student with an understanding of place.

Economic Geography focuses on questions about the locations of resource, manufacturing and service activities, urbanization and the nature of cities and city systems, the nature of transportation networks, population problems, patterns of regional growth and decline, and the use and abuse of resources. Within economic geography students may elect courses in resources and environmental geography, regional development and planning, and urban geography.

Physical Geography fundamentals are introduced through the basic subdisciplines of geomorphology, climatology and biogeography. The sequence and options give a firm background for environmental studies to the liberal arts student. For those with, or wishing to develop, a more rigorous science background, the B.Sc. program is structured to give a detailed grasp of several aspects of the earth sciences. The programs feature 'hands-on' learning experience in the field and in laboratory techniques.

Geographic Techniques feature quantitative methods and geographical information systems, which comprise cartography, computer cartography, air photo interpretation and remote sensing. In support, the Department has a remote sensing and computer cartography laboratory which is one of the best-equipped in North America. The department operates a Macintosh microcomputer facility. Other computer terminals in laboratories connect students with the University IBM and VAX computers.

Regional Geography courses at Simon Fraser University concentrate on Canada along with other North and South American countries, Africa and Europe. They study the geographical features and problems of particular regions.

Program Selection and Completion

University Regulations

The University Calendar sets out the requirements to be fulfilled in order to complete the desired degree. "General Regulations" apply to all students and gives information on grade point averages and graduation requirements. The Faculty sections, i.e. Arts, Science, Education, etc., specify the requirements for the degree. The Geography sections specify the requirements of the Department. It is important in planning a program of study that all requirements be met.

This booklet outlines the Faculty of Arts requirements, as well as the Geography Major, Minor and Honors requirements for a B.A. and for a B.Sc. However, it is best to refer to the Calendar that corresponds to the declaration semester of the Major, Minor and Honors for complete details on the requirements. The student's official record will state the semester in which the declaration was made.

Academic Advice and Counselling

Each student is responsible for being aware of and fulfilling the requirements as set out in the Calendar. There are advisors on campus to help students understand and follow the regulations. The Academic Advice Centre, Shrum Science Centre, P9310, tel. 291-4356 provides assistance to those who have questions or difficulties of an academic nature. The Centre approves course selections for students who have not yet declared a major, and is an excellent source of information on university regulations.

Ida Curtis, the Academic Advisor in the Department of Geography, advises students wishing to declare a Major, Minor or Honors in Geography. Her office is located in 7124CC, tel. 291-4128 and she is available for academic advising between 1:30 and 4:30 daily. Faculty advisors are also available. Pages 6 to 11 of this booklet give the courses recommended for specialization within the Geography program.

The Counselling Service, located in Room 200 - Transportation Centre, tel. 291-3694 is available for personal counselling, vocational counselling, and as a career resource centre. This service helps students who are unsure about personal and career goals.

B.A. Program in Geography

The overall minimum course requirements for the B.A. Major, Minor or Honors that appears in the University Calendar for 1988-89, is given below. Appendix A lists upper level (300 & 400 series) course numbers, titles and prerequisites and is followed by brief content descriptions of all geography courses. Faculty of Arts requirements are given in Appendix B, and the B.Sc. program requirements in Appendix C.

GENERAL PROGRAM

Lower Division Minimum Course Requirements: B.A.

1. Students intending to Major, Minor or take Honours in Geography are required to take:
 GEOG 100-3 Human Geography
 GEOG 111-3 Physical Geography. *(6 credit hrs)*
2. B.A. Honors and major students must take one course at the 200 level from Section A and both GEOG 221-3 and 241-3 from Section B. In addition, GEOG 250 or 251 are required from Section C. *(12 credit hrs)*
3. For the Minor the following are required: GEOG 100-3, 111-3, 221-3 or 241-3, and 250-3. *(12 credit hrs)*

Section A - Physical Geography

- GEOG 111-3 Physical Geography
- 112-3 Introductory Geology
- 213-3 Geomorphology I
- 214-3 Climatology I
- 215-3 Biogeography I

Section B - Human Geography

- GEOG 100-3 Human Geography
- 102-3 World Problems in Geographic Perspective
- 212-3 Geography of Natural Hazards
- 221-3 Economic Geography
- 241-3 Social Geography

Section C - Techniques and Special Requirements

- GEOG 250-3 Cartography I
- 251-3 Methods in Spatial Analysis
- 253-3 Aerial Photographic Interpretation

Section D - Regions

- GEOG 162-3 Canada
- 263-3 Selected Regions
- 265-3 Geography of British Columbia

Upper Division minimum course requirements: B.A.

Majors and Honors students are required to take:

1. Twenty (20) semester hours of 300 level courses, including GEOG 301-4 and at least one course from Section A (Physical Geography) **(20 credit hours)**
 2. Twelve (12) semester hours of 400 level courses, including at least one course from Section D (Regional Geography) **(12 credit hours)**
- (Total hrs req'd: 32)**

Honors students

In addition, Honors students must take GEOG 491-4, and fourteen (14) additional credit hours from courses in the 300 and 400 level listings. **(18 credit hrs)**

(Total hrs req'd: 50)

Students taking a MINOR require:

Sixteen (16) credit hours in Geography courses numbered 300 and 400. **(16 credit hrs)**

B.A., Geography Major: Specialized streams

General Introduction

The Geography curriculum is structured to allow choice of a core specialization program from within the four groups: **human, physical, geographical information systems and regional geography.**

All geography students must take, at least, the six 100 and 200 level required courses, a methodology and technique course (301), one upper level physical geography (one of 313 to 317) and an upper level regional course (one of 460 to 470). Students select the remaining required 20 upper level credit hours in Geography according to their interests.

Some selected groupings, course selections and a reference chart are given below.

1. Cultural Historical Geography

The Geography Department offers a sequence of courses around which students may organize their programs in cultural-historical geography.

The core courses are:

GEOG 343	Transitional Societies
344	Modern Industrial Societies
362	Urban Development
375	Historical Geography I
420	Comparative Cultural Geography
431	The Landscape in Science, Art, Music and Literature
446	Contemporary Societies
475	Historical Geography II

Additional exposure to regional geography courses is recommended. Other courses should augment the student's preparation for the particular speciality he/she wishes to pursue.

2. Urban Geography

To study the city is to focus on the central issue in human geography. The societies of the contemporary world are either largely urban or must react to the imperatives of a largely urban world. The landscape formations of cities are the geographically articulated spaces in which urban life occurs and which change in response to the impulses of urban society.

The core course in urban geography is Geography 361 (introduction and overview). GEOG 325 (Service Activities) and 344 (Modern Industrial Societies) approach the city from economic and cultural perspectives respectively, while 362 (Urban Development) emphasizes the development of the built environment in comparative historical perspective. GEOG 424 (Transportation) provides an in depth approach to one of the most important problems facing all large cities while 441 (Urban Regions) focuses on international comparisons of metropolitan development.

Fourth year courses emphasize independent research. Other courses, listed below as 'complementary', deal with subject matter which is important to the understanding of the city, and it is recommended that students take a selection of these. For some professional occupations such as urban planning, architecture and engineering, a sound knowledge of the physical geography of cities is required. Thus a selection of basic courses in geomorphology, climatology and soils should be taken. Courses in other disciplines, such as History, Sociology-Anthropology and Political Science might also be useful.

Core courses

GEOG 361	Introduction to Urban Geography
362	Urban Development
325	Service Activities
344	Modern Industrial Societies
424	Urban Transportation
441	Urban Regions

Complementary courses are:

GEOG 323, Manufacturing; 324, Transportation; 343, Transitional Societies; 369, Human Microgeography; 382, Population Geography; 383, Regional Planning I; 444, Regional Planning II.

3. Regional and Resource Development

Economic Geography has two distinct but closely related thrusts: regional development and planning, and resource development and management. With such a background students can pursue their interests further in specialized graduate programs (in geography, planning, and environment management), look for jobs in the public sector at federal, provincial and local levels, or, as we find increasingly, develop careers in the private sector including, for example, in consulting and real estate.

Regional development and planning:

Courses in this 'stream' are particularly concerned with identifying social, political and economic indices of regional welfare; explanations for regional and community growth and decline; theories and methods for analyzing regional and community structures, industrial location and urban and rural land use patterns; the nature of regional policies and regional planning in Canada and elsewhere; the emerging role of tourism in community development and methods for evaluating the effectiveness of policies. The key upper level courses which focus on these questions are: GEOG 383, Regional Planning I; GEOG 423, Tourism and Outdoor Recreation; GEOG 426, Industrial Organization, Location and Planning; GEOG 444, Regional Planning II; and GEOG 445, Resource Planning. In addition, at the third year level GEOG 323 and 325 deal directly with the principles and practice of location and land use planning in the private and public sectors and therefore provide essential inputs to the regional development and planning stream.

Technical skills in statistics, computer operations and cartography would also be useful. Outside of the Department several courses are

recommended and, in particular, ECON 365. Students should be aware that the Economics Department is planning two more courses in regional economics.

Core Courses:

GEOG 323	Manufacturing
325	Services
383	Regional Planning I
422	Lesser Developed Countries
423	Tourism and Outdoor Recreation
426	Industrial Organization, Location and Planning
444	Regional Planning II
464	Intertropical Africa
466	Latin American Regional Development

Resource development and management:

Resource and environmental management is concerned with the human use of the earth. Within this broad theme stands a number of distinct sub-fields representing the issues of resource development, resource policy, and environmental impact. Key courses representing these issues are: GEOG 322, 382, 385, 421 and 445. Students should also be aware that courses in physical geography examine the physical processes shaping environmental change.

Core Courses:

GEOG 322	Primary Activities
382	Population Geography
385	Introduction to Agricultural Geography
421	Resources Development
445	Resource Planning

Complementary courses in other disciplines are:

ECON 362-4 Economics of Natural Resources

POL 451-3 Public Policy Analysis

4. Physical Geography

A B.A. in physical geography provides understanding of the environmental sciences without developing the technical depth required by a B.Sc. in physical geography.

Those looking to pursue the B.A. in physical geography should, at the lower levels, have GEOG 111, GEOG 213 or 214 or 215 and GEOG 250 or 251. They should choose at least 2 additional courses from the following:

GEOG 112, 213, 214, 215, 250, 251, 253.

At the upper levels they should have one course from 313, 314, 315, 317 and at least 4 additional courses from the following:

GEOG 313, 314, 315, 317, 358: 412, 413, 414, 415, 416, 417, 419.

Key courses depend on the sub-area of physical geography selected but, for instance, if geomorphology were favoured, the core group of courses would comprise GEOG 112, 213, 313, 412 and 413.

In addition, courses from Physics, Chemistry, Mathematics or Bioscience might be appropriate, depending upon the areas of specialization. A faculty advisor should be contacted for help with selection of courses.

5. Cartography, Remote Sensing and Geographical Information Systems

Cartography, air photo interpretation, remote sensing and GIS are all part of the *spatial information program* in geography. In addition to courses offered by the Department, the Department of Computing Science offers relevant courses.

The program instructs students in the four principal areas of "spatial information processing" which includes:

1. Basic principles of map design.
2. Evaluation of effectiveness and efficiency of communication in the relationship between maps and map users.
3. Theories of cartographic communication and data handling.
4. Spatial information as research tools and aids to understanding.

Core courses for the special study of spatial information are:

Lower Level

GEOG 250 Cartography I
 251 Methods in Spatial Analysis
 253 Remote Sensing I

Upper Level

GEOG 351 Cartography II
 353 Remote Sensing II
 354 Digital Cartography
 355 Geographical Information Systems
 356 Cognitive Cartography
 418 Terrain Evaluation
 452 Advanced Topics in Geoprocessing
 453 Digital Image Processing
 407 Quantitative Methods in Geography

Complementary courses in Computing Science are:

CMPT 201-4 , Data & Program Organization and CMPT 351-4,
Introduction to Computer Graphics.

6. Regional Studies. The core courses assess the natural and social conditions found in many countries of the world. They deal with a wide range of problems, commonly of a geopolitical, economic and environmental nature that are amenable to geographical analysis, diagnosis and prescription. Those intending to develop a special competence and intelligence on regional matters should take GEOG 102, World problems in Geographic perspective and at least one of GEOG 162 - Canada, 263 - Selected Regions and 265 - British Columbia. GEOG 462 - Canada and the United States and at least one additional 400 level regional course give a further 8 credit hour upper-level core.

Almost all the Geography Department courses have relevance to the many sub-specialties in Regional Geography - but GEOG 322, 343, 361, 375, 381, 382, 420 and 422 and 441 have particularly useful content.

Courses offered by other Departments at SFU, especially History, Sociology Anthropology and Political Science should be considered.

B.A. Program in Geography S.F.U.

	A. Physical	B. Human			C. Techniques	D. Regional
Year 1	111; 112	100	102			162
Year 2	213 or 214 or 215	212	221	241	250 or 251 253	263 265
	Environmental Studies	Cultural-Historical	Urban	Regional & Resource Dev.	Cart., R.S. & G.I.S.	Regional Geography
Year 3	301	301	301	* 301 ** 301	301	301
	313 or 314 or 315 or 317 358	343 344 375	361 362 325 344 323 324 343 369 362 383	323 322 325 382 383 385	351 353 354 355 356	322 343 362 375 381 382
Year 4	413 414 415 416 417 419	420 431 446 475	424 441 444	422 421 423 425 426 444 464 466	452 453 407 418	460 462 464 466 469 470 420 422 441

Required Course, Geography B.A.

Optional/Upper level recommended for special streams

Complementary course recommended for special streams

*Regional Development & Planning

**Resource Development & Management

Graduate Studies

Students who have a good academic record (3.0 G.P.A. or better) through the undergraduate program may wish to pursue graduate studies.

The Department of Geography offers graduate training leading to the degrees of Master of Arts, Master of Science and Doctor of Philosophy. Major areas of advanced study in the department include spatial information systems, computer cartography and remote sensing, biogeography, geomorphology, climatology, economic geography, and cultural-historical geography. Considerable overlap exists among faculty research interests, which allows for bridging of these separate research streams to reinforce the integrative nature of geographic inquiry.

Because each graduate program is made for the individual, students are advised to study the department graduate studies handbook and course offerings, along with faculty interests in order to select a study route of a satisfying and stimulating nature.

Department of Geography Faculty

- W.G. Bailey, Ph.D., McMaster, 1978, Associate Professor - climatology
agricultural meteorology, hydrometeorology
- J.A. Brohman, Ph.D., pending, UCLA, Assistant Professor - Third World
development, economic and regional geogaphy, Latin America.
- R.C. Brown, Ph.D., Michigan State, 1967, Associate Professor and Dean of
Arts - agricultural geography, resources development
- C.B. Crampton, Ph.D., Bristol, 1956, Professor - geology, pedology, ecology
- M.E. Eliot Hurst, Ph.D., Durham, 1966, Professor - Marxist and socialist
approaches to human geography, aesthetics, culture and ideology. The
geography of food, diet and nutrition. Transportation.
- L.J. Evenden, Ph.D., Edinburgh, 1970, Associate Professor - urban, local
government
- E.M. Gibson, Ph.D., British Columbia, 1970, Associate Professor - human
geography of modern and post-modern societies, landscape style,
Canada
- A.M. Gill, Ph.D., Manitoba, 1982, Assistant Professor - resources
management, tourism planning, behavioural geography
- M. Hayes, Ph.D., pending, McMaster, Assistant Professor - medical
geography, methodology, quantitative methods
- R. Hayter, Ph.D., Washington, 1973, Associate Professor and Chair -
economic, manufacturing
- E.J. Hickin, Ph.D., Sydney, 1971, Professor - fluvial geomorphology
- R.B. Horsfall, Ph.D., Johns Hopkins, 1969, Assistant Professor - social
geography, environmental psychology
- I. Hutchinson, Ph.D., Simon Fraser, 1977, Associate Professor -
biogeography
- P.M. Koroscil, Ph.D. Michigan, 1970, Associate Professor - historical,
Canada
- J.T. Pierce, Ph.D., London, 1976, Associate Professor - economic and
resource geography, food systems
- T.K. Poiker, Ph.D., Heidelberg, 1966, Professor - computer cartography,
geographic information systems, economic, quantitative methods
- A.C.B. Roberts, Ph.D., York, 1981, Associate Professor - remote sensing,
cultural-historical

M.C. Roberts, Ph.D., Iowa, 1966, Professor - fluvial geomorphology, field methods

R.B. Sagar, M.Sc., McGill, 1959, Associate Professor - climatology, glaciology

S.T. Wong, Ph.D., Chicago, 1968, Professor - resources management, quantitative methods

Associate Member

W.G. Gill, Ph.D., British Columbia, 1981, Assistant Professor and Executive Director, S.F.U. at Harbour Centre - social and urban geography, symbolic landscapes and behavior, transportation

Professors Emeritii

F.F. Cunningham, B.A., M.A., Dip.Ed., Durh., F.R.G.S. - geomorphology, Latin America.

A. MacPherson, M.A., Edin., F.R.Met.S. - cultural geography, Western Europe, geographic ideas and methodology.

P.L. Wagner, A.B., M.A., Ph.D., Calif. - cultural geography.

J.W. Wilson, B. Sc., Glas., M.Sc., M.I.T., M.R.P., N. Calif. - urban and regional planning.

The Geography Student Union

All students taking a course in geography, not just declared Majors, can be members of this group. Your participation is always welcome. The GSU is funded through your activity fee and is part of the Simon Fraser Student Society (SFSS). The executive is elected each semester, and each March all members elect a representative to the Student Society Forum. Of equal importance, the GSU has a voice on the Department Undergraduate Studies Committee. This committee formulates important policy on the shape and content of geography course offerings. Social and other activities are prominent, and have ranged from such things as team entry in sand castle competitions to video shows that inspire discussion of topical issues. The hub of the action is the GSU common room (CC6102) which has such facilities as a refrigerator and a toaster oven for the 'brown baggers'! Students can borrow old exam copies that are kept on file, and, when it is time to choose courses, there is usually some 'veteran' present to help.

Appendix A

Department of Geography:

Upper Level Courses

and

Course Descriptions

1988-89 Calendar

Physical Geography (Section A)

313-4	Geomorphology II
314-4	Climatology II
315-4	Regional Ecosystems
317-4	Soil Geography
412-4	Quaternary Geology and Geomorphology
413-4	Geomorphology III
414-4	Climatology III
415-4	Advanced Biogeography
416-4	Pleistocene Geography
417-4	Biometeorology
418-4	Terrain Evaluation
419-4	Mass transfer in the Biosphere

Prerequisites

213
214 & MATH 151 and 152 or MATH 154 and 155 or MATH 157 and 158 recommended
215 or BISC 204
30 hours including 111 or 112
213
313
214
315
One of 313, 314, 315, 317
314 & MATH 151 and 152 or MATH 154 and 155 or MATH 157 and 158
Two of 313, 315, 317
314 or 315 or enrolment in Env. Toxicology Minor program or in Env. Toxicology Extended Studies Diploma.

Human Geography (Section B)

322-4	World resources	30 hours including 111 and 221
323-4	Geography of Manufacturing	221
324-4	Geography of Transportation	221 & 241
325-4	Geography of Service Activities	221
343-4	Geography of Transitional Societies	241
344-4	Geography of Modern Industrial Societies	241
361-4	Introduction to Urban Geography	221 & 241
362-4	Geography of Urban Development	221 & 241 (& 361 recommended)
369-4	Human Microgeography	241
375-4	Historical Geography	241
381-4	Political Geography	241
382-4	Population Geography	221 & 241
383-4	Regional Planning I	221 & 241
385-4	Introduction to Agricultural Geography	221
420-4	Comparative Cultural Geography	343 & 344
421-4	Geography of Resource Development	322 & 8 hrs. 300 & 400 level Geog.

422-4	Geography of The Third World	60 credit hrs. inc. 111, 221, 241
423-4	Geography of Tourism and Outdoor Recreation	12 hrs. 300 or 400 level Geog.
424-4	Urban Transportation	324 and 361 or 362
426-4	Industrial Organization, Location and Planning	60 credit hours including 323 or 383
431-4	The Landscape in Science, Art Music and Literature	344
441-4	Geography of Urban Regions	60 credit hrs. inc. 361 or 362
444-4	Regional Planning II	60 credit hrs. inc. 383 (& 361 recommended).
445-4	Resource Planning	322 or 385
446-4	Geography of Contemporary Societies	344
475-4	Historical Geography II	375

Techniques and Special Requirements (Section C)

301-4	Geographic Ideas and Methodology	30 hrs. inc. 15 in Geog.
351-4	Cartography II	250 or 251
353-4	Remote Sensing	253
354-4	Digital Cartography	250 and 251
355-4	Geographic Information Systems	250 and 251 & permission of instructor
356-4	Cognitive Cartography	250
358-2	Field Techniques in Physical Geography	One of 213, 214, 215
359-2	Methods in Human Geography	221 and 241
404-2	Directed Readings	Permission
405-4	Directed Readings	Permission
407-4	Quantitative Methods in Geography	60 hrs. credit including GEOG 251 or MATH 101
452-4	Advanced Topics in Geoprocessing	354 or 355
453-4	Digital Image Processing	353
490-4	Selected Topics	75 credit hours including 30 credit hours in GEOG
491-4	Honors Essay	Honors program & 105 credit hrs.
498-4	Field Studies	60 credit hrs. inc. 30 in Geog., and permission

Regions (Section D)

460-4	Selected Regions	60 hrs. inc. 8 upper level Geog.
462-4	Canada and the United States	60 hrs. inc. 8 upper level Geog.
464-4	Intertropical Africa	60 hrs. inc. 8 upper level Geog.
466-4	Latin American Regional Development	60 hrs. inc. 8 upper level Geog.
469-4	Canadian North and Middle North	60 hrs. inc. 8 upper level Geog.
470-4	Western Canada	60 hrs. inc. 8 upper level Geog.

Department of Geography, SFU

Course Descriptions, 1988-89 Calendar

GEOG 100-3 Human Geography

This course introduces the basic systematic approaches in the study of contemporary human geography including the distribution of population, spatial aspects of economic, cultural and political development, landscape and resource study.

(Lecture/Tutorial)

Students with credit for GEOG 101, 121, or 141 may not take this course for further credit.

GEOG 102-3 World Problems in Geographic Perspective

Current world-scale problems are examined in their regional and global contexts, with emphasis being placed on the importance of dynamics of the natural environment in human affairs.

(Lecture/Tutorial)

GEOG 111-3 Physical Geography

An introduction to landforms, climates, soils and vegetation; their origins, distributions, inter-relationships and roles in the ecosystem. Laboratory work and field trips are included.

(Lecture/Laboratory)

GEOG 112-3 Introductory Geology

Basic geology for geographers--an introduction to mineralogy, petrology, weathering, structural geology, methods of dating geological information, and the geological column. Laboratory work and field trips are included.

(Lecture/Laboratory)

GEOG 162-3 Canada

The geographical character of Canada; the Canadian environment, regional differences in socio-economic growth.

(Lecture/Tutorial)

Students with credit for GEOG 262 may not take this course for further credit.

GEOG 212-3 Geography of Natural Hazards

An introduction to the occurrence and origin of natural hazards such as volcanic eruptions, landslides, etc. Interaction between the relevant natural processes and society will be examined, as well as prediction of natural events and the amelioration of the effects of such events within different cultural contexts.

(Lecture/Tutorial)

Prerequisite: GEOG 111 or 112.

Students who completed GEOG 312 prior to 88-3 may not take this course for further credit.

GEOG 213-3 Geomorphology I

An examination of landforms, processes, laws, and theories of development; types and distributions.
(Lecture/Laboratory)

Prerequisite: GEOG 111 or 112.

Students who completed GEOG 313 prior to 88-3 may not take this course for further credit.

GEOG 214-3 Climatology I

A review of the basic principles and processes involved in physical and dynamic climatology, with particular emphasis on global distributions and change.
(Lecture/Laboratory)

Prerequisite: GEOG 111.

Students who completed GEOG 314 prior to 88-3 may not take this course for further credit.

GEOG 215-3 Biogeography

An examination of the abiotic and biotic factors that control the distribution and development of plant communities, including climatic and geological change.
(Lecture/Laboratory)

Prerequisite: GEOG 111.

Students who completed GEOG 315 prior to 88-3 may not take this course for further credit. Students granted credit for GEOG 215 may not be granted credit for BISC 204.

GEOG 221-3 Economic Geography

The basic concepts of economic geography, involving consideration of the spatial organization and development of economic and resource based systems.
(Lecture/Tutorial)

Prerequisite: GEOG 100.

Students with credit for GEOG 121 may not take this course for further credit.

GEOG 241-3 Social Geography

Systematic consideration of the spatial and environmental bases of societies, in historical and cultural perspective.
(Lecture/Tutorial)

Prerequisite: GEOG 100.

Students with credit for GEOG 141 may not take this course for further credit.

GEOG 250-3 Cartography I

An introduction to the interpretation of maps and air photographs.
(Lecture/Laboratory)

Prerequisite: GEOG 100 or 102 and GEOG 111 or 112.

GEOG 251-3 Methods in Spatial Analysis

A systematic introduction to the quantitative and theoretical approaches to the study of geography.
(Lecture/Tutorial/Laboratory)

Prerequisite: GEOG 100 or 102 and GEOG 111 or 112.

GEOG 253-3 Aerial Photographic Interpretation

Uses of aerial photography and air photo interpretation in geography. The course is divided into four sections: (1) technical background regarding aerial photography and photo interpretation; (2) air photo interpretation and mapping; (3) application of air photo interpretation; and (4) introduction to remote sensing. (Lecture/Laboratory)

Prerequisite: GEOG 100 and 111.

Students who have completed GEOG 353 prior to 88-3 may not take this course for further credit.

GEOG 263-3 Selected Regions

A study of the geographical character of a major world region. (Lecture/Tutorial)

Prerequisite: At least 9 credit hours.

This course may not be counted more than once towards a degree.

GEOG 265-3 Geography of British Columbia

An examination of the physical landscape, the migration process, resource exploitation and the development of the settlement patterns. (Lecture/Tutorial)

Prerequisite: At least 9 credit hours.

GEOG 301-4 Geographic Ideas and Methodology

A study of contemporary geographical concepts in historical perspective, the course will examine the traditional approaches to the subject matter of geography, giving particular attention to present day methodological debate and foci of interest. (Lecture/Seminar)

Prerequisite: Completion of 30 credit hours, including 15 in geography.

GEOG 313-4 Geomorphology II

Intermediate analysis in fluvial, glacial and coastal geomorphology with particular reference to British Columbia. (Lecture/Laboratory)

Prerequisite: GEOG 213 (formerly 313).

Students who completed GEOG 313 prior to 88-3 may take this course for further credit. Students who completed GEOG 413 prior to 88-3 may not take this course for further credit.

GEOG 314-4 Climatology II

An introduction to atmospheric science with emphasis on processes in the boundary layer; examination of the radiation, energy and water balances; description and analysis of heat and mass transfer. (Lecture/Laboratory)

Prerequisite: GEOG 214 (formerly 314) or permission of instructor. MATH 151 and 152 or MATH 154 and 155 or MATH 157 and 158 are recommended. Students who completed GEOG 314 prior to 88-3 may take this course for further credit.

GEOG 315-4 Regional Ecosystems

Physical and biological characteristics of regional ecosystems; historical evolution of biomes, management of biotic resources. (Lecture/Seminar)

Prerequisite: GEOG 215 (formerly 315) or BISC 204.

Students who completed GEOG 315 prior to 88-3 may take this course for further credit.

GEOG 317-4 Soil Geography

An introduction to soils and soil geography. Factors and processes of soil formation, profile description and soil surveying. Elementary field and laboratory techniques of soil analysis.

(Lecture/Laboratory)

Prerequisite: At least 30 credit hours including GEOG 111 or 112.

GEOG 322-4 World Resources

An analysis of the use and development of natural resources from a geographic, economic and institutional perspective.

(Lecture/Tutorial)

Prerequisite: At least 30 credit hours including GEOG 111 and 221 (formerly 121).

GEOG 323-4 Geography of Manufacturing

Basic analyses of manufacturing location, linkages and flows, and the processes of decision making, locational adaptation and adoption.

(Lecture/Tutorial)

Prerequisite: GEOG 221 (formerly 121).

GEOG 324-4 Geography of Transportation

An empirical and theoretical examination of the geographical aspects of transportation systems.

(Lecture/Tutorial)

Prerequisite: GEOG 221 (formerly 121) and GEOG 241 (formerly GEOG 141).

GEOG 325-4 Geography of Service Activities

Central place theory, marketing and retail location, urban economic base, land use models, and tourism.

(Lecture/Tutorial)

Prerequisite: GEOG 221 (formerly 121).

GEOG 343-4 Geography of Transitional Societies

Theoretical and empirical approaches to environmental problems of the world's transitional societies, environmental and cultural change, cultural processes and the development of primary productions and urban growth.

(Lecture/Tutorial)

Prerequisite: GEOG 241 (formerly 141).

GEOG 344-4 Geography of Modern Industrial Societies

The theme of this course is the effect upon modern urban morphology of certain ideas and institutions prevalent in Anglo-Saxon cultures between the late 18th and early 20th centuries. The origin, spread and differentiation of selected man-made landscape features are systematically reconstructed.

(Lecture/Seminar)

Prerequisite: GEOG 241 (formerly 141). GEOG 301 and courses in 19th century English literature and history are recommended.

GEOG 351-4 Cartography II

Cartographic processes and techniques with an emphasis on thematic cartography; photographic process; the computer as a cartographic tool.
(Lecture/Laboratory)

Prerequisite: GEOG 250 or 251.

GEOG 353-4 Remote Sensing

Applied remote sensing and image analysis. Topics include air photo interpretation, multispectral and colour photography, thermal imagery, multispectral scanners, microwave applications, satellite imagery and SPOT data. The relation of remote sensing information and Geographic Information Systems is discussed. Manual interpretation and computer analysis will be used.

(Lecture/Laboratory)

Prerequisite: GEOG 253 (formerly 353).

Students who completed GEOG 353 prior to 88-3 may take this course for further credit. Students who completed GEOG 453 prior to 88-3 may not take this course for further credit.

GEOG 354-4 Digital Cartography

Computational aspects of cartography. Map projections; data input; spatial data manipulation; computer-assisted mapping. Students who do not know any programming will have to take a short introduction to Fortran.

(Lecture/Laboratory)

Prerequisite: GEOG 250 and 251 and permission of instructor.

Geog 355-4 Geographic Information Systems

Introduction to Geographic Information Systems; cadastral systems; thematic mapping and census systems; resource systems; digital elevation systems; topographic mapping systems. Data bases; data analysis.

(Lecture/Laboratory)

Prerequisite: GEOG 250 and 251 and permission of instructor.

GEOG 356-4 Cognitive Cartography

Analyzes the map-user interface, the basic perceptual and cognitive processes used by the map reader, and the principles of design and presentation which lead to effective map use.

(Lecture/Seminar)

Prerequisite: GEOG 100 and 250; or GEOG 101 or 121 or 141 (if completed prior to 88-3) and GEOG 250.

GEOG 358-2 Field Techniques in Physical Geography

The theory and practice of selected field and experimental techniques in physical geography.

(Field Work/Laboratory)

Prerequisite: One of GEOG 213, 214, 215; or one of GEOG 313, 314, 315 if completed prior to 88-3.

GEOG 359-2 Research Methods in Human Geography

A practical introduction to field methods employed by human geographers. Particular emphasis is placed on rural and urban classification procedures, questionnaire methods, participant and landscape observation and recording.

(Lecture/Field Work)

Prerequisite: GEOG 221 and 241; or GEOG 121 and 141 if completed prior to 88-3.

GEOG 361-4 Introduction to Urban Geography

This course will introduce basic concepts in the study of urban geography by systematically identifying and examining major components of urban structure.

(Lecture/Seminar)

Prerequisite: At least 30 credit hours including GEOG 221 (formerly 121) and GEOG 241 (formerly 141). It is preferable to take this course before taking GEOG 362.

GEOG 362-4 Geography of Urban Development

This course will apply the principles of urban geographical analysis to the study of urbanization as exemplified in the development of cities in Europe and North America.

(Lecture/Tutorial)

Prerequisite: At least 30 credit hours including GEOG 221 (formerly 121) and GEOG 241 (formerly 141). It is preferable to take this course after GEOG 361.

GEOG 369-4 Human Microgeography

An examination of human interaction with physical environment, focussing on the individual as the unit of analysis, with special emphasis upon designed environments. A series of field studies will be required of each student.

(Lecture/Seminar)

Prerequisite: GEOG 241 (formerly 141).

GEOG 375-4 Historical Geography I

Geographical factors in the settlement of Canada and the United States; the role of the frontier; and geographic factors in the changing nature of the perception of resources.

(Lecture/Seminar)

Prerequisite: GEOG 241 (formerly 141).

GEOG 381-4 Political Geography

Theoretical approaches to problems of the interactions of political decisions and power structures with territorial organization.

(Lecture/Tutorial)

Prerequisite: GEOG 241 (formerly 141).

GEOG 382-4 Population Geography

A study of the application of theories of population growth and demographic techniques; a consideration of the implications of these on the distribution and evolution of population in selected areas.

(Lecture/Tutorial)

Prerequisite: GEOG 221 (formerly 121) and GEOG 241 (formerly 141).

GEOG 383-4 Regional Planning I

Concepts and theories of regional development and environmental planning; the spatial component of regional planning problems; goal formulation, process and implementation.

(Lecture/Tutorial)

Prerequisite: GEOG 221 (formerly 121) and GEOG 241 (formerly 141).

Students with credit for GEOG 443 may not take this course for further credit.

GEOG 385-4 Introduction to Agricultural Geography

A critical examination of the current theories and issues in the study of the patterns and processes underlying the agricultural landscape. Emphasis will be placed on the Canadian agricultural scene.

(Lecture/Tutorial)

Prerequisite: GEOG 221 (formerly 121).

GEOG 404-2 Directed Readings**GEOG 405-4 Directed Readings**

Designed for upper level geography major and honors students who wish to continue research started in conjunction with an earlier course.

Prerequisite: Permission to enter Directed Readings courses requires written consent of both the faculty member willing to supervise the research, and the chairperson of the department.

GEOG 407-4 Quantitative Methods in Geography

An examination of the basic quantitative techniques used in geographical investigation.

(Lecture/Seminar)

Prerequisite: 60 credit hours including GEOG 251 or MATH 101.

GEOG 412-4 Quaternary Geology and Geomorphology

Stratigraphy of the Quaternary Period; geomorphic and sedimentary evidence of glaciation; models of glacial and periglacial environments. Laboratory and field study of glacial deposits.

(Lecture/Laboratory/Field Work)

Prerequisite: GEOG 213 (formerly 313).

GEOG 413-4 Geomorphology III

Advanced treatment of topics in glacial and fluvial geomorphology with emphasis on current research problems.

(Lecture/Laboratory)

Prerequisite: GEOG 313 (formerly 413).

GEOG 414-4 Climatology III

The influence of climate on human activities, with emphasis on such broad fields as agriculture and hydrology, and on climatic variation.

(Lecture/Laboratory)

Prerequisite: GEOG 214.

GEOG 415-4 Advanced Biogeography

A survey of advanced biogeographic theory, and techniques of vegetation analysis. The application of these theories and techniques to biotic resources management is also examined.

(Lecture/Seminar)

Prerequisite: GEOG 315. Students who completed GEOG 315 prior to 88-3 also require permission of the instructor.

GEOG 416-4 Pleistocene Geography

An examination of the physical geomorphic, pedologic and biotic processes and evidence from human geography of the period will be studied as they affect landscape changes.

(Lecture/Seminar)

Prerequisite: One of GEOG 213 (formerly 313), 214 (formerly 314), 215 (formerly 315), 317.

GEOG 417-4 Biometeorology

An introduction to current research efforts in biometeorology; theory and application of mathematical models to describe processes of radiation, heat and mass transfer.

(Lecture/Seminar)

Prerequisite: GEOG 314 or permission of instructor; MATH 151 and 152 or MATH 154 and MATH 155 or MATH 157 and 158. Students who completed GEOG 314 prior to 88-3 do not have the prerequisite.

GEOG 418-4 Terrain Evaluation

The extensive classification of a landscape based on geology, geomorphology, soils, vegetation, and historic and current land-use, and the assessment of qualitative values as an aid to multiple land-use management.

(Lecture/Seminar)

Prerequisite: Two of GEOG 213 (formerly 313), 215 (formerly 315) and 317.

GEOG 419-4 Mass Transfer in the Biosphere

An introduction to the processes responsible for mass transfer in the biosphere. Emphasis will be given to the transfer of toxic agents in the environment.

(Seminar/Laboratory)

Prerequisite: GEOG 314 or 315 or enrolment in Environmental Toxicology Minor Program or Environmental Toxicology Extended Studies Diploma.

GEOG 420-4 Comparative Cultural Geography

A comparative study of selected world cultures and landscapes in the light of recent theoretical developments in geography.

(Lecture/Seminar)

Prerequisite: GEOG 343 and 344.

GEOG 421-4 Geography of Resource Development

Geographical aspects of development and management of natural resources. Particular attention will be given to contemporary problems in Western Canada. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including GEOG 322 plus 8 hours of upper division geography courses.

GEOG 422-4 Geography of the Third World

A geographic study of 'development' and 'underdevelopment' with particular references to selected lesser developed regions. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including GEOG 111, 221 (formerly 121), and 241 (formerly 141).

GEOG 423-4 Geography of Tourism and Outdoor Recreation

Factors underlying the changing geography of tourism and outdoor recreation on a regional, national, and international scale. Case studies from a variety of cultural settings illustrate planning strategies designed to cope with economic, social and biophysical impacts.

(Lecture/Seminar)

Prerequisite: 12 hours of upper division geography courses.

GEOG 424-4 Urban Transportation

An extension of the theoretical and conceptual approach to transportation (GEOG 324), but with application to urban areas. (Lecture/Seminar)

Prerequisite: GEOG 324 and 361 or 362.

GEOG 426-4 Industrial Organization, Location and Planning

Relationships between corporate and regional planning and methods for assessing the effectiveness of locational incentive schemes. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including GEOG 323 or 383.

GEOG 431-4 The Landscape in Science, Art, Music and Literature

This course focusses on landscape, the central study of geography. It does not, however, restrict itself to considering only the scientific interpretations of landscape, but investigates how these interpretations have influenced and interacted with aesthetic perceptions of landscape.

(Lecture/Seminar)

Prerequisite: GEOG 344.

GEOG 441-4 Geography of Urban Regions

An evaluation of the nature of urbanization, having specific reference to theories of urban spatial structure and to comparisons of urbanization in Canada and abroad.

(Lecture/Seminar)

Prerequisite: At least 60 credit hours including GEOG 361 or 362.

GEOG 444-4 Regional Planning II

The practice of regional planning is approached through case and workshop studies of real-life situations. (Lecture/Seminar/Laboratory)

Prerequisite: At least 60 credit hours including GEOG 383. GEOG 361 is recommended.

GEOG 445-4 Resource Planning

This course introduces the student to the principles and practices of resource planning within a Canadian context. Special attention is paid to land-use planning as it relates to major resource sectors.

(Lecture/Seminar)

Prerequisite: GEOG 322 or 385.

GEOG 446-4 Geography of Contemporary Societies

Examination and analysis of the contemporary landscape as a cultural expression of Anglo-Saxon thought since the 1920s. The focus will be on North American landscapes, but with reference to convergent phenomena elsewhere in the world. The effect upon the contemporary landscape of certain ideas and institutions prevalent in Anglo-Saxon cultures since World War I. The origin, spread and differentiation of selected humanized landscape features are constructed.

(Lecture/Tutorial)

Prerequisite: GEOG 344. Courses in the humanities and fine arts are recommended.

GEOG 452-4 Advanced Topics in Geoprocessing

An in-depth treatment of selected subjects in computer mapping and Geographic Information Systems. Topics will vary in accordance with trends in the subject and with faculty and student interests.

(Lecture/Laboratory)

Prerequisite: GEOG 354 or 355.

Students who completed GEOG 452 prior to 88-3 may take this course for further credit.

GEOG 453-4 Digital Image Processing

Computational aspects of remote sensing. Systems consideration; statistical extraction; image enhancement; thematic information extraction; change detection.

(Lecture/Laboratory)

Prerequisite: GEOG 353.

Students who completed GEOG 453 prior to 88-3 may take this course for further credit.

GEOG 460-4 Selected Regions

A study of the geographical character of a major world region.

(Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division geography courses.

GEOG 462-4 Canada and the United States

Selected problems in the geography of Canada; emphasizes territorial differentiation in cultures, regional resource problems, interregional resource conflicts, and the question of the geographical basis for national unity.

(Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division geography courses.

GEOG 464-4 Intertropical Africa

Africa between the tropics; attention will also be given to the general problems of low-latitude regions and developing countries.

(Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division geography courses.

GEOG 466-4 Latin American Regional Development

The course introduces students to a geographical analysis of patterns of Latin American development and planning. It is divided into two sections: geographical/historical development of selected countries; and analysis of common Latin American developmental models. A geographical perspective is used which stresses the interconnectedness of spatial and socio-economic structures.

(Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division geography courses.

GEOG 469-4 The Canadian North and Middle North

Special attention will be given to resource appraisal and utilization, spatial organization, and the consideration of future development; comparisons will be made with experience of sub-arctic development in other parts of the world.

(Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division geography courses.

GEOG 470-4 The Geography of Western Canada

A regional geographic interpretation of British Columbia and the Prairies. The physical environment, population, land tenure, regional resource problems, economic development and the settlement process will be examined to explain the geographic character of Western Canada.

(Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division geography courses.

GEOG 475-4 Historical Geography II

An examination of the ways in which the study of historical geography has been adapting to new problems, new methodologies, new techniques, and new sources. The course will attempt to deal primarily with the application of historical geography to a North American context with an emphasis on Canada and British Columbia.

(Lecture/Seminar)

Prerequisite: GEOG 375.

GEOG 490-4 Selected Topics

The topics will vary from semester to semester depending on the interests of faculty and students.

(Lecture/Tutorial)

Prerequisite: 75 credit hours including 30 credit hours in geography.

GEOG 491-4 Honors Essay

All candidates for honors will be required to submit a major paper on geographical topic to be selected in consultation with the Department.

Prerequisite: 105 credit hours and consent of supervisor. See a departmental academic advisor for details.

GEOG 498-4 Field Studies

Special studies and practical problems in field techniques.

(Field/Laboratory)

Prerequisite: 60 credit hours, including 30 credit hours in geography, and permission of department.

Appendix B

Faculty of Arts:

Bachelor of Arts Degree:

General Program - Requirements

At least 120 semester hours which include:

- a) At least 70 semester hours in Arts subjects
- b) At least 45 semester hours in upper division courses which must include at least 30 semester hours in upper division courses in an Arts major program.*
- c) Lower division prerequisites for at least one Arts major program.
- d) Satisfaction of the Faculty of Arts breadth requirements (see below).
- e) At least 30 semester hours taken outside in the major department.

* A department may designate up to 8 credit hours of program related upper division courses offered by other departments, as being acceptable in fulfilling part of this requirement.

Honors Program - Requirements

At least 132 semester hours of credit which include:

- a) At least 82 semester hours in Arts subjects.
- b) At least 60 semester hours in upper division courses which must include at least 50 semester hours in upper division courses in an Arts honors program.*
- c) Lower division prerequisites for at least one Arts honors program.
- d) Satisfaction of the Faculty of Arts breadth requirements (see below).
- e) At least 30 semester hours taken outside the honors department.

* A department may designate up to 12 credit hours of program related upper division courses offered by other departments, as being acceptable in fulfilling part of this requirement.

Minor Program - Requirements

All minor programs offered by the Faculty of Arts require at least 15 upper division hours taken within a single discipline unless otherwise specified in the Calendar.

N.B. For each of the General, Honors and Minor programs, students may count any course for credit with the exception of EDUC 401-8, 402-7, 405-15, and 406-5.

Breadth Requirements

In addition to completing the courses within a department required for a major or honors program in the Faculty of Arts, students must complete breadth requirements designed to acquaint them with areas of knowledge and modes of thought outside their discipline of specialization. The requirements are as follows:

1. A minimum of 30 credit hours outside the Arts major or honors department. (For the purpose of this requirement, read "school" as department).
2. Courses from at least five departments outside the Arts major or honors department. No more than 9 credit hours from any one department may be counted toward the total of 30 required hours.

For the purpose of this last requirement the following academic units will count as separate "departments":

Archaeology (ARC)	Gerontology (GERO)
Biological Sciences (BISC)	History (HIST)
Business Administration (BUS)	Humanities (HUM)
Canadian Studies (CNS)	Kinesiology (KIN)
Centre for the Arts (FPA)	Latin American Studies (LAS)
Chemistry (CHEM)	Linguistics (LING)
Communication (CMNS)	Mathematics and Statistics (MATH and STAT)
Computing Science (CMPT)	Philosophy (PHIL)
Criminology (CRIM)	Physics (PHYS)
Economics (ECON and BUEC)	Political Science (POL)
Education (EDUC, except EDUC 401, 402, 405 and 406)	Psychology (PHYS)
Engineering Science (ENSC)	Sociology and Anthropology (SA)
English (ENGL)	Spanish and Latin American Studies (includes SPAN and LAS)
French (FREN)	Women's Studies (WS)
Geography (GEOG)	

Students are advised that course enrolment in some of these subjects may be limited to students with concentrations in those subjects. Courses that are not clearly within the above "departments" or courses transferred from other institutions in subject area without direct equivalence at Simon Fraser may be counted toward these requirements on an individual basis and upon application by the student to the Office of the Dean of Arts.

These faculty breadth requirements may be met in a variety of ways in completing them, students are encouraged to earn a **Certificate In Liberal Arts**, a program specifically tailored for breadth of learning. Whether or not they complete the certificate program, students may take the faculty breadth requirements as an opportunity for exploratory study in advance of choosing a major discipline. Some departments will advise students as to subject areas and specific courses they recommend to prepare for their major programs. A substantial proportion of these requirements may also be applied to a number of cross-disciplinary major or minor programs within the faculty. In planning the most effective way to fulfill the breadth requirements students should seek advice both in the Academic Advice Centre and in any departments in which they may be planning to major.

Requirements for Acceptance and Continuance

Prior to or upon registering for the semester in which the 61st credit is taken, students must formally declare a major program, and may, subject to the regulations below, apply for an honors program. The formal declaration establishes the exact requirements for graduation as they appear in the Calendar in effect at the time of declaration. Students are urged to keep a copy of the Calendar, known as the "Graduating Calendar", for reference.

Honors Program

Acceptance to the honors program is contingent upon satisfying the entrance requirements of the department concerned. Applicants for the honors program will normally be expected to have received a grade point average of 3.0 in subject(s) of the honors field. When admission has been granted, the student may then register as an honors student. To continue in the honors program, this 3.0 GPA must be maintained. Failure to maintain a GPA of 3.0 in the subject(s) of the honors program will place the student in the corresponding general degree program. Students will still be subject to the regulations of the original "Graduating Calendar". If a student is subsequently reinstated into the honors program, the "Graduating Calendar" is the Calendar which was in effect at the time of the original acceptance into the program.

Students wishing to change their degree programs may do so at any time prior to graduation. A new formal declaration to this effect must be approved by the department of the new major and by the Dean of Arts office if a change of faculty is involved. At that time, the Calendar then in effect becomes the new "Graduating Calendar", and the requirements which it specifies for the degree program must be fulfilled.

Requirements for Graduation

Graduation GPA may be different from the cumulative GPA. Please refer to the graduation requirements which appear in the **general regulations** for the calculation of the graduation grade point average.

General Program

The minimum requirement for graduation is a graduation GPA of 2.0 AND a GPA of 2.0 in all upper and lower division courses taken in the major or minor department(s) with the exception that duplicate courses are counted only once. It should be noted that the university regulations governing the duplication of courses are vigorously applied in the Faculty of Arts. Students who do not obtain the minimum GPA in their major fields within the limits of five duplications will not be able to complete a major or minor degree within the Faculty of Arts.

Honors Program

For the award of the honors degree, a graduation GPA of 3.0 is required. If a graduation GPA of 3.5 or higher is obtained, the designation "First Class" will apply to the honors degree. (Please refer to the **general regulations** for details).

Load Levels

Students who have not yet completed 60 credit hours require the written consent of the Dean to take more than 16 credit hours in one semester. Students who have completed 60 credit hours require the written consent of the Dean to take more than 18 credit hours in one semester.

APPENDIX C

BACHELOR OF SCIENCE

GEOGRAPHY

The Department of Geography offers a program of study within the Faculty of Science leading to the degree of Bachelor of Science with a major or honors in Geography.

A student entering the program should contact a member of the Advising Committee to plan the course work for one of the recommended options:
biogeography, climatology, geomorphology or terrain evaluation.

Advising Committee:

W.G. Bailey	I. Hutchinson
C.B. Crampton	M.C. Roberts
E.J. Hickin	R.B. Sagar

Advisor: Ida Curtis, 7124 Classroom Complex, 291-4128

Geography Major Program

LOWER DIVISION COURSE REQUIREMENTS *(total Required Hours - 54)*

a) Required Geography Courses:

GEOG 100 Human Geography; 111 Physical Geography; 112 Introductory Geography

Two of GEOG 213 Geomorphology I; 214 Climatology I; 215 Biogeography I;

One of GEOG 221 Economic Geography; 241 Social Geography;

One of GEOG 250 Cartography I; 253 Aerial Photographic Interpretation
(21 semester hours)

b) Required Faculty of Science Courses:

BISC 101-4 Introduction to Biology; 102-4 Introduction to Biology
(8 hours)

CHEM 102-3 General Chemistry I for Physical Sciences; 103 General Chemistry II for Physical Sciences; 115-2 General Chemistry Laboratory I
(8 hours)

PHYS 101-3 General Physics I; 102-3 General Physics II; 130-2 General Physics Laboratory A
(8 hours)

MATH 101-3 Introduction to Statistics A; or 102-3 Introduction to Statistics B

and MATH 151-3 Calculus I; 152-3 Calculus

or MATH 154-3 Calculus I for the Biological Sciences; 155-3 Calculus II for the Biological Sciences

(9 hours)

Any student planning to take further courses in Chemistry, Mathematics or Physics may need to take MATH 251-3. Further, any student planning to take additional courses in Chemistry may need to take CHEM 118-2.

- c) Courses outside the Faculty of Science and outside the department of Geography Science stream:
A minimum of 6 hours.

UPPER DIVISION COURSE REQUIREMENTS
(Total Specified Hours - 37)

- a) Required Geography Courses - 300 Level
Physical Geography (Section A).
Three of:

GEOG 313 Geomorphology II
314 Climatology II

GEOG 315 Regional Ecosystems
317 Soil Geography

(12 hours)

Human Geography (Section B).
One of:

GEOG 322 World Resources
323 Manufacturing
324 Transportation
325 Service Activities
343 Transitional Societies
344 Modern Industrial Societies

GEOG 362 Urban Development
369 Human Microgeography
375 Historical Geography I
381 Political Geography
382 Population Geography
383 Regional Planning I
385 Agricultural Geography

(4 hours)

Techniques and Special Requirements (Section C)
One of:

GEOG 301 Geographic Ideas
and Methodology
351 Cartography 2
353 Remote Sensing

GEOG 354 Digital Cartography
355 Geographic Information
Systems
356 Cognitive Cartography

(4 hours)

b) Required Geography Courses - 400 Level

Two of:

GEOG 412 Quaternary Geology
and Geomorphology

413 Geomorphology III

414 Climatology III

415 Advanced Biogeography

GEOG 416 Pleistocene Geography

417 Biometeorology

418 Terrain Evaluation

419 Mass Transfer in the
Biosphere**(8 hours)**

Plus 8 additional hours of Upper Level courses from any 300 or 400 level courses in Geography.

c) Faculty of Science Courses:

A minimum of 9 semester hours of 300-400 division BISC, CHEM, MATH or PHYS courses.
(9 hours)

A student must present a total of 44 semester hours of upper division credit (excluding EDUC 401, 402, 405 and 406), and additional credit in any courses (excluding EDUC 401, 402, 405 and 406) sufficient to bring the total credit for the degree to 120 semester hours. (See Faculty of Science requirements in the University calendar).

Honors Program

The Honors program is the same as the Major program except that it must include a minimum of 60 semester hours of 300-400 division courses, of which 48 must be in Geography or Faculty of Science subjects. A student must complete a total of 132 semester hours of credit. (See Faculty of Science requirements). Entry into the honors program requires the approval of the department.

APPENDIX K

**EXTRACTS FROM THE 1988-89 SIMON FRASER
UNIVERSITY CALENDAR, SHOWING REGULATIONS
OF THE FACULTY OF ARTS, FACULTY OF SCIENCE,
AND DEPARTMENT OF GEOGRAPHY**

Faculty of Arts

Location: Room 6168 - Academic Quadrangle
Telephone: 291-4414
Dean: R.C. Brown, B.S., M.S. (Oregon State), Ph.D. (Mich. State)

Associate Dean: E. Alderson, B.A. (Haverford), M.A., Ph.D. (Calif.)

Associate Dean: J. W. Ekstedt B.Sc. (Seattle Pac.), B.Div. (C'dia Sem.), M.A. (Chic.), M.Div. (C'dia Sem.), Ph.D. (Calif.)

DEGREES OFFERED

B.A. — General Program
 B.A. — Honors Program
 B.G.S. — General Studies Program
 M.A. — See *Graduate Studies*
 M.A. (Criminology) — See *Graduate Studies*
 M.A.—Teaching of French — See *Graduate Studies*
 Ph.D. — See *Graduate Studies*

DIPLOMAS AND CERTIFICATES OFFERED

The Faculty of Arts offers:

Extended Studies Diploma
 Extended Studies Diploma — Criminology
 Extended Studies Diploma — Ethnic Relations
 Extended Studies Diploma — Gerontology
 Extended Studies Diploma — Humanities
 Extended Studies Diploma — Public History
 Extended Studies Diploma — Social Policy Issues

B.C Studies Certificate
 Chinese Studies Certificate
 Criminology — General Certificate
 Criminology — Advanced Certificate
 French Canadian Studies Certificate
 French Language Proficiency Certificate
 Liberal Arts Certificate
 Public History Certificate
 Senior Citizens Certificate

Academic Advice

Each of the departments in the Faculty of Arts provides an advisory service for assisting in choosing courses to satisfy degree requirements. Students who have made a formal declaration of program should avail themselves of these services. Those who have not made a formal declaration will be advised by a representative of the Faculty in the Academic Advice Centre. Where specified, students should also consult the Office of the Dean of Arts regarding Arts regulations. Advisors should be consulted prior to each semester in which students intend to register.

Students may count any course for which credit is received towards the B.A. degree with the exception of EDUC 401-8, 402-7, 405-15, and 406-5.

LOAD LEVELS

Students who have not yet completed 60 credit hours require the written consent of the Dean to take more than 16 credit hours in one semester. Students who have completed 60 credit hours require the written consent of the Dean to take more than 18 credit hours in one semester.

BACHELOR OF ARTS DEGREE

General Program — Requirements

At least 120 semester hours which include:

- At least 70 semester hours in Arts subjects.
- At least 45 semester hours in upper division courses which must include at least 30 semester hours in upper division courses in an Arts major program.*
- Lower division prerequisites for at least one Arts major program.
- Satisfaction of the Faculty of Arts breadth requirements (see below).
- At least 30 semester hours taken outside the major department.

*A department may designate up to 8 credit hours of program related upper division courses offered by other departments, as being acceptable in fulfilling part of this requirement.

Honors Program — Requirements

At least 132 semester hours of credit which include:

- At least 82 semester hours in Arts subjects.
- At least 60 semester hours in upper division courses which must include at least 50 semester hours in upper division courses in an Arts honors program.*
- Lower division prerequisites for at least one Arts honors program.
- Satisfaction of the Faculty of Arts breadth requirements (see below).
- At least 30 semester hours taken outside the honors department.

*A department may designate up to 12 credit hours of program related upper division courses offered by other departments, as being acceptable in fulfilling part of this requirement.

Minor Program — Requirements

All minor programs offered by the Faculty of Arts require at least 15 upper division hours taken within a single discipline unless otherwise specified in the Calendar.

Breadth Requirements

In addition to completing the courses within a department required for a major or honors program in the Faculty of Arts, students must complete breadth requirements designed to acquaint them with areas of knowledge and modes of thought outside their discipline of specialization. The requirements are as follows:

- A minimum of 30 credit hours outside the Arts major or honors department. (For the purpose of this requirement, read "school" as department.)
- Courses from at least five departments outside the Arts major or honors department. No more than 9 credit hours from any one department may be counted toward the total of 30 required hours.

For the purpose of this last requirement the following academic units will count as separate "departments":

Archaeology (ARC)
 Biological Sciences (BISC)
 Business Administration (BUS)
 Canadian Studies (CNS)
 Centre for the Arts (FPA)
 Chemistry (CHEM)
 Communication (CMNS)
 Computing Science (CMPT)
 Criminology (CRIM)
 Economics (ECON and BUJEC)
 Education (EDUC, *except* EDUC 401, 402, 405, and 406)
 Engineering Science (ENSC)
 English (ENGL)
 French (FREN)
 Geography (GEOG)
 Gerontology (GERO)
 History (HIST)
 Humanities (HUM)
 Kinesiology (KIN)
 Latin American Studies (LAS)
 Linguistics (LING)
 Mathematics and Statistics (MATH and STAT)
 Philosophy (PHIL)
 Physics (PHYS)
 Political Science (POL)
 Psychology (PSYC)
 Sociology and Anthropology (SA)
 Spanish and Latin American Studies (includes SPAN and LAS)
 Women's Studies (WS)

Students are advised that course enrolment in some of these subjects may be limited to students with concentrations in those subjects. Courses that are not clearly within the above "departments", or courses transferred from other institutions in subject areas without direct equivalence at Simon Fraser may be counted toward these requirements on an individual basis and upon application by the student to the Office of the Dean of Arts.

These faculty breadth requirements may be met in a variety of ways. In completing them, students are encouraged to earn a **Certificate in Liberal Arts**, a program specifically tailored for breadth of learning. Whether or not they complete the certificate program, students may take the faculty

66 Arts — Bachelor of General Studies, Certificate in Liberal Arts

breadth requirements as an opportunity for exploratory study in advance of choosing a major discipline. Some departments will advise students as to subject areas and specific courses they recommend to prepare for their major programs. A substantial proportion of these requirements may also be applied to a number of cross-disciplinary major or minor programs within the faculty. In planning the most effective way to fulfill the breadth requirements students should seek advice both in the Academic Advice Centre and in any departments in which they may be planning to major.

Requirements for Acceptance and Continuance

Prior to or upon registering for the semester in which the 61st credit is taken, students must formally declare a major program, and may, subject to the regulations below, apply for an honors program. The formal declaration establishes the exact requirements for graduation as they appear in the Calendar in effect at the time of declaration. Students are urged to keep a copy of this Calendar, known as the "Graduating Calendar", for reference.

Honors Program

Acceptance to the honors program is contingent upon satisfying the entrance requirements of the department concerned. Applicants for the honors program will normally be expected to have received a grade point average of 3.0 in subject(s) of the honors field. When admission has been granted, the student may then register as an honors student. To continue in the honors program, this 3.0 GPA must be maintained. Failure to maintain a GPA of 3.0 in the subject(s) of the honors program will place the student in the corresponding general degree program. Students will still be subject to the regulations of the original "Graduating Calendar" If a student is subsequently reinstated into the honors program, the "Graduating Calendar" is the Calendar which was in effect at the time of the original acceptance into the program.

Students wishing to change their degree programs may do so at any time prior to graduation. A new formal declaration to this effect must be approved by the department of the new major and by the Dean of Arts office if a change of faculty is involved. At that time, the Calendar then in effect becomes the new "Graduating Calendar", and the requirements which it specifies for the degree program must be fulfilled.

Requirements for Graduation

Graduation GPA may be different from the cumulative GPA. Please refer to the graduation requirements which appear in the *general regulations* for the calculation of the graduation grade point average.

General Program

The minimum requirement for graduation is a graduation GPA of 2.0 AND a GPA of 2.0 in all upper and lower division courses taken in the major or minor department(s) with the exception that duplicate courses are counted only once. It should be noted that the university regulations governing the duplication of courses are vigorously applied in the Faculty of Arts. Students who do not obtain the minimum GPA in their major fields within the limits of five duplications will not be able to complete a major or minor degree within the Faculty of Arts.

Honors Program

For the award of the honors degree, a graduation GPA of 3.0 is required. If a graduation GPA of 3.5 or higher is obtained, the designation "First Class" will apply to the honors degree. (Please refer to the *general regulations* for details.)

BACHELOR OF GENERAL STUDIES DEGREE

The Bachelor of General Studies degree is a non-specialist degree program, administered within the Faculty of Arts. It is designed for students whose educational goals are not met by the other, more structured, undergraduate degree programs available in the University. Students may complete a minor or minors (but no major) in any academic area(s) as part of the B.G.S. degree.

Students who may be considering this program are strongly urged to consult the program advisor before declaring the B.G.S. as the goal. The faculty advisor will work with the student to develop a program of courses to achieve the student's academic objectives. Students who declare a B.G.S. will be asked to maintain a program plan in the office of the advisor, and to consult regularly regarding course selection.

The B.G.S. program may not be used as a second or subsequent Bachelor's degree, except by written approval of the Dean of Arts prior to admission. Students who hold a first degree and who are interested in a program of general studies may wish to consider an Extended Studies Diploma Program.

Requirements

Requirements for the degree are:

120 semester hours of credit, including at least 45 upper division semester hour credits. The minimum requirement for graduation is a graduation GPA of 2.0 AND a cumulative GPA of 2.0 in all upper division courses taken, except duplicate courses.

With the exception of EDUC 401-8, 402-7, 405-15 and 406-5, courses taken from any of the faculties may be used to satisfy the requirements for the degree, but students are cautioned that their admission to courses is subject to the prerequisite requirements of the various departments.

Transfer

Special transfer regulations for the B.G.S. degree provide broadened opportunities for degree completion for students who may have difficulty in availing themselves of courses at Simon Fraser:

In accordance with normal university regulations, 60 hours of transfer and/or course challenge credit may count toward an SFU degree. In addition, a further 30 hours of transferable credit from a degree granting institution recognized and accepted by SFU may be credited toward the B.G.S. degree, provided that the student also completes at least 30 of the required 45 hours of upper division credit in Simon Fraser University courses.

Note that even within these special transfer regulations, students must complete a total of 45 hours of upper division credit. Any minor program undertaken within the B.G.S. must include at least seven hours of upper division credit earned at Simon Fraser. Please refer to the *general regulations* governing transfer credit.

CERTIFICATE IN LIBERAL ARTS

The Certificate in Liberal Arts provides students with a broad exposure to areas of knowledge and methods of inquiry that can be considered essential to a liberal education. It is available to all undergraduate students in the University who desire a program structured for breadth of learning. It may be taken in conjunction with a degree program, or it may be taken by students not currently seeking a degree. Students planning to obtain a B.A. within the Faculty of Arts may choose to complete the certificate in such a way that most or all of the Faculty of Arts breadth requirements are fulfilled by the same course.

The Certificate in Liberal Arts requires the completion of ten courses, comprising at least 30 credit hours, from among a list of designated courses. These courses, which include both lower division and some upper division courses, have been carefully chosen for their suitability in providing accessible and valuable material for the generally interested student.

The courses that can be applied toward the Certificate in Liberal Arts are listed in 12 sets. Each set includes courses from various departments in the University. In order that the certificate student will become acquainted with various fields of inquiry and approaches to knowledge, the ten courses required must be distributed across these sets in the manner described below (see *distribution requirements*). The sets, together with brief descriptions of the kinds of courses that the student will find in each of them, are as follows:

1. **Verbal skills**
These courses are designed to enhance the student's mastery of some basic tools of verbal reasoning and expression. They include courses on writing and critical thinking, and introductory language courses. Students who take an introductory course in a language other than English are strongly urged to complete a second course in that language as part of their certificate program.
2. **The Study of Theory and Theory-Building**
These courses are designed to introduce students to the nature of explanatory systems in various fields of inquiry. They include courses from various disciplines that focus on the dynamics of theory construction and on the historical evolution of theory within that discipline. Courses in this set will give students some appreciation for the ways in which the processes of reasoning, argument, observation and analysis are included within the development of disciplines.
3. **The Analysis of Contemporary Issues**
These courses are designed to examine some current social problems and controversies, emphasizing the application of appropriate conceptual and investigative methods to areas of public concern. Courses in this set will give students some appreciation for the ways in which careful reasoning and disciplinary knowledge can be applied in clarifying the discussion of public issues.
4. **The Study of Literature**
These courses are designed to introduce students to important liter-

ary works and to ways of understanding literary expression. They include courses on literature written in English and in other languages, as well as literature in translation.

5. **Fine and Performing Arts**
These courses are designed to familiarize students with non-literary modes of artistic expression and with important works of art. They include courses on the history and criticism of various arts forms.
6. **Studies in Culture and Civilization**
These courses introduce students to the widely-based study of cultures and civilizations. They include courses that consider the development of human values, and that take comparative and interdisciplinary approaches to culture, as well as historical studies that include substantial attention to cultural themes.
7. **The Study of Period and Place**
These courses study a spectrum of developments in human society with particular emphasis on their historical or regional particularity, and introduce some of the methods associated with such study. They include courses that focus on regions and regionalism, as well as courses that concentrate on specific historical periods.
8. **Foundations of Social Science**
These courses provide an introduction to fundamental concepts and methods of investigation in the various social science disciplines.
9. **Social and Behavioral Analysis**
These courses articulate an approach to the study of social structures or to individual or group behavior and apply that perspective to a particular area of social investigation.
10. **Natural Science**
These courses introduce students to methods basic to the natural sciences and to findings in at least one specific science.
11. **The Impact of Science and Technology**
These courses investigate the social impact of developments in science, technology, and computational and quantitative methods.
12. **Quantitative skills**
These courses will enhance the student's mastery of mathematical skills and tools for quantitative reasoning. They include basic level mathematics and computing courses, and statistics-oriented research methods courses.

Distribution Requirements

Eight of the required 10 courses must be distributed among the above sets as follows:

- two courses drawn from any two of the sets 1-3;
- two courses drawn from any two of the sets 4-6;
- two courses drawn from any two of the sets 7-9;
- two courses drawn from any two of the sets 10-12.

The two additional courses required may be selected from any two sets.

Within these distribution requirements, students are free to select any listed courses, and are encouraged to tailor their choices toward their own academic needs and interests. Credits applied toward this certificate may not be applied toward any other Simon Fraser University certificate or diploma, but may also be applied toward major or minor program requirements.

Course Lists

The lists of courses within each set are published on an annual basis and are available through Academic Advice and the Office of the Dean of Arts. The lists include both courses regularly approved by Senate for inclusion in the program and "occasional" courses that are approved as certificate courses only for a single offering.

Students should be aware that some listed courses have prerequisites. In most such instances the specific course prerequisites may also be completed within the certificate program.

Students should also consult the Calendar listing and course outline for any course they may be considering in order to understand clearly the nature of the course and any prerequisites. Some of the listed courses may be very demanding for students without adequate preparation in the subject area. Advice regarding courses and course selection is available through departmental advisors, the Office of the Dean of Arts, and the Academic Advice Centre.

Transfer Credit

Transfer credit toward the Certificate in Liberal Arts is permitted to a maximum of 15 credit hours. Normally, only credit that is assigned as directly equivalent to a course regularly listed within the certificate program may be transferred.

Relation to Faculty of Arts Breadth Requirements

The Faculty of Arts recommends that students planning to major within the Faculty complete the Faculty of Arts breadth requirements through the certificate program. Completion of the certificate does not exempt students from the Faculty requirements, but it is readily possible to fill these requirements entirely within the certificate program.

DEPARTMENT OF GEOGRAPHY

Location: Room 7123 — Classroom Complex

Telephone: 291-3321

Chairman: R. Hayter, B.A. (Ncle, U.K.), M.A. (Alta.), Ph.D. (Wash.)

Professors Emeriti

F.F. Cunningham B.A., M.A., Dip.Ed. (Durh.), F.R.G.S.

J.W. Wilson B.Sc. (Glas.), M.Sc. (M.I.T.), M.P.P. (N. Carolina)

P.L. Wagner A.B., M.A., Ph.D. (Calif.)

Professors

C.B. Crampton B.Sc., Ph.D. (Brist.)

M.E. Eliot Hurst B.Sc., Ph.D. (Durh.)

E.J. Hickin B.A., Ph.D. (Syd.)

A. MacPherson M.A. (Edin.), F.R.Met.S.

T.K. Poiker Dr.phil. (Hdbg.)

M.C. Roberts B.Sc. (Lond.), M.A. (Tor.), Ph.D. (Iowa), F.R.G.S.

S.T. Wong A.B. (Augustana), A.M. (Yale), Ph.D. (Chic.)

Associate Professors

W.G. Bailey B.Sc. (Tor.), Ph.D. (McM.)

R.C. Brown B.S., M.S. (Oregon State), Ph.D. (Mich. State), Dean of Arts

L.J. Evenden B.A. (McM.), M.A. (Georgia), Ph.D. (Edin.)

E.M. Gibson B.A., M.A. (W. Ont.), Ph.D. (Br. Col.)

R. Hayter B.A. (N'cle U.K.), M.A. (Ala.), Ph.D. (Wash.), Department Chairman

I. Hutchinson B.A. (Liv.), M.Sc.B (McG.), Ph.D. (S. Fraser)

P.M. Koroscil B.A., M.A., Ph.D. (Mich.)

J.T. Pierce B.A. (Tor.), M.A. (Wat.), Ph.D. (Lond.)

A.C.B. Roberts B.A. (Tor.), M.A. (Wat.), Ph.D. (York)

R.B. Sagar B.Sc. (Lond.), M.Sc. (McG.), F.R.Met.S.

Assistant Professors

J.A.C. Brohman B.A. (Carlton), M.A. (Calif.)

A.M. Gill B.A. (Hull), M.A. (Alta.), Ph.D. (Manit.)

W.G. Gill B.A., M.A., Ph.D. (Br. Col.), Executive Director, Harbor Centre

R.B. Horsfall B.A. (Reed), M.A., Ph.D. (Johns H.)

Advisor:

Ida Curtis
Room 7124 — Classroom Complex
291-4128

The Department of Geography offers a program of study within the Faculty of Arts leading to the degree of Bachelor of Arts with honors, major or minor standing in Geography. Students interested in a Bachelor of Science degree in Geography should refer to the *Faculty of Science* section.

General Program

(Students should check that they have fulfilled the requirements of the Faculty of Arts as detailed in the *Faculty of Arts* section.)

Lower Division Minimum Course Requirements: B.A.

1. Students intending to major, minor or take honors in Geography are required to take:

GEOG	100-3	Human Geography	} (6 credit hours)
	111-3	Physical Geography	

2. B.A. honors and major students must take **one** course at the 200 level from section A and both GEOG 221-3 and 241-3 from section B. In addition, 250 or 251 are required from section C.

(12 credit hours)

3. For the minor the following are required: GEOG 100-3, 111-3, 1221-3 or 241-3, and 250-3.

(12 credit hours)

Section A — Physical Geography

GEOG	111-3	Physical Geography
	112-3	Introductory Geology
	213-3	Geomorphology I
	214-3	Climatology I
	215-3	Biogeography

Section B — Human Geography

GEOG	100-3	Human Geography
	102-3	World Problems in Geographic Perspective
	212-3	Geography of Natural Hazards
	221-3	Economic Geography
	241-3	Social Geography

Section C — Techniques and Special Requirements

GEOG	250-3	Cartography I
	251-3	Methods in Spatial Analysis
	253-3	Aerial Photographic Interpretation

Section D — Regions

GEOG	162-3	Canada
	263-3	Selected Region
	265-3	Geography of British Columbia

Upper Division Minimum Course Requirements: B.A.

Students are expected to consult with a departmental undergraduate advisor when they formally declare a major, honors or minor in Geography. Students who do not seek advice from the department run the risk of prolonging their programs.

Majors and Honors

- 20 semester hours of 300 level courses, including GEOG 301-4 and at least one course from section A. (20 credit hours) (24)
- 12 semester hours of 400 level courses, including at least one course from section D. (12 credit hours)

Total credit hours required 32 (30)

Honors

In addition, honors students must take GEOG 491-4 and 14 additional credit hours from courses in the 300 and 400 level listings. (18 credit hours)

HONS

Total credit hours required

50

Minor

16 credit hours in GEOG courses numbered 300 and 400

(16 credit hours)

Total credit hours required

16

Division Structure: Upper Levels

Section A — Physical Geography

GEOG	313-4	Geomorphology II
	314-4	Climatology II
	315-4	Regional Ecosystems
	317-4	Soil Geography
	412-4	Quaternary Geology and Geomorphology
	413-4	Geomorphology III
	414-4	Climatology III
	415-4	Advanced Biogeography
	416-4	Pleistocene Geography
	417-4	Biometeorology
	418-4	Terrain Evaluation
	419-4	Mass Transfer in the Biosphere

Section B — Human Geography

GEOG	301-4	Geographic Ideas and Methodology
	322-4	World Resources
	323-4	Geography of Manufacturing
	324-4	Geography of Transportation
	325-4	Geography of Service Activities
	343-4	Geography of Transitional Societies
	344-4	Geography of Modern Industrial Societies
	361-4	Introduction to Urban Geography
	362-4	Geography of Urban Development
	369-4	Human Microgeography
	375-4	Historical Geography I
	381-4	Political Geography
	382-4	Population Geography
	383-4	Regional Planning I
	385-4	Introduction to Agricultural Geography
	420-4	Comparative Cultural Geography
	421-4	Geography of Resource Development
	422-4	Geography of the Third World
	423-4	Geography of Tourism and Outdoor Recreation
	424-4	Urban Transportation
	426-4	Industrial Organization, Location and Planning
	431-4	Landscape in Science, Art, Music and Literature
	441-4	Geography of Urban Regions
	444-4	Regional Planning II
	445-4	Resource Planning
	446-4	Geography of Contemporary Societies
	475-4	Historical Geography II

Section C — Techniques and Special Requirements

GEOG	351-4	Cartography II
	353-4	Remote Sensing
	354-4	Digital Cartography
	355-4	Geographic Information Systems
	356-4	Cognitive Cartography
	358-2	Field Techniques in Physical Geography
	359-2	Methods in Human Geography
	404-2	Directed Readings
	405-4	Directed Readings
	407-4	Quantitative Methods in Geography
	452-4	Advanced Topics in Geoprocessing
	453-4	Digital Image Processing
	490-4	Selected Topics
	491-4	Honors Essay
	498-4	Field Studies

Section D — Regions

GEOG	460-4	Selected Regions
	462-4	Canada and the United States
	464-4	Intertropical Africa
	466-4	Latin American Regional Development
	469-4	Canadian North and Middle North
	470-4	Western Canada

Supporting Courses Outside Geography

Students proposing to major or to take honors in Geography will profit greatly if they select a wide range of outside subjects during the first four levels; Economics, Sociology and Anthropology, Political Science, History, and many subjects in the Faculty of Science can be of great value to the

prospective geographer. A student may wish to take a minor in one of these fields, and any faculty member in the Department of Geography will be pleased to advise.

Students with credit or claiming advanced standing in Geography should consult an undergraduate advisor in the department concerning the structure of their programs.

Languages Other Than English

Some graduate schools require some proficiency in a language other than English. Those who contemplate graduate studies in Geography are advised to include courses in languages other than English in their programs.

Geography/Latin American Studies Joint-Major Program

The attention of students is drawn to the joint major program in Geography and Latin American Studies. See the *Department of Spanish and Latin American Studies* section in this Calendar.

Faculty of Science

Location: Shrum Science Centre P9451
Telephone: 291-3771

Dean: C.H.W. Jones, B.Sc., Ph.D. (Manc.)

Research interests of Faculty members are given in the *Graduate Studies* section of this Calendar.

DEGREES OFFERED IN THE FACULTY OF SCIENCE

B.Sc. — Major program
 B.Sc. — Honors Program
 M.P.M. — see *Graduate Studies* section
 M.Sc. — see *Graduate Studies* section
 Ph.D. — see *Graduate Studies* section

REQUIREMENTS FOR THE B.Sc. DEGREE PROGRAMS

The Faculty of Science offers major and honors programs in each of the following disciplines: Applied Physics, Biochemistry, Biological Sciences, Chemical Physics, Chemistry, Geography, Mathematics, Management and Systems Science, and Physics. Honors programs are offered in Mathematical Physics and in Mathematics/Computing Science.

Minor programs, which may be taken in conjunction with a major or honors program in other disciplines, are offered in Biochemistry, Biological Sciences, Chemistry, Environmental Toxicology, Mathematics, Nuclear Science, Physics, Quaternary Studies and Statistics.

An Extended Studies Diploma program is available in Environmental Toxicology and other extended programs may be arranged on an individual basis.

Major Program

A major program provides a broad general education in several fields of study and some specialization in one field known as the major. Optional programs which include double majors or majors and minors, are possible. The general regulations are given below in Faculty of Science requirements for the B.Sc. (Major), and for details on specific course requirements students should refer to the academic department concerned. Students who do not wish to pursue any specialization may elect to undertake a Bachelor of General Studies (B.G.S.) degree. Information regarding this latter option may be found in the Faculty of Arts requirements.

FACULTY OF SCIENCE REQUIREMENTS FOR THE B.Sc. (MAJOR)

- 120 semester hours of credit which include:
 - a minimum of 28 semester hours of upper division credit (i.e. courses numbered 300 and 400) in one subject area, formally known as the major.
 - additional semester hours of upper division credit; bringing the total to a minimum of 44 semester hours of upper division credit.
 - a minimum of 6 semester hours of electives in subjects taken outside the Faculty of Science (excluding EDUC 401, 402, 405 and 406).
- Additional requirements as specified by the major program.
- A graduation grade point average of 2.0 calculated on the required 120 semester hours, or on the 60 semester hours taken in the last four levels including the 44 semester hours of upper division credit.
- A cumulative grade point average of 2.0 in the courses comprising the major studies.

Honors Program

An honors program provides a broad general education with "in depth" study in a single field and requires the student to concentrate his/her studies in the 5th to 8th levels in the chosen field. This program is recommended for students who intend to proceed to advanced degrees, provided that they meet the entrance requirements and maintain the required standing.

Students applying for admission to an honors program will normally be expected to have achieved a cumulative grade point average of 3.0 (B standing). A student is expected to maintain this standard to continue in the honors program.

FACULTY OF SCIENCE REQUIREMENTS FOR THE B.Sc. (HONORS AND HONORS FIRST CLASS)

- 132 semester hours of credit as prescribed by the honors department which include:

- a minimum of 48 semester hours of upper division credit in one subject area
 - additional semester hours of upper division credit bringing the total to a minimum of 60 semester hours of upper division credit
 - a minimum of 6 semester hours of electives in subjects taken outside the Faculty of Science (excluding EDUC 401, 402, 405 and 406)
- Additional requirements as specified by the honors program.
 - A graduation grade point average of 3.0 for honors or 3.5 for first class honors calculated on the required 132 semester hours or on 60 required semester hours of upper division credit.

Program Guidelines

- At the outset, students are requested to indicate their intended major so as to facilitate counselling.
- Students who have not determined their intended major or are intending to transfer to a professional school (i.e. Medicine, Dentistry, etc.) should seek advice from the Academic Advice Centre or the Office of the Dean of Science.
- Declaration of major or honors must be officially accepted by the department in which this program will be pursued, prior to the completion of 60 semester hours of credit.
- New students intending to take more than 15 semester hours in their first semester of studies should seek advice from the Academic Advice Centre, the Office of the Dean of Science or their major department.
- Normally, the graduation requirements, as published in the Calendar at the time of formal declaration of major or honors, will apply.
- Programs totalling more than 18 hours of credit per semester require the approval of the Dean.

Minor Program

The selection of courses used to fulfill the requirements of a minor program should be made in consultation with the advisor in the department involved. Some suggested programs and lists of prerequisites are given in the departmental entries. An average grade of at least 2.0 is required in those courses used to satisfy the requirements for a minor.

CO-OPERATIVE EDUCATION PROGRAMS

Co-operative Education programs are available in Biological Sciences, Chemistry, Mathematics and Physics. Details are given in the departmental sections and in the *Co-operative Education* section.

TRANSFER CREDIT AND BACHELOR OF SCIENCE DEGREES FOR STUDENTS WHO SUCCESSFULLY COMPLETE FIRST YEAR MEDICAL SCIENCE PROFESSIONAL TRAINING:

Students who have completed at least 90 semester hours credit in a science degree program and are accepted into an accredited professional program in medicine, dentistry, or veterinary medicine are eligible to receive a Bachelor of Science degree from Simon Fraser University after successful completion of the first year of professional study. To be acceptable, the courses taken in the professional program must not duplicate courses already taken at SFU and must be acceptable for transfer credit in a major or honors degree program. Candidates must apply for transfer credit and for receipt of the Bachelor's degree through Office of the Registrar, Simon Fraser University. Since official transcripts of the work completed in the first year of the professional program are required for transfer credit purposes, application for graduation should be delayed until the Summer semester following the completion of requirements.

REQUIREMENTS FOR STUDENTS WISHING TO TRANSFER INTO PROFESSIONAL SCHOOLS

a) Engineering Transfer Program

Advisors: Ms. Mary E. MacDonald
 School of Engineering Science, AQ 5134
 291-4295

Dr. D.L. Sharma
 Mathematics and Statistics, TLX 10523
 291-3636

Dr. R. Frindt
 Physics, P8470
 291-3161

Mr. Darrell Zarn
School of Engineering Science, AQ 5003
291-3310

Engineering Study in B.C.

To complete engineering degree studies in British Columbia, students studying in the Engineering Transfer program at Simon Fraser must transfer to an Engineering program at SFU, UBC or UVic.

International students who are not Canadian residents, are not eligible to transfer to UBC and must apply directly to UBC from their home countries.

Transfer to the Engineering Program at the University of B.C.

Students wishing to enter second year Engineering at UBC are eligible to be considered if they have an overall grade point average of 2.5 including all semesters and any failed courses. Students who have taken first year science are eligible to be considered for admission to first year Engineering at UBC if they have achieved an overall grade point average of at least 2.5, including any failed courses, with a grade point average of at least 2.7 in Mathematics, Physics and Chemistry with no grade less than a C in these subjects.

Students who complete the following courses and who meet the UBC Faculty of Applied Science admission standards will be eligible to be considered for admission to second year Engineering. UBC course ASPC 151, Engineering Graphics, must be taken along with the normal second year program at UBC.

The courses listed below as a typical sequence, are required for entry into the second year of Engineering and those designated with an asterisk (*) are required for transfer into the first year Engineering. The elective requirement can be met by courses from the Faculty of Arts or Business Administration and/or combinations with such courses as BISC 101-4, 102-4.

Additional courses may also be transferable. An advisor at UBC must be consulted if these courses are to be included.

Typical Course Sequence

Chemistry, Mathematics and Physics courses are required in the order listed to meet prerequisites. Other courses may be scheduled in various orders, but selections should be approved by an advisor.

Semester 1 (Fall)

*CHEM 102-3	General Chemistry I for Physical Sciences
*CHEM 115-2	General Chemistry Lab. I
*MATH 151-3	Calculus I
*PHYS 120-3	Physics I
*One of ENGL 101, 102, 103, 104	
*Elective-3	

Semester 2 (Spring)

*CHEM 103-3	General Chemistry II for Physical Sciences
*MATH 152-3	Calculus II
*PHYS 121-3	Physics II
*PHYS 131-2	General Physics Laboratory B
*One of ENGL 101, 102, 103, 104	
*Elective-3	

At this stage the student might transfer to the first year of the UBC program or to the SFU Engineering Science program.

Semester 3 (Fall)

MATH 232-3	Elementary Linear Algebra
MATH 251-3	Calculus III
MATH 262-4	Engineering Mechanics I
PHYS 233-2	Introductory Physics Laboratory A
GEOG 112-3	Introductory Geology

Semester 4 (Spring)

MATH 252-3	Vector Calculus
MATH 310-3	Introduction to Differential Equations
PHYS 344-3	Thermal Physics
CMPT 102-3	Introduction to Programming for Science Students
MATH 263-4	Engineering Mechanics II

At this point the student might transfer to the second year of the UBC program or to the SFU Engineering Science program.

Transfer to the Engineering Science Program at SFU

Engineering Science at SFU is a restricted entry program with a fixed enrolment limit. Students planning entry through the Engineering Transfer program should discuss their plans with the Engineering Science advisor.

b) Faculty of Dentistry at the University of B.C. requires the following courses which are prerequisites for entrance into the first year of Dentistry (D.M.D.):

ENGL	any two of 101, 102, 103, 104
BICH	301/302 (or BISC 201/301)
BISC	101/102
CHEM	104/105/115/118 (or 102/103/115/119), 251/252/256 and 356
MATH	151/152 (or 154/155)
PHYS	101/102/130 (or 120/121/131)

Additional courses are required to complete 6 semesters (90 semester hours) of study. These should be chosen in accordance with a specific degree program at SFU but students are advised to select some courses from disciplines in the humanities and social sciences.

c) Vancouver Vocational Institute requires the following courses which are prerequisites for entrance into the Dental Hygiene program:

ENGL	any two of 101, 102, 103, 104
BISC	101/102
CHEM	104/105/115/118
PSYC	101/105, or 101/106
Electives	6 semester hours.

d) Faculty of Forestry at the University of B.C.

The Faculty of Forestry offers a four-year degree program. The new curricula in Forestry allow two admission pathways. One is directly from high school, the other follows a year of university science at UBC or its equivalent at another post-secondary institution.

If first-year science is taken at SFU, the following courses are required:

ENGL	any two of 101, 102, 103, 104
BISC	101/102
CHEM	102/103/115/119
MATH	151/152 (or 154/155 or 157/158)
PHYS	101/102/130 (or 120/121/131)

Students who elect to apply after one year of science will need three or four years after completion of the first year science to fulfill the Forestry degree requirements, depending on the Forestry program chosen.

e) Faculty of Medicine at the University of B.C. requires the following courses which are prerequisites for entrance into the first year of Medicine:

ENGL	any two of 101, 102, 103, 104
BICH	301/302 (or BISC 201/301)
BISC	101/102
CHEM	104/105/115/118 (or 102/103/115/119), 251/252/256 and 356
MATH	151/152 (or 154/155) or 157/158, (or STAT 102/MATH 151, or STAT 102/MATH 154), STAT 102/MATH 157)
PHYS	101/102/130 (or 120/121/131)

Other admission requirements will remain as defined in the University of British Columbia Faculty of Medicine Calendar.

The number of applicants for entrance into the University of British Columbia Faculty of Medicine considerably exceeds the number of available places in the entering class; therefore, students planning to enter into Medicine after the sixth level of work at Simon Fraser University should arrange their programs so that they will be able to complete a Major degree at SFU in the event that they are not accepted by the Faculty of Medicine.

f) Faculty of Pharmaceutical Sciences at the University of B.C. requires the following courses which are prerequisites for entrance into the first year of Pharmacy:

ENGL	any two of 101, 102, 103, 104
CHEM	104/105/115/118 (or 102/103/115/119)
MATH	151/152 (or 154/155)
BISC	101/102 or PHYS 101/102/130 (or 120/121/131) or
Electives	6 semester hours

A GPA of not less than 2.4 must be obtained in all required courses.

Students who have completed the equivalent of second year science may be admitted to the second year of Pharmacy. Students should consult the Faculty of Pharmaceutical Sciences at the University of B.C.

g) School of Rehabilitation Medicine at the University of B.C. requires the following courses:

ENGL	any two of 101, 102, 103, 104
BISC	101/102

118 Science -

CHEM 104/105/115/118 (or 102/103/115/119)
 MATH 151/152 (or 154/155, or 157/158)
 PSYC 101/105 (or 101/106)

Intending applicants to the school should note that orientation sessions are offered; it is recommended that they attend and contact the school during September, if interested.

h) Western College of Veterinary Medicine at the University of Saskatchewan, Saskatoon, will require by the 1988-89 Academic Year the following courses:

ENGL any two of 101, 102, 103, 104
 BICH 301/302 (or BISC 201/301)
 BISC 101, 102, 202 and 303
 CHEM 104/105/115/118 (or 102/103/115/119) and 251/256
 MATH 154/155 (or 151/152, or STAT 102/MATH 154, or
 STAT 102/MATH 151)
 PHYS 101/102/130 (or 120/121/131)
 Elective 15 semester hours

The choice of electives should be based upon the program in which the student is enrolled, and may include subjects not related to science. Students are encouraged to choose electives which will liberalize or broaden their perspectives. The electives taken should not include courses which are equivalent to B.C. High School Grade 12, or which are general education courses at the 000 division.

General Note:

All course requirements should be completed by the end of the Spring semester preceding the proposed date of entry to a professional school.

Teaching Careers

Students interested in elementary or secondary teaching should consult the Faculty of Education regarding requirements for entry into the Professional Development Program and Teacher Certification before entering the upper levels of their programs. (See also the *Faculty of Education* section.)

Languages other than English

Most graduate schools require proficiency in one or two languages other than English. Students who intend to pursue studies at the graduate level at another university are advised to include in their programs, at least 6 semester hours of course work in languages other than English. In general, the most useful languages for reading research papers are German, French and Russian.

GENERAL EDUCATION COURSES

Several courses have been designed with no prerequisite structure and are meant to convey a broad perspective of scientific outlook to students who are non-specialists in science. These courses are as follows:

Science:	SCI	010-3	Contemporary Topics in the Natural Sciences. (This course may be offered by any of the Science department.)
Biological Sciences:	BISC	003-3	Ecology and the Population Explosion
		004-3	Apiculture: An Introduction to Bees and Beekeeping
		105-3	Biology and the Human Species
Chemistry:	CHEM	003-3	Chemistry, Technology and Society
		004-3	Pollution, Energy and Resources
		005-3	The Chemistry of Life

GEOGRAPHY PROGRAM

Location: Room 7123 — Classroom Complex
Telephone: 291-3321

Geography (B.Sc.)

Advising Committee: W.G. Bailey
 C.B. Crampton
 E.J. Hickin
 I. Hutchinson
 M.C. Roberts
 R.B. Sagar

Advisor: Ida Curtis
 7124 Classroom Complex
 291-4128

The Department of Geography offers a program of study within the Faculty of Science leading to the degree of Bachelor of Science with a major or honors in Geography. Students interested in a Bachelor of Arts degree in Geography should refer to the *Faculty of Arts*.

Requirements for the Bachelor of Science in Geography are set out below.

A student entering the program should contact a member of the Advising Committee to plan the course work for one of the recommended options: biogeography, climatology, geomorphology or terrain evaluation.

Geography Major Program

LOWER DIVISION COURSE REQUIREMENTS

(Total Required Hours — 54)

a) Required Geography Courses:

GEOG 100-3 Human Geography
 111-3 Physical Geography
 112-3 Introductory Geology

Two of

GEOG 213-3 Geomorphology
 214-3 Climatology I
 215-3 Biogeography

One of

GEOG 221-3 Economic Geography
 241-3 Social Geography

One of

GEOG 250-3 Cartography I
 253-3 Aerial Photographic Interpretation

(21 semester hours)

b) Required Faculty of Science Courses:

BISC 101-4 Introduction to Biology
 102-4 Introduction to Biology

(8 hours)

CHEM 102-3 General Chemistry I for Physical Sciences
 103-3 General Chemistry II for Physical Sciences
 115-2 General Chemistry Laboratory I

(8 hours)

PHYS 101-3 General Physics I

Program for Honors

The honors program is the same as the major program except that it must include a minimum of 60 semester hours of 300-400 division courses, of which 48 must be in Geography or Faculty of Science subjects. A student must complete a total of 132 semester hours of credit. (See *Faculty of Science* requirements.) Entry into the honors program requires the approval of the department.

126 Science —

102-3 General Physics II
 130-2 General Physics Laboratory A

(8 hours)

STAT 101-3 Introduction to Statistics, Option A
 (or STAT 102-3 Introduction to Statistics, Option B)
 and

MATH 151-3 Calculus I
 152-3 Calculus II

or MATH 154-3 Calculus I for the Biological Sciences
 155-3 Calculus II for the Biological Sciences

(9 hours)

Any student planning to take further courses in Chemistry, Mathematics or Physics may need to take MATH 251-3. Further, any student planning to take additional courses in Chemistry may need to take CHEM 118-2.

c) Courses outside the Faculty of Science and outside the department of Geography Science stream:

A minimum of 6 hours.

UPPER DIVISION COURSE REQUIREMENTS

(Total Specified Hours — 37)

a) Required Geography Courses — 300 Level

Three of

GEOG 313-4 Geomorphology II
 314-4 Climatology II
 315-4 Regional Ecosystems
 317-4 Soil Geography

(12 hours)

One of

GEOG 322-4 World Resources
 323-4 Geography of Manufacturing
 324-4 Geography of Transportation
 325-4 Geography of Service Activities
 GEOG 343-4 Geography of Transitional Societies
 344-4 Geography of Modern Industrial Societies
 362-4 Geography of Urban Development

GEOG 369-4 Human Microgeography
 375-4 Historical Geography I
 381-4 Political Geography
 382-4 Population Geography
 383-4 Regional Planning I
 385-4 Introduction to Agricultural Geography

(4 hours)

One of

GEOG 301-4 Geographic Ideas and Methodology
 351-4 Cartography II
 353-4 Remote Sensing
 354-4 Digital Cartography
 355-4 Geographic Information Systems
 356-4 Cognitive Cartography

(4 hours)

b) Required Geography Courses - 400 Level

Two of

GEOG 412-4 Quaternary Geology and Geomorphology
 413-4 Geomorphology III
 414-4 Climatology III
 415-4 Advanced Biogeography
 416-4 Pleistocene Geography
 417-4 Biometeorology
 418-4 Terrain Evaluation
 419-4 Mass Transfer in the Biosphere

(8 hours)

Plus 8 additional hours of upper level courses from any 300 or 400 level courses in Geography.

c) Faculty of Science Courses

A minimum of 9 semester hours of 300-400 division BISC, CHEM, MATH or PHYS courses.

(9 hours)

A student must present a total of 44 semester hours of upper division credit (excluding EDUC 401, 402, 405 and 406), and additional credit in any courses (excluding EDUC 401, 402, 405 and 406) sufficient to bring the total credit for the degree to 120 semester hours. (See *Faculty of Science* requirements.)

UNDERGRADUATE COURSES

GEOGRAPHY (GEOG) FACULTY OF ARTS

GEOG 100-3 Human Geography

This course introduces the basic systematic approaches in the study of contemporary human geography including the distribution of population, spatial aspects of economic, cultural and political development, landscape and resource study.

Students with credit for GEOG 101, 121 or 141 may not take this course for further credit.

GEOG 102-3 World Problems in Geographic Perspective

Current world scale problems are examined in their regional and global contexts, with emphasis being placed on the importance of dynamics of the natural environment in human affairs. (Lecture/Tutorial)

GEOG 111-3 Physical Geography

An introduction to landforms, climates, soils and vegetation; their origins, distributions, inter-relationships and roles in the ecosystem. Laboratory work and field trips are included. (Lecture/Laboratory)

GEOG 112-3 Introductory Geology

Basic geology for geographers — an introduction to mineralogy, petrology, weathering, structural geology, methods of dating geological information, and the geological column. Laboratory work and field trips are included. (Lecture/Laboratory)

GEOG 162-3 Canada

The geographical character of Canada; the Canadian environment, regional differences in socio-economic growth. (Lecture/Tutorial)

Students with credit for GEOG 262 may not take this course for further credit.

GEOG 212-3 Geography of Natural Hazards

An introduction to the occurrence and origin of natural hazards such as volcanic eruptions, landslides, etc. Interaction between the relevant natural processes and society will be examined, as well as prediction of natural events and the amelioration of the effects of such events within different cultural contexts. (Lecture/Tutorial)

Prerequisite: GEOG 111 or 112.

Students who completed GEOG 312 prior to Fall 1988 may not take this course for further credit.

GEOG 213-3 Geomorphology I

An examination of landforms, processes, laws, and theories of development; types and distributions. (Lecture/Laboratory)

Prerequisite: GEOG 111 or 112

Students who completed GEOG 313 prior to Fall 1988 may not take this course for further credit.

GEOG 214-3 Climatology I

A review of the basic principles and processes involved in physical and dynamic climatology, with particular emphasis on global distributions and change. (Lecture/Laboratory)

Prerequisite: GEOG 111

Students who completed GEOG 314 prior to Fall 1988 may not take this course for further credit.

GEOG 215-3 Biogeography

An examination of the abiotic and biotic factors that control the distribution and development of plant communities, including climatic and geological change. (Lecture/Laboratory)

Prerequisite: GEOG 111

Students who completed GEOG 315 prior to Fall 1988 may not take this course

for further credit. Students granted credit for GEOG 215 may not be granted credit for BISC 204.

GEOG 221-3 Economic Geography

The basic concepts of economic geography, involving consideration of the spatial organization and development of economic and resource based systems. (Lecture/Tutorial)

Prerequisite: GEOG 100

Students with credit for GEOG 121 may not take this course for further credit.

GEOG 241-3 Social Geography

Systematic consideration of the spatial and environmental bases of societies, in historical and cultural perspective. (Lecture/Tutorial)

Prerequisite: GEOG 100

Students with credit for GEOG 141 may not take this course for further credit.

GEOG 250-3 Cartography I

An introduction to the interpretation of maps and air photographs. (Lecture/Laboratory)

Prerequisite: GEOG 100 or 102 and GEOG 111 or 112

GEOG 251-3 Methods in Spatial Analysis

A systematic introduction to the quantitative and theoretical approaches to the study of geography. (Lecture/Tutorial/Laboratory)

Prerequisite: GEOG 100 or 102 and GEOG 111 or 112.

GEOG 253-3 Aerial Photographic Interpretation

Uses of aerial photography and air photo interpretation in geography. The course is divided into four sections: (1) technical background regarding aerial photography and photo interpretation; (2) air photo interpretation and mapping; (3) application of air photo interpretation; and (4) introduction to remote sensing. (Lecture/Laboratory)

Prerequisite: GEOG 100 and 111.

Students who have completed GEOG 353 prior to Fall 1988 may not take this course for further credit.

GEOG 263-3 Selected Regions

A study of the geographical character of a major world region. (Lecture/Tutorial)

Prerequisite: At least 9 credit hours.

This course may not be counted more than once toward a degree.

GEOG 265-3 Geography of British Columbia

An examination of the physical landscape, the migration process, resource exploitation and the development of the settlement patterns. (Lecture/Tutorial)

Prerequisite: At least 9 credit hours.

GEOG 301-4 Geographic Ideas and Methodology

A study of contemporary geographical concepts in historical perspective, the course will examine the traditional approaches to the subject matter of geography, giving particular attention to present day methodological debate and foci of interest. (Lecture/Seminar)

Prerequisite: Completion of 30 credit hours, including 15 in Geography.

GEOG 313-4 Geomorphology II

Intermediate analysis in fluvial, glacial and coastal geomorphology with particular reference to British Columbia. (Lecture/Laboratory)

Prerequisite: GEOG 213 (formerly 313).

Students who completed GEOG 313 prior to Fall 1988 may take this course for further credit. Students who completed GEOG 413 prior to Fall 1988 may not take this course for further credit.

GEOG 314-4 Climatology II

An introduction to atmospheric science with emphasis on processes in the boundary layer; examination of the radiation, energy and water balances; description and analysis of heat and mass transfer. (Lecture/Laboratory)

Prerequisite: GEOG 214 (formerly 314) or permission of instructor. MATH 151 and 152 or MATH 154 and 155 or MATH 157 and 158 are recommended.

Students who completed GEOG 314 prior to Fall 1988 may take this course for further credit.

GEOG 315-4 Regional Ecosystems

Physical and biological characteristics of regional ecosystems; historical evolution of biomes, management of biotic resources. (Lecture/Seminar)

Prerequisite: GEOG 215 (formerly 315) or BISC 204.

Students who completed GEOG 315 prior to Fall 1988 may take this course for further credit.

GEOG 317-4 Soil Geography

An introduction to soils and soil geography. Factors and processes of soil formation, profile description and soil surveying. Elementary field and laboratory techniques of soil analysis. (Lecture/Laboratory)

Prerequisite: At least 30 credit hours including GEOG 111 or 112.

GEOG 322-4 World Resources

An analysis of the use and development of natural resources from a geographic, economic and institutional perspective. (Lecture/Tutorial)

Prerequisite: At least 30 credit hours including GEOG 111 and 221 (formerly 121).

GEOG 323-4 Geography of Manufacturing

Basic analyses of manufacturing location, linkages and flows, and the processes of decision-making, locational adaptation and adoption.

Prerequisite: GEOG 221 (formerly 121). (Lecture/Tutorial)

GEOG 324-4 Geography of Transportation

An empirical and theoretical examination of the geographical aspects of transportation systems.

Prerequisite: GEOG 221 (formerly 121) and GEOG 241 (formerly GEOG 141). (Lecture/Tutorial)

GEOG 325-4 Geography of Service Activities

Central place theory, marketing and retail location, urban economic base, land use models, and tourism.

Prerequisite: GEOG 221 (formerly 121). (Lecture/Tutorial)

GEOG 343-4 Geography of Transitional Societies

Theoretical and empirical approaches to environmental problems of the world's transitional societies, environmental and cultural change, cultural processes and the development of primary production and urban growth.

Prerequisite: GEOG 241 (formerly 141). (Lecture/Tutorial)

GEOG 344-4 Geography of Modern Industrial Societies

The theme of this course is the effect upon modern urban morphology of certain ideas and institutions prevalent in Anglo-Saxon cultures between the late 18th and early 20th centuries. The origin, spread and differentiation of selected man-made landscape features are systematically reconstructed.

(Lecture/Seminar)

Prerequisite: GEOG 241 (formerly 141). *GEOG 301 and courses in 19th century English literature and history are recommended.*

GEOG 351-4 Cartography II

Cartographic processes and techniques with an emphasis on thematic cartography; photographic process; the computer as a cartographic tool.

Prerequisite: GEOG 250 or 251. (Lecture/Laboratory)

GEOG 353-4 Remote Sensing

Applied remote sensing and image analysis. Topics include air photo interpretation, multispectral and color photography, thermal imagery, multispectral scanners, microwave applications, satellite imagery and SPOT data. The relation of remote sensing information and Geographic Information Systems is discussed. Manual interpretation and computer analysis will be used.

Prerequisite: GEOG 253 (formerly 353). (Lecture/Laboratory)

Students who completed GEOG 353 prior to Fall 1988 may take this course for further credit. Students who completed GEOG 453 prior to Fall 1988 may not take this course for further credit.

GEOG 354-4 Digital Cartography

Computational aspects of cartography. Map projections; data input; spatial data manipulation; computer-assisted mapping. Students who do not know any programming will have to take a short introduction to FORTRAN.

(Lecture/Laboratory)

Prerequisite: GEOG 250 and 251 and permission of instructor.

GEOG 355-4 Geographic Information Systems

Introduction to Geographic Information Systems; cadastral systems; thematic mapping and census systems; resource systems; digital elevation systems; topographic mapping systems. Data bases; data analysis.

(Lecture/Laboratory)

Prerequisite: GEOG 250 and 251 and permission of instructor.

GEOG 356-4 Cognitive Cartography

Analyses the map-user interface, the basic perceptual and cognitive processes used by the map reader, and the principles of design and presentation which lead to effective map use.

(Lecture/Seminar)

Prerequisite: GEOG 100 and 250; or GEOG 101 or 121 or 141 (if completed prior to Fall 1988) and GEOG 250.

GEOG 358-2 Field Techniques in Physical Geography

The theory and practice of selected field and experimental techniques in physical geography.

(Field Work/Laboratory)

Prerequisite: One of GEOG 213, 214, 215; or one of GEOG 313, 314, 315 if completed prior to Fall 1988.

GEOG 359-2 Research Methods in Human Geography

A practical introduction to field methods employed by human geographers. Particular emphasis is placed on rural and urban classification procedures, questionnaire methods, participant and landscape observation and recording.

(Lecture/Field Work)

Prerequisite: GEOG 221 and 241; or GEOG 121 and 141 if completed prior to Fall 1988.

GEOG 361-4 Introduction to Urban Geography

This course will introduce basic concepts in the study of urban geography by systematically identifying and examining major components of urban structure.

(Lecture/Seminar)

Prerequisite: At least 30 credit hours including GEOG 221 (formerly 121) and GEOG 241 (formerly 141). It is preferable to take this course before taking

GEOG 362.**GEOG 362-4 Geography of Urban Development**

This course will apply the principles of urban geographical analysis to the study of urbanization as exemplified in the development of cities in Europe and North America.

(Lecture/Tutorial)

Prerequisite: At least 30 credit hours including GEOG 221 (formerly 121) and GEOG 241 (formerly 141). It is preferable to take this course after GEOG 361.

GEOG 369-4 Human Microgeography

An examination of human interaction with physical environment, focusing on the individual as the unit of analysis, with special emphasis upon designed environments. A series of field studies will be required of each student.

Prerequisite: GEOG 241 (formerly 141). (Lecture/Seminar)

GEOG 375-4 Historical Geography I

Geographical factors in the settlement of Canada and the United States; the role of the frontier; and geographic factors in the changing nature of the perception of resources.

(Lecture/Seminar)

Prerequisite: GEOG 241 (formerly 141).

GEOG 381-4 Political Geography

Theoretical approaches to problems of the interactions of political decisions and power structures with territorial organization.

(Lecture/Tutorial)

Prerequisite: GEOG 241 (formerly 141).

GEOG 382-4 Population Geography

A study of the application of theories of population growth and demographic techniques; a consideration of the implications of these on the distribution and evolution of population in selected areas.

(Lecture/Tutorial)

Prerequisites: GEOG 221 (formerly 121) and GEOG 241 (formerly 141).

GEOG 383-4 Regional Planning I

Concepts and theories of regional development and environmental planning; the spatial component of regional planning problems; goal formulation, process and implementation.

(Lecture/Tutorial)

Prerequisite: GEOG 221 (formerly 121) and GEOG 241 (formerly 141).

Students with credit for GEOG 443 may not take this course for further credit.

GEOG 385-4 Introduction to Agricultural Geography

A critical examination of the current theories and issues in the study of the patterns and processes underlying the agricultural landscape. Emphasis will be placed on the Canadian agricultural scene.

(Lecture/Tutorial)

Prerequisite: GEOG 221 (formerly 121).

GEOG 404-2 Directed Readings**GEOG 405-4 Directed Readings**

Designed for upper level Geography Major and Honors students who wish to continue research started in conjunction with an earlier course.

Prerequisite: permission to enter Directed Readings courses requires written consent of both the faculty member willing to supervise the research, and the Chairperson of the Department.

GEOG 407-4 Quantitative Methods in Geography

An examination of the basic quantitative techniques used in geographical investigation.

(Lecture/Seminar)

Prerequisite: 60 credit hours including GEOG 251 or MATH 101.

GEOG 412-4 Quaternary Geology and Geomorphology

Stratigraphy of the Quaternary Period; geomorphic and sedimentary evidence of glaciation; models of glacial and periglacial environments. Laboratory and field study of glacial deposits.

(Lecture/Laboratory/Field Work)

Prerequisite: GEOG 213.

Students who completed GEOG 313 prior to Fall 1988 already have the required prerequisite and may enrol directly in this course.

GEOG 413-4 Geomorphology III

Advanced treatment of topics in glacial and fluvial geomorphology with emphasis on current research problems.

(Lecture/Laboratory)

Prerequisite: GEOG 313.

Students who completed GEOG 413 prior to Fall 1988 may take this course for further credit.

GEOG 414-4 Climatology III

The influence of climate on human activities, with emphasis on such broad fields as agriculture and hydrology, and on climatic variation.

Prerequisite: GEOG 214.

(Lecture/Laboratory)

GEOG 415-4 Advanced Biogeography

A survey of advanced biogeographic theory, and techniques of vegetation analysis. The application of these theories and techniques to biotic resources management is also examined.

(Lecture/Seminar)

Prerequisite: GEOG 315. *Students who completed GEOG 315 prior to Fall 1988 also require permission of the instructor.*

GEOG 416-4 Pleistocene Geography

An examination of the physical geomorphic, pedologic and biotic processes and evidence from human geography of the period will be studied as they af-

176 Undergraduate Courses — Geography

fect landscape changes. (Lecture/Seminar)
Prerequisite: One of GEOG 213 (formerly 313), 214 (formerly 314), 215 (formerly 315), 317.

GEOG 417-4 Biometeorology

An introduction to current research efforts in biometeorology; theory and application of mathematical models to describe processes of radiation, heat and mass transfer. (Lecture/Seminar)

Prerequisite: GEOG 314 or permission of instructor; MATH 151 and 152 or MATH 154 and MATH 155 or 157 and 158.

Students who completed GEOG 314 prior to Fall 1988 do not have the prerequisite.

GEOG 418-4 Terrain Evaluation

The extensive classification of a landscape based on geology, geomorphology, soils, vegetation, and historic and current land-use, and the assessment of qualitative values as an aid to multiple land-use management. (Lecture/Seminar)

Prerequisite: Two of GEOG 213 (formerly 313), 215 (formerly 315) and 317.

GEOG 419-4 Mass Transfer in the Biosphere

An introduction to the processes responsible for mass transfer in the biosphere. Emphasis will be given to the transfer of toxic agents in the environment. (Seminar/Laboratory)

Prerequisite: GEOG 314 or 315 or enrollment in Environmental Toxicology minor program or Environmental Toxicology Extended Studies Diploma.

GEOG 420-4 Comparative Cultural Geography

A comparative study of selected world cultures and landscapes in the light of recent theoretical developments in geography. (Lecture/Seminar)

Prerequisite: GEOG 343 and 344.

GEOG 421-4 Geography of Resource Development

Geographical aspects of development and management of natural resources. Particular attention will be given to contemporary problems in Western Canada. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including GEOG 322 plus 8 hours of upper division Geography courses.

GEOG 422-4 Geography of the Third World

A geographic study of 'development' and 'underdevelopment' with particular references to selected lesser developed regions. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including GEOG 111, 221 (formerly 121), and 241 (formerly 141).

GEOG 423-4 Geography of Tourism and Outdoor Recreation

Factors underlying the changing geography of tourism and outdoor recreation on a regional, national, and international scale. Case studies from a variety of cultural settings illustrate planning strategies designed to cope with economic, social and biophysical impacts. (Lecture/Seminar)

Prerequisite: 12 hours of upper division Geography courses.

GEOG 424-4 Urban Transportation

An extension of the theoretical and conceptual approach to transportation (GEOG 324), but with application to urban areas. (Lecture/Seminar)

Prerequisite: GEOG 324 and 361 or 362.

GEOG 426-4 Industrial Organization, Location and Planning

Relationships between corporate and regional planning and methods for assessing the effectiveness of locational incentive schemes. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including GEOG 323 or 383.

GEOG 431-4 The Landscape in Science, Art, Music, and Literature

This course focuses on landscape, the central study of geography. It does not, however, restrict itself to considering only the scientific interpretations of landscape, but investigates how these interpretations have influenced and interacted with aesthetic perceptions of landscape. (Lecture/Seminar)

Prerequisite: GEOG 344.

GEOG 441-4 Geography of Urban Regions

An evaluation of the nature of urbanization, having specific reference to theories of urban spatial structure and to comparisons of urbanization in Canada and abroad. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including GEOG 361 or 362.

GEOG 444-4 Regional Planning II

The practice of regional planning is approached through case and workshop studies of real-life situations. (Lecture/Seminar/Laboratory)

Prerequisite: 60 credit hours including GEOG 383. GEOG 361 is recommended.

GEOG 445-4 Resource Planning

This course introduces the student to the principles and practices of resource planning within a Canadian context. Special attention is paid to land-use

planning as it relates to major resource sectors. (Lecture/Seminar)

Prerequisite: GEOG 322 or 385.

GEOG 446-4 Geography of Contemporary Societies

Examination and analysis of the contemporary landscape as a cultural expression of Anglo-Saxon thought since the 1920's. The focus will be on North American landscapes, but with reference to convergent phenomena elsewhere in the world. The effect upon the contemporary landscape of certain ideas and institutions prevalent in Anglo-Saxon cultures since World War I. The origin, spread and differentiation of selected humanized landscape features are constructed. (Lecture/Tutorial)

Prerequisite: GEOG 344. Courses in the humanities and fine arts are recommended.

GEOG 452-4 Advanced Topics in Geoprocessing

An in-depth treatment of selected subjects in computer mapping and Geographic Information Systems. Topics will vary in accordance with trends in the subject and with faculty and student interests. (Lecture/Laboratory)

Prerequisite: GEOG 354 or 355.

Students who completed GEOG 452 prior to Fall 1988 may take this course for further credit.

GEOG 453-4 Digital Image Processing

Computational aspects of remote sensing. Systems consideration; statistical extraction; image enhancement; thematic information extraction; change detection. (Lecture/Laboratory)

Prerequisite: GEOG 353.

Students who completed GEOG 453 prior to Fall 1988 may take this course for further credit.

GEOG 460-4 Selected Regions

A study of the geographical character of a major world region. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division Geography courses.

GEOG 462-4 Canada and the United States

Selected problems in the geography of Canada; emphasizes territorial differentiation in cultures, regional resource problems, interregional resource conflicts, and the question of the geographical basis for national unity. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division Geography courses.

GEOG 464-4 Intertropical Africa

Africa between the tropics; attention will also be given to the general problems of low-latitude regions and developing countries. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division Geography courses.

GEOG 466-4 Latin American Regional Development

The course introduces students to a geographical analysis of patterns of Latin American development and planning. It is divided into two sections: geographical/historical development of selected countries; and analysis of common Latin American developmental models. A geographical perspective is used which stresses the interconnectedness of spatial and socio economic structures. (Lecture/Seminar)

Prerequisite: 60 credit hours including 8 hours of upper division Geography.

GEOG 469-4 The Canadian North and Middle North

Special attention will be given to resource appraisal and utilization, spatial organization, and the consideration of future development; comparisons will be made with experience of sub-Arctic development in other parts of the world. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division Geography courses.

GEOG 470-4 The Geography of Western Canada

A regional geographic interpretation of British Columbia and the Prairies. The physical environment, population, land tenure, regional resource problems, economic development and the settlement process will be examined to explain the geographic character of Western Canada. (Lecture/Seminar)

Prerequisite: At least 60 credit hours including 8 hours of upper division Geography courses.

GEOG 475-4 Historical Geography II

An examination of the ways in which the study of historical geography has been adapting to new problems, new methodologies, new techniques, and new sources. The course will attempt to deal primarily with the application of historical geography to a North American context with an emphasis on Canada and British Columbia. (Lecture/Seminar)

Prerequisite: GEOG 375.

GEOG 490-4 Selected Topics

The topics will vary from semester to semester depending on the interests of

faculty and students (Lecture/Tutorial)
Prerequisite: 75 credit hours including 30 credit hours in Geography.

GEOG 491-4 Honors Essay

All candidates for honors will be required to submit a major paper on a geographical topic to be selected in consultation with the Department.
Prerequisite: 105 credit hours and consent of supervisor. See a departmental academic advisor for details.

GEOG 498-4 Field Studies

Special studies and practical problems in field techniques.
(Field/Laboratory)
Prerequisite: 60 credit hours including 30 hours of courses in Geography and permission of department.

