

# SIMON FRASER UNIVERSITY

## MEMORANDUM

S. 76-172

To SENATE

From SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Subject Curriculum Changes, Course  
Changes and New Course Proposals  
Department of Geography

Date 10th December, 1976

Action taken by the Senate Committee on Undergraduate Studies at its meeting of December 7, 1976 gives rise to the following motion:

### MOTION

That Senate approve and recommend approval by the Board of Governors the Department of Geography course and program changes, as set forth in S.76-172, specifically including:

- i) Change in lower division requirements for a Minor in Geography to delete the requirement of three hours beyond the four basic required courses.
- ii) Change of title, vector, and course description - GEOG 413-5 from "Geomorphology II" to "The Hydrology and Geomorphology of Drainage Basins" with a vector of 2-2-2. (To more accurately describe the course as it has been taught since first mounted in 1970-1.)
- iii) Approve new course - GEOG 418-5 Terrain Evaluation (To provide a course which can integrate and apply many aspects of physical and cultural geography.)
- iv) Title change - GEOG 443-5 from "Regional Planning" to "Regional Planning I"
- v) Approve new course - GEOG 444-5 Regional Planning II
- vi) Approve new course - GEOG 470-5 The Geography of Western Canada



Daniel R. Birch

SIMON FRASER UNIVERSITY

SCUS 76-50

MEMORANDUM

Mr. H. Evans

Secretary, SCUS

From..... Sheila Roberts, Secretary.....  
Faculty of Arts Curriculum  
Committee.....

Subject..... Curriculum Changes, Course  
Changes and New Course Proposals  
Geography

Date..... December 1, 1976.....

The Faculty of Arts Curriculum Committee at recent meetings approved the attached changes in regulations, courses, and New Course Proposals for the Department of Geography. Would you please put these on the next agenda of S.C.U.S.

Thank you.

*Sheila Roberts.*

SR:ET

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FACULTY OF ARTS CALENDAR SUBMISSION

1977-78

DEPARTMENT OF GEOGRAPHY — COURSE & PROGRAM CHANGES

P. 128 Lower division course requirements MINORS

CHANGE IN REQUIREMENTS: FROM " GEOG 111-3, 121-3, 141-3, 250-3 and 3 additional hours selected from the other 100 and 200 division courses in Geography. TO " GEOG 111-3, 121-3, 141-3, and 250-3."

RATIONALE: It has been found that the requirement of three additional lower division hours is unnecessary. The four required courses provide the core material for the upper division. The student taking a minor normally prefers to take upper division courses and the removal of this requirement simply adds a little additional flexibility.

~~P. 129 Course Requirements Honors: (1)~~

~~CHANGE IN REQUIREMENTS: FROM "GEOG 406-2 407-3 and 491-5."~~

~~TO "GEOG 406-2, 407-3 and 491-5. The Honors student must present a bound copy of the Honor's Essay to the Department before being recommended for the degree."~~

~~RATIONALE: Even though the essay is an integral part of the Department's Honors programme the final resting place has been unspecified. By having a bound copy deposited in the Department the whole problem is resolved.~~

P. 134 GEOG 413-5

TITLE CHANGE: FROM " Geomorphology II"

TO " The Hydrology and Geomorphology of Drainage Basins "

CHANGE OF DESCRIPTION: FROM " The appreciation of statistical and other methodologies in the examination of theoretical and applied problems in landform analysis."

TO " The morphology and evolution of drainage basins; analysis of surface and subsurface flow in the drainage basin; stream-hillslope erosion and sedimentation."

CHANGE OF NATURE OF THE COURSE: FROM "Lecture/Seminar "

TO " Lecture/Seminar/ Laboratory " 2-2-2

Students with credit for GEOG 413 under its former title cannot take this course for further credit.

RATIONALE: Since this course was first taught in the Spring of 1970 the content has been as outlined in the new description. These changes simply specify in more detail, what has, and is, actually happening in the course. The original title of the course is a reflection of course naming in the early days of the University and the department would like to change it so it more accurately reflects the course as taught. The course is presently taught with a lecture, seminar, laboratory component. SEE APPENDIX A

p. 135 GEOG  
418-5

NEW COURSE PROPOSAL

SEE APPENDIX B

p. 136 GEOG  
443-5

CHANGE OF TITLE: FROM " Regional Planning"

TO " Regional Planning I " SEE APPENDIX C

p. 136 GEOG  
444-5

NEW COURSE PROPOSAL " Regional Planning II"

SEE APPENDIX D

RATIONALE: The position of ' Urban-Regional Planner' permits the Department, for the first time, to offer undergraduates a thorough grounding in Regional Planning. Geog 444 is a workshop course applying the principles learned in Geog. 443. The course will widen the breadth of urban studies in the University and will provide an opportunity, via the case study approach, to study practical problems.

p. 137 GEOG  
470-5

NEW COURSE PROPOSAL

See APPENDIX E

# SIMON FRASER UNIVERSITY

## MEMORANDUM

*Michael C. Roberts*

Sheila Roberts  
Administrative Assistant  
to the Dean  
Faculty of Arts  
Subject: Calendar Changes - Undergraduate  
Programme

From: Michael C. Roberts  
Chairman  
Dept. of Geography  
Date: November 18, 1976

1. Change in the Lower Division Requirements for the MINOR.

It has been found that this requirement of '3 additional hours' is unnecessary; the four required courses provide the core material for the upper division. The student taking a minor normally prefers to take upper division courses and the removal of this requirement simply adds a little additional flexibility.

2. Bound Honor's Essay.

Even though the essay is an integral part of the Department's Honor's programme the final 'resting place' has been unspecified. By having a bound copy deposited in the Department the whole problem is resolved.

3. New Course Proposals - Rationale.

Geog. 413

Geog. 418

Geog. 443

Geog. 444

Geog. 470

Geog. 413 - The Hydrology and Geomorphology of Drainage Basins.

This is a change in title and calendar description only. Since the course was first taught in 70-1 this has been the nature of its content. These changes simply specify, in more detail, what has, and is, actually happening in the course. The original title of the course is a reflection of course naming in the early days of the University and we would like to bring it up to date.

Geog. 418 - Terrain Analysis.

The different courses in physical geography treat this subject as discrete packages of information, e.g. soil geography, biogeography and geomorphology (principally at the 300 level).

Cont'd...2

Geog. 418 - Cont'd.

Terrain evaluation (418) gives the student an opportunity to inter-relate all these different fields of study. The success of Terrain Evaluation depends upon an appreciation of the complex interaction between soils, vegetation and landform, and the interpretation of the evaluation for multiple-choice land-use requires an adequate background in the various fields of cultural geography. Terrain evaluation is one of unified field courses coming near the end of a geography degree curriculum. This course is ideal for these students intending to enter environmental work.

Geog. 443 - Regional Planning I

Title change only. The old title was Regional Planning.

Geog. 444 - Regional Planning II

The position of 'Urban-Regional Planner' permits the Department, for the first time, to offer undergraduates a thorough grounding in Regional Planning. Geog. 444 is a workshop course applying the principles learned in Geog. 443. The course will widen the breadth of urban studies in the University and will provide an opportunity, via the case study approach, to study practical problems.

Geog. 470 - The Geography of Western Canada

The Department has never offered a course examining the evolution and structure of the local region and this course fills the gap. Many students have expressed interest in gaining a better understanding of the local area. There is considerable faculty interest in the course.

MCR/mgb  
Atch.

APPENDIX A. ~~DELETED~~ TITLE AND DESCRIPTION  
NATURE OF COURSE ONLY

Calendar Information

Department: Geography

Abbreviation Code: Geog. Course Number: 413 Credit Hours: 5 Vector: 2-2-2

Title of Course: The Hydrology and Geomorphology of Drainage Basins

Calendar Description of Course:

The morphology and evolution of drainage basins; analysis of surface and subsurface flow in the drainage basin; stream - hillslope erosion and sedimentation.

Nature of Course Lecture, seminar, laboratory

Prerequisites (or special instructions):

At least 60 credit

hours including Geography 313.

Students with credit for GEOG 413 under its former title cannot take this course for further credit.

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

2. Scheduling

How frequently will the course be offered? Once a year

Semester in which the course will first be offered? 77-3

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

M.C. Roberts and E.J. Hickin

3. Objectives of the Course

To provide practical and theoretical knowledge of an important area of geomorphic knowledge, namely, the drainage basin.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

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

N.B. This course has been offered regularly for a number of years.

5. Approval

Date: Nov 18, 1976 Dec. 7/76 Dec 7/76

Michael C. Roberts  
Department Chairman

J. M. Munro  
Dean

Chairman, SCUS

Course Outline

THE HYDROLOGY AND GEOMORPHOLOGY OF DRAINAGE BASINS

This course is designed to provide empirical and conceptual knowledge of one of the most important elements of the physical landscape - the drainage basin. The lectures will be complemented by field trips, laboratory work and independent work on two instrumental drainage basins in Surrey.

Weekly Lecture Themes

Laboratory Sessions

- |  |  |
|--|--|
| 1. Review of the Hydrological Cycle and Classical Fluvial Geomorphology. | The definition of drainage basins on topographic maps and drainage nets. |
| 2. Continuation of the above.  | Identification of floodplains and floodplain features.                   |
| 3. Measurement and Analysis of Surface Water Flow in a Drainage Basin.   | Calculation of discharge using a current meter.                          |
| 4. Continuation of the above with emphasis on Flood Flows                | Analysis of Flood Flows.   |
| 5. Subsurface Flow.  | Field trip.  |
| 6. The Morphometric Analysis of Drainage Basins.                         | Morphometric Analysis of Selected Drainage Basins.                       |
| 7. Hydraulics of Streams.  | Flume.   |
| 8. Deposition and Sedimentation in a River Basin.                        | Air photo interpretation of floodplains and associated deposits.         |
| 9. Erosional Processes - Stream channel.                                 | Surrey Projects.   |
| 10. Erosional Processes - Drainage basin slopes.                         | Surrey Project.  |
| 11. Drainage Basin Chronology.   | Surrey Project.  |
| 12. Land Use and Drainage Basins.  | Field trip.  |

Grading

This will be based on the following schedule:

Laboratory work & field reports	15%
Mid-term Examination	30%
Final Examination	40%
Short term paper	15%

Textbooks

The required text is:

K.J. Gregory & D.E. Walling, Drainage Basin, Form and Process, J. Wiley & Sons (Halsted Press), 1973.

## READING LIST

### Classical Fluvial Geomorphology

1. W.D. Thornbury, 1954, Principles of Geomorphology, Wiley: Chapters 5, 6, 7 and 8.
2. G.H. Dury (ed.), 1970, Rivers and River Terraces, MacMillan: Chapters 1 and 2.
3. L.B. Leopold, 1962, Rivers: Amer. Scientist, Vol. 50, No. 4, pp. 511-537.
4. W.M. Davis, 1954, Geographical Essays, Dover: Chapter 8.
5. L.B. Leopold, G.B. Wolman & J.P. Miller, 1964, Fluvial Processes in Geomorphology, Freeman: Chapter 11.

### Hydrological Cycle - General Concepts

1. R.C. Ward, 1967, Principles of Hydrology, McGraw-Hill: Chapter 1.
2. M.E. Morisawa, 1968, Streams: their dynamics and morphology, McGraw-Hill: Chapters 1 and 2.
3. D.M. Gray (ed.), 1970, Handbook on the Principles of Hydrology, Nat. Res. Coun. (Canada), Section 1.

### Subsurface Flow

1. J.D. Hewlett & A.R. Hibbert, 1963, Moisture and energy conditions withing a sloping soil mass during drainage, J. Geophys. Res., Vol. 68, No. 4, pp. 1081-1087.
2. R.Z. Whipkey, 1965, Subsurface stormflow from forested slopes, Bull. Int. Assoc. Sci. Hydro., Vol. 10, pp. 74-85.
3. M.J. Kirkby & R.J. Chorley, 1967, Throughflow, overland flow and erosion, Bull. Int. Assoc. Sci. Hydro., Vol. 12, pp. 5-21.
4. J.D. Hewlett & A.R. Hibbert, 1967, Factors affecting the response of small watersheds to precipitation in humid areas. In Sopper, W.E. and H.W. Lull (eds.), International Symposium on Forest Hydrology: Pergamon Press.
5. M.A. Carson & E.A. Sutton, 1971, The hydrologic response of the Eaton River Basin, Quebec, Can. J. Earth Sci., Vol. 8, pp. 102-115.

6. T. Dunne & R.D. Black, 1970, An experimental investigation of runoff production in permeable soils, Water Resources Res., Vol. 6, pp. 478-490.
7. T. Dunne & R.D. Black, 1970, Partial area contributions to storm runoff in a small New England watershed, Water Resources Res., Vol. 6, pp. 1296-1311.
8. D.R. Weyman, 1970, Throughflow on slopes and its relation to the stream hydrograph, Bull. Int. Assoc. Sci. Hydro., Vol. 15, pp. 25-33.

#### Morphometric Analysis of Drainage Basins

1. A.N. Strahler, 1975, Quantitative analysis of watershed geomorphology, Trans. Am. Geophys. Union, Vol. 38, pp. 913-920.
2. R.E. Horton, 1945, Erosional development of streams and their drainage basins: hydrophysical approach to quantitative morphology, Bull. Geol. Soc. Amer., Vol. 56, pp. 275-370.
3. S.A. Schumm, 1956, Evolution of drainage systems and slopes in badlands at Perth Amboy, N.J., Bull. Geol. Soc. Amer., Vol. 67, pp. 597-646.
4. M.E. Movisawa, 1962, Quantitative geomorphology of some watersheds in the Appalachian Plateau, Bull. Geol. Soc. Amer., Vol. 73, pp. 1025-1046.
5. A.N. Strahler, 1964, Quantitative geomorphology of drainage basins and channel networks. In V.T. Chow (ed.), Handbook of Applied Hydrology, Section 4, pp. 39-76.

#### Land Use and Drainage Basins

1. H.C. Pereira, 1973, Land Use and Water Resources in Temperate and Tropical Climates: Cambridge Univ. Press.
2. A.R. Hibbert, 1969, Water yield changes after converting a forested catchment to grass, Water Resources Res., Vol. 5, pp. 634-640.
3. W.E. Sopper & H.W. Lull (eds.), 1967, International Symposium on Forest Hydrology, Pergamon Press. (pp. 527-543.)
4. W.J. Schneider & G.R. Ayer, 1961, Effect of reforestation on streamflow in Central New York, U.S.G.S., Water-Supply Paper 1602.

5. A.R. Hibbert, 1971, Increases in streamflow after converting Chaparral to grass, Water Resources Res., Vol. 7, No. 1, pp. 71-80.
6. K.J. Gregory, 1974, Streamflow and building activity. In K.J. Gregory and D.E. Walling, Fluvial Processes in Instrumented Watersheds, Special Pub., No. 6, Inst. Brit. Geog.
7. M.C. Roberts, 1972, Watersheds in the rural-urban fringe, Nat. Symposium on Watersheds in Transition, A.W.R.A., Ft. Collins, Colo.

#### Drainage Basin Chronology

1. W.M. Davis, 1954, Geographical Essays, Dover: Chapter 8.
2. R.V. Ruhe & J.G. Cady, 1967, Landscape evolution and soil formation in southwestern Iowa, Tech. Bull. 1349, U.S.D.A., Soil Conservation Service.
3. R.B. Daniels & R.M. Jordan, 1966, Physiographic history and the soils, entrenched stream systems, and gullies, Harrison County, Iowa, Tec. Bull. 1348, U.S.D.A., Soil Conservation Service.
4. J.T. Hack, 1960, Interpretation of erosional topography in humid temperate regions, Amer. J. Sc., Vol. 258A, pp. 80-97.
5. J.T. Hack & J.C. Goodlett, 1960, Geomorphology and forest ecology of a mountain region in the Central Appalachians, U.S.G.S., Prof. Paper 347.
6. M.E. Morisawa, 1964, Development of drainage systems on an upraised lake floor, Amer. J. Sci., Vol. 262, pp. 340-354.
7. S.A. Schumm, 1965, Quaternary Paleohydrology. In H.E. Wright & D.G. Frey (eds.), The Quaternary of the United States, Princeton Univ. Press.

#### Erosional and Depositional Processes - Stream Channels

1. A. Sundborg, 1956, The river Klavälven, a study of fluvial processes, Geog. Annaler, Vol. 38, pp. 127-316.
2. L.B. Leopold & T. Maddock, 1953, The hydraulic geometry of stream channels and some physiographic implications, U.S.G.S., Prof. Paper 252.

3. L.B. Leopold & J.P. Miller, 1956, Ephemeral streams - hydraulic factors and their relation to the drainage net, U.S.G.S., Prof. Paper 282A.
4. L.B. Leopold & M.G. Wolman, 1957, River channel patterns - braided, meandering, and straight, U.S.G.S., Prof. Paper 282B.
5. J.R.L. Allen, 1970, Physical Processes of Sedimentation, Amer. Elsevier.
6. J.R.L. Allen, 1965, A review of the origin and characteristics of recent alluvial sediments, Sedimentology, Vol. 5, No. 2, pp. 89-191.

#### Erosional and Depositional Processes - Drainage Basin Slopes

1. M.A. Carson & M.J. Kirkby, 1972, Hillslope, Form and Process, Cambridge Univ. Press: Chapter 16.
2. R.F. Hadley & G.C. Lusby, 1967, Runoff and hillslope erosion resulting from a high-intensity thunderstorm near Mack, western Colorado, Water Resources Res., Vol. 3, pp. 139-146.
3. L.B. Leopold, W.W. Emmett & R.W. Myrick, 1966, Channel and hillslope processes in a semi-arid area, New Mexico, U.S.G.S., Prof. Paper 352G.

#### Surface Flow - Measurement and Analysis

1. M.C. Roberts & P.C. Klingeman, 1970, The influence of landform and precipitation parameters on flood hydrographs, J. Hydrol., Vol. 11, pp. 393-411.
2. M. Church & R. Kellerhals, 1970, Stream gauging techniques for remote areas using portable equipment, Tech. Bull. 25, Inland Waters Branch, Dept. of Energy, Mines and Resources.
3. S.T. Wong, 1963, A multivariate statistical model for predicting mean annual flood in New England, Annals Assoc. Amer. Geog., Vol. 53, pp. 298-311.
4. U.S. Depart. of Interior, 1967, Water Measurement Manual, Bureau of Reclamation, U.S.D.I.
5. Techniques of Water-Resources Investigations of the United States Geological Survey. Various dates.

Research Watersheds

1. R.C. Ward, 1971, Small watershed experiments: an appraisal of concepts and research developments, Univ. of Hull, Occasional Papers in Geography 18.
2. U.S. Dept. of Agriculture, 1964, Stream-gauging stations for research on small watersheds, U.S.D.A., Forest Service, Agricultural Handbook 268.
3. W.C. Ackermann, 1966, Guidelines for Research on Hydrology of Small Watersheds, U.S.D.I., Office of Water Resources Res.
4. Can. National Comm. for Int. Hydrol. Decade, 1966, Guidelines for Research Basin Studies, Nat. Workshop Seminar Proceedings.
5. Colorado State University, 1967, Research Data Assembly for Small Watershed Floods Part II, General Series 856, C.S.U., Expt. Station.

## NEW COURSE PROPOSAL FORM

B

1. Calendar InformationDepartment: GeographyAbbreviation Code: Geog. Course Number: 418 Credit Hours: 5 Vector: 2-3-0Title of Course: Terrain Evaluation

## Calendar Description of Course:

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.

Nature of Course 2 hour class, plus three hours per week for field work and its analysis (currently based on the U.B.C. Research Forest).

Prerequisites (or special instructions):

At least 60 credit hours including GEOG 313, 315 and 317

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

2. SchedulingHow frequently will the course be offered? Once every 4 or 5 semestersSemester in which the course will first be offered? Fall 1977

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

C.B. Crampton, M.C. RobertsObjectives of the Course

To bring all physical geography courses, and several elements of cultural geography, together within one, coherent application with practical implications.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty	Faculty will offer other courses less frequently.
Staff	That is normal for any course (registration, etc.).
Library	Most of journals and other resources already available.
Audio Visual	None.
Space	Labs. available.
Equipment	Maps and air photographs (\$350).

5. Approval

Date:

Nov 18, 1976Dec. 7/76Dec. 7/76Michael C Roberts

Department Chairman

J. M. Munro

Dean

Robert B. ...

Chairman, SCUS

Selected Topics in Physical Geography

Terrain Evaluation

Description

Extensive land classification and evaluation requires the development of the ability to understand the landscape from many specialist viewpoints; geology, glaciology, soils, vegetation, past and present land-use. The aim is to develop, as far as it is possible, a "genetic" classification combining in the most useful way aspects of all of these special approaches, and then to interpret this classification in terms of a selected objective, such as recreation, conservation (of any of a number of factors), or optimum land-use. The U.B.C. Forest Research Area will be used as the study-area for field work, and for comparison, examples of terrain evaluation in Australia, Canada and Europe will be examined. Terrain evaluation is the first step towards resource management in an area.

TEXT. Mitchell, C.W. 1973. Terrain Evaluation. Longman, London (U.K.).

OUTLINE

(To run concurrently)

Terrain evaluation technique:

Mitchell, 1973.

Examples of terrain evaluation:

CSIRO Land Research  
Series reports.  
Crampton, 1973.  
Hills, 1961.

Assessment of values relating to the landscape:

Krutilla, 1972.  
Coomber & Biswas, 1973.  
Stewart, 1968.

Terrain evaluation of U.B.C. Forest Research Area:

GRADING - End of semester report - 100%. However, the field work, its interpretation and the "writing-up" will proceed throughout the course.

A complete air-photo coverage of the U.B.C. Forest Research Area is available for interpretation. In addition, surveys of the geology, soils, vegetation and microclimate of Burnaby Mountain and Belcarra Park are available as a local example.

Material on Reserve

- C.S.I.R.O., 1963. General Report on the Lands of the Hunter Valley. Land Research Series No. 8. And all other Land Research Series Reports. Melbourne, Australia.
- Crampton, C.B. 1973. Landscape survey in the Upper and Central Mackenzie Valley. Environmental-Social Committee, Northern Pipelines, Task Force on Northern Oil Development, Report No. 73-8. (I have additional copies).
- Coomber, N.H. and Biswas, A.K. 1973. Evaluation of Environmental Intangibles. Genera Press, New York.
- Hills, G.A. 1961. The ecological basis for land use planning. Res. Rep. No. 46, Ontario Dept. Lands and Forests, Research Branch.
- Krutilla, J.V. ed. 1972. Natural Environments. John Hopkins University Press, Baltimore and London.
- Mitchell, C. 1973. Terrain Evaluation. Longman, London.
- Stewart, G.A. ed. 1968. Land Evaluation. Macmillan of Australia.

PROPOSAL FOR A NEW COURSE "TERRAIN EVALUATION" IN THE DEPARTMENT OF GEOGRAPHY

C.B. Crampton

During the Summer Session of 1976 a new course "Terrain Evaluation" was offered under the title of Geography 419 "Selected Topics in Physical Geography". The Course Outline and advertising circular have been appended. An end-of-semester course evaluation by the students supported impressions gained during teacher-student interaction throughout the session that while most students thought the course was skewed towards the difficult pole, it was a challenging course with the final assessment being closely related to the effort that they had been prepared to put into the course. In order to complete the course within one semester it was necessary to provide the students with some basic distribution information, and the trial run of Terrain Evaluation during the Summer Session enabled me to assess how much of each kind of information it was necessary to provide. Under pressure of the course I now have a complete set of maps providing all this basic information, and I have a much better idea of what kinds of interpretation can be made of the chosen study area.

Terrain Evaluation has to be a 400 level course since it depends upon the student having a working knowledge of all aspects of physical geography, including geology, geomorphology, soils, biogeography, climatology and cartography, with the final interpretation being considerably enhanced by a reasonable familiarity with economic and cultural geography. To the extent that terrain evaluation demands a very wide base knowledge, it is understandable that many students found the course difficult rather than moderately easy. To help offset this difficulty, the earlier lectures were occupied with reviews of the required prerequisite courses, a necessary procedure since it is not just the knowledge from these prerequisite courses that is needed, but an ability to think and assess in an interdisciplinary sense. This need to think geographically during any terrain evaluation, rather than consideration of one specialism in the broad field of geography, is offered as one of the most important attributes of the course. Experience outside geography can also be brought usefully into terrain evaluation. The other important attribute of the course is the job opportunities it opens to students since it is, as the advertising circular states, the first stage in land resource management of an area. Currently many environmental studies are being undertaken by Governmental

and consulting agencies, and an aptitude in terrain evaluation, coupled with whatever happens to be the student's preferred special field, enables the student to assess an area within the time and financial constraints set. Terrain evaluation has the virtue of being a highly flexible technique, the scale of operations being related directly to the constraints.

The U.B.C. Research Forest Area was chosen as the study area since some information was already available for interpretation. For example, stand information was available, yielding cover maps, and from which I calculated and drew up productivity maps for douglas fir, western hemlock and red cedar. Some soil and geomorphic information was already available, though additional survey work was required in order to draw up maps showing the distribution of soils and surficial geomorphology. The geology was extracted from maps produced by the Geological Survey. The Research Forest also has a dramatic history of logging and mining, and relics of this early activity are scattered across the land surface, for example in the form of an abandoned mine and an extensive system of abandoned railways. The Research Forest is financed entirely by logging revenues, and some past cutting practices have been distinctly bad. An air-photo coverage for stereo work, and an air-photo mosaic are available for the area, aiding in the assessment of past and present logging practices, and in the assessment of the distribution of soils, surficial geomorphology and hardrock geology. The U.B.C. Research Forest was the most convenient area for utilization in the first terrain evaluation course, especially since it is so close for field work, but it is intended to survey other areas for use in future courses.

Within the constraints of time and money, terrain evaluation involves, first, the combining of all the physical factors of the landscape into one map showing the distribution of terrain units, each composite unit involving vegetation, geomorphology, geology and soil characteristics. This process involves judgement, the usefulness of which will, of course, increase with experience. The generalization required is probably the most difficult part of the course, partly because its usefulness is not apparent until near the end of the course when the final land-use interpretation is made of what was originally an impossibly complex natural landscape. My own terrain evaluations in the Mackenzie River valley and in northern B.C. are useful in this respect (eg. Crampton, 1975).

Extensive land classification interpreted from the observed vegetation and landform relationships has been undertaken in several countries: eg. in Canada by Hills (1961), and in Australia and New Guinea by the Commonwealth Scientific and Industrial Research Organization (CSIRO 1970, 1973). The aim has been to rapidly identify and classify ecologically different parts of a large land area. The landscape unit generally shown on a map has been called the Land System, which is conceived as defining a recurring pattern of landforms, soils and vegetation, normally recognizable in air photographs (Mitchell, 1973). Renwick's (in Stewart, 1968) assessment of landscape mapping in the Hunter Valley of New South Wales, Australia (Story et al., 1963), illustrates the general usefulness of this style of survey for regional planning, influencing the planned distribution of farm and forest land, and the extension of urban areas. With practical objectives, landform-vegetation patterns have been mapped extensively in Jordan and neighbouring areas (Mitchell, 1973). There are examples in the published literature where the disciplined simplification of the legend has not been achieved, and great accuracy has been bought at the cost of any effective use of the maps by the layman.

The unit of subdivision of the Land System has often been called the Land Facet which, according to Mabbutt (in Stewart, 1968) is characterized by an unbroken continuity of internal properties that the Land System cannot have and which, by implication, is based on much more detailed ground inspection. Land Systems can be conveniently grouped into what may be called Land Region on the basis of selected common attributes. Land Regions, with Land Systems and Land Facets provide a possible three-level stratification for a biophysical land classification.

Once the physical landscape has been simplified into a three-tiered structure of terrain units, the other important attribute of terrain evaluation becomes apparent. It is now possible to interpret this map in terms of, for example, optimum land-use, the precise meaning of "optimum" depending upon whether the objective is weighted in favour of financial, conservational or recreational objectives. All summer students found this the most stimulating part of the course, as the true purpose of the exercise became apparent only at this stage. For example, areas best suited to providing logging revenues for supporting the Research Forest can be separated from areas best protected

as containing trails along water ways and up on to alpine meadows. Areas have to be set aside for forestry research, and there is the problem concerning the possibility of reopening the Viking Mine if copper prices rise sufficiently. Urban expansion is another consideration that requires attention. These and many other "Best land-use" evaluations are firmly based on the physical landscape. There is the opportunity for the student to introduce any special approach that he desires, based on other courses he/she is reading at the University. The several field trips into the study-area allow the student to examine the land-based features, and to appraise the intangible, non-parametric values relating to the landscape. Terrain evaluation helps relate the physical landscape to people and their aspirations (Coomber and Biswas, 1973; Krutilla, 1972).

#### References

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# **TERRAIN EVALUATION** **the first stage in resource management** **of an area** **GEOGRAPHY 419-5**

The Department of Geography is offering this 1976 Summer Session evening, within Selected Topics in Physical Geography, a course on Terrain Evaluation. Extensive land classification and evaluation requires the development of an appreciation of the geographical landscape from many viewpoints: geology, glaciology, soils, vegetation, past and present land use. The aim is to construct a classification combining in the most useful way aspects of all of these special approaches, and then to interpret this classification in terms of a selected objective, such as recreation, conservation (of any of a number of factors), or optimum land use. The UBC Forest Research Area will be used as the study area for special attention. Starting with an assessment of forest land productivity, the classification will evolve to incorporate more qualitative assessments of the landscape. The course will involve, concurrently, terrain evaluation from Australia,

Canada and Europe; assessment of values relating to the landscape, including the intangible, non-parametric values; and terrain evaluation of the UBC Forest Research Area, based on a complete air-photo coverage; and several field excursions. The instructor will be Dr. Colin Crampton. The class will meet for lectures on Mondays and Tuesdays at 17:30 to 19:20, and for a seminar or field excursions on Wednesdays and Thursdays, at 17:30 to 20:20. A general familiarity with handling maps, geomorphology, soils and vegetation will be expected, though the instructor should be consulted, and the course will start from basics.

The normal prerequisites for this course include twelve hours of Geography Division A courses. For further information on course content, see Dr. Colin Crampton in room 7223 Classroom Complex (telephone 291-3714). For information on course registration see Stan Kanehara, Departmental Assistant, in room 7124 Classroom Complex (telephone 291-4128).

APPENDIX  
C.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

CHANGE OF  
TITLE ONLY

Calendar Information

Department: Geography

Abbreviation Code: Geog. Course Number: 443

Credit Hours: 5 Vector: 3-2-0

Title of Course: Regional Planning I

Calendar Description of Course: As now:

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

Nature of Course Lecture and seminar.

Prerequisites (or special instructions): As now:

At least 60 credit hours including 12 hours of courses from Geography Division A.

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

2. Scheduling

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

Semester in which the course will first be offered? Fall 1977

Which of your present faculty would be available to make the proposed offering possible? J.W. Wilson, M.L. Barker, S.T. Wong

3. Objectives of the Course

THIS IS A TITLE CHANGE ONLY.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

THIS IS A TITLE CHANGE ONLY.

Audio Visual

Space

Equipment

5. Approval

Date: NOV 18, 1976

Dec 7/76

Dec 7/76

Michael C. Roberts  
Department Chairman

J. M. Munro  
Dean

DR. B. Smith  
Chairman, SCUS

REGIONAL PLANNING I

**Purpose:** To introduce upper-level Geography students to the field of planning, with particular reference to urban regions.

**Content:** This course which constitutes the first part of a two-semester program, deals with the introductory and theoretical aspects of urban region planning. The main topics are as follows:

- (1) An overview of the modern North American city -- its systemic structure, its relationship to natural environmental systems, and the trends in the socio-economic and governmental forces which shape it.
- (2) Social objectives for planning: an overview of man's behaviours in the urban environment; philosophies and objectives for physical planning; and ways of defining objectives through citizen participation.
- (3) The governmental context of planning: the multi-level structure of government within which planning takes place and the mechanisms and processes by which planning and coordination are carried out; the role of planning in this context.
- (4) Planning law and implements: the powers and administrative mechanisms available for planning and its effectuation, and their legislature and statutory setting.
- (5) The planning process: study of the broad process of policy-making and planning and its typical elements (a) situation scanning and problem formulation (b) derivation of objectives (c) situation and problem analysis (d) future forecasting (e) derivation of alternative policies and plans (f) evaluation of alternatives and choice of the optimum (g) implementive programming.
- (6) Case studies and general readings in planning and implementation. Use is made of Canadian, British and American sources, with special emphasis on Canadian and B.C. experience.

Study

Materials: On account of its scope and purpose, the course leans heavily on excerpted materials drawn mainly from the journals and papers of the Canadian Institute of Planners, the American Institute of Planners and from reports and plans of government agencies at all levels. Specific use is made of Managing Decisions; the strategic choice approach, Allen Hickling, Mantec Publications, 1974; Regional Planning; a comprehensive view, Allen and Morgan, Halsted Press and Wiley and Sons, 1975; and With man in mind, Perrin, M.I.T. Press, 1970.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

APPENDIX

NEW COURSE PROPOSAL FORM

D

Calendar Information

Department: Geography

Abbreviation Code: Geog. Course Number: 444 Credit Hours: 5 Vector: 1-2-3

Title of Course: Regional Planning II

Calendar Description of Course:

The practice of regional planning is approached through case and workshop studies of real-life situations.

Nature of Course Lecture, seminar, laboratory

Prerequisites (or special instructions): GEOG 443;

At least 60 credit hours including 12 hours of courses from Geography Division A; Geog. 361 is recommended.

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

2. Scheduling

How frequently will the course be offered? Once a year

Semester in which the course will first be offered? Spring 1978

Which of your present faculty would be available to make the proposed offering possible? J.W. Wilson, J.T. Pierce

3. Objectives of the Course

To introduce upper level Geography students to the practice of planning with particular reference to urban regions applications.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty: An urban-regional planner has been hired by the University.
Staff: None other than normal for registration and preparation of course materials.
Library: Normal growth of Library.
Audio Visual: Overheads.
Space: Normal classrooms
Equipment: Other than cartographic supplies (\$50 per semester) nothing is required.

5. Approval

Date: Nov 18, 1976 Dec. 7/76 Dec. 7/76

Michael C. Roberts
Department Chairman

J. M. Munro
Dean

OR Birch
Chairman, SCUS

REGIONAL PLANNING II

Purpose: To introduce upper-level Geography students to the practice of planning with particular reference to urban region applications.

Content: This course, which constitutes the second part of a two-semester program, concentrates on practical application of the concepts studied in Geography 443. It is centred on case studies and workshops focussed on a variety of realistic situations and problems derived mainly from the Lower Mainland region.

The case study materials are drawn from the following:

- (1) The works of the Lower Mainland Regional Planning Board, notably the Official Regional Plan and the technical studies which preceded it.
- (2) The works of the Planning Department of the Greater Vancouver Regional District, notably the Liveable Region Plan and the technical studies which preceded it.
- (3) The published reports and planning studies of municipal and other agencies, both urban and rural, especially in British Columbia but also in other parts of Canada.

The workshops focus on adjacent areas which can easily be inspected in the field and deal typically with problems of land use and development, transportation, services and utilities and environmental impact and the application of a logical planning process to the resolution of these problems. Particular attention is paid to the derivation of planning objectives and the testing of alternative plans and policies.

Sources  
and

Materials:

Basic data for workshop use are obtained from census and other governmental sources and from the files of the municipality under study. Materials for lecture and seminar purposes, as well as for application to workshop problems are taken mainly from the following:

Regional Planning: a comprehensive view,  
Alden and Morgan, Wiley & Sons, 1974;

Managing Decisions and the strategic choice  
approach, Hickling, Mantec Publications,  
1973;

Selected articles and special reports from  
The Journal of the American Institute of  
Planners and Plan Canada (the Journal of  
the Canadian Institute of Planners).

SENATE COMMITTEE ON UNDERGRADUATE STUDIES  
NEW COURSE PROPOSAL FORM

APPENDIX  
E

Calendar Information

Department: Geography

Abbreviation Code: Geog. Course Number: 470 Credit Hours: 5 Vector: 2-3-0

Title of Course: The Geography of Western Canada.

Calendar Description of Course:

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.

Nature of Course Lecture/tutorial

Prerequisites (or special instructions):

At least 60 credit hours including Geography 262 and 12 hours of courses from Geography Division A.

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

2. Scheduling

How frequently will the course be offered? Once every year and one half years.

Semester in which the course will first be offered?

Which of your present faculty would be available to make the proposed offering possible? P.M. Koroscil, E.M. Gibson, M.L. Barker, G.A. Rheumer

3. Objectives of the Course

To provide a detailed geographic analysis of one area of Canada. This is not possible in Geography 462.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty	Other courses will be offered slightly less frequently.
Staff	None other than normal for registration and preparation of course materials.
Library	Normal growth of Library holdings.
Audio Visual	Overhead projector.
Space	Normal classroom.
Equipment	None.

5. Approval

Date: Nov 18, 1976

Dec. 7/76

Dec. 7/76

Michael C. Roberts  
Department Chairman

J. M. Munro  
Dean

K. R. Zinich  
Chairman, SCUS

### The Geography of Western Canada

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

#### Required Texts

J. Lewis Robinson (ed.), Studies in Canadian Geography, British Columbia, University of Toronto Press, 1972.

P.J. Smith (ed.), Studies in Canadian Geography, The Prairie Provinces, University of Toronto Press, 1972.

#### Course Structure

There will be a two-hour lecture and one three-hour seminar each week.

#### Course Grade

The seminar will account for 33-1/3%, a major term paper for 33-1/3%, and a normal examination will account for the remaining 33-1/3%.

#### Topics to be Covered

1. The Physical Environmental Basis of Western Canada  
Areal Differentiation
2. Land Tenure, a method of survey and inferences of political development.
3. The Peopling of Western Canada, Characteristics and Areal Differentiation
4. Land Use, Resources, and Economic Development. Areal Differentiation
5. Settlement Process, Areal Pattern and Form
6. Summary of the geographic character of Western Canada.  
Differentiation within the Area.

#### Partial Bibliography

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- M.J. Matheson, The Semi-Arid Area of Saskatchewan, Geographical Branch, Dept. Mines, Technical Surveys, Ottawa, 1959.
- J.H. Richards and K.I. Fung (eds.), Atlas of Saskatchewan, University of Saskatchewan, 1969.
- D. Kerr, "The Physical Basis of Agriculture in British Columbia", Economic Geography, Vol. 28, 1952.
- R.R. Kreuger, "The Physical Basis of the Orchard Industry of B.C.", Geographical Bulletin, No. 20, 1963.
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- N.L. Nicholson, "Regions in Southern Alberta", Revue Canadienne de Geographie, Vol. 8, 1954.
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- B.G. Vanderhill, "The Farming Frontier of Western Canada, 1950-1960" Journal of Geography, Vol. 61, 1962.
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- Szabo, M.L., 1965 Depopulation of Farms in Relation to the Economic Conditions of Agriculture on the Canadian Prairies, Geographical Bulletin 7 (3-4): 187-203.

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Holland, S.S., 1964 Landforms of British Columbia, B.C. Dept. of Mines and Petroleum Resources, Bull. 48.

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Economics and Statistics Branch, 1970 Summary of Economic Activity in British Columbia, 1970 (Victoria: Department of Industrial Development, Trade and Commerce).