SIMON FRASER UNIVERSITY

S.82-83

MEMORANDUM

To: SENATE

From: SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Subject: NEW COURSE PROPOSAL - BIOLOGICAL SCIENCES - BISC 330-3 - THE TERRESTRIAL ENVIRONMENT - MICROCLIMATE AND SOIL.

Date: 25 AUGUST 1982.

Action taken by the Senate Committee on Undergraduate Studies at its meeting of June 29, 1982 gives rise to the following motion:

MOTION:

"That Senate approve and recommend approval to the Board of Governors, as set forth in S.82-83, the proposed new course BISC 330-3 - The Terrestrial Environment - Microclimate and Soil"

Introduction of this course will result in the discontinuation of BISC 300-3 - Physical and Chemical Aspects of the Envirnoment.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 330 Credit Hours: 3 Vector: 2-0-4

Title of Course: The Terrestrial Environment - Microclimate and Soil

Calendar Description of Course: Analysis of the terrestrial environment as related to biological systems. Large- and small-scale environmental processes: radiation, CO_2, H_2O, and energy fluxes; modification of environmental parameters near the ground surface. Measurement and evaluation of selected microclimatic and soil factors.

Nature of Course Lectures, laboratories and field projects.

Prerequisites (or special instructions):

75 semester hours credit in Biological Sciences program

What course (courses), if any, is being dropped from the calendar if this course is approved: To replace BISC 300.

2. Scheduling

How frequently will the course be offered? One semester/year (Fall semester)

Semester in which the course will first be offered? 1982-3

Which of your present faculty would be available to make the proposed offering possible? Drs. Lister and Brooke

3. Objectives of the Course

1) To familiarize students with selected above- and below-ground environmental processes.
2) To introduce students to the study of the state and behaviour of the atmosphere and environmental conditions at the air-earth interface and the interactions between microclimates and biological systems.
3) By laboratories and field projects to provide students with hands-on experience with instrumentation, field techniques and protocol required to measure and
4) (See attached) evaluate modification of parameters near the ground surface.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty	NONE
Staff	NONE
Library	NONE
Audio Visual	NONE
Space	NONE
Equipment	NONE

5. Approval

Date: Dec 30, 1981 JUN 15 [illegible]

Department Chairman Dean Chairman, SCUS

SCUS 73-34b:- (When completing this form, for instructions see Memorandum SCUS 73-34a.

3. Objectives of the Course (contd.)

4) To provide students with an appreciation of the processes coupling an organism to the terrestrial environment.

COURSE OUTLINE

Lectures

Introduction
Radiation: cosmic, solar, and terrestrial
- intensity quality: units, solar constant colour temperature, filters emission, absorption and reflectance spectra
- modification of radiant energy spectrum by the atmosphere and vegetation cover
- Carbon dioxide and water vapour fluxes
- Environmental and Climatic change
- The plant-environment interface

The ground surface
- energy exchange processes
- modifications at the terrestrial surface influencing energy/heat balances
- energy/heat balances: bare soil, herbaceous cover, forest.

The below-surface environment: soil
- components and processes
- physical characteristics from rock to soil
- soil-water relationships
- soil chemical characteristics
  - soil colloids and exchange reactions
- soil genesis and the soil environment

Laboratories and Field Projects

Calibration and use of instruments for determining and monitoring microclimatic factors and their variability in space and time.
Monitoring micrometeorological stations in several distinct habitats or environments (e.g., conifer and deciduous forest, grass, mulch, greenhouse) to evaluate differences caused by the presence or absence of particular canopy covers.
Student designed projects investigating particular above- or below-ground environments, or environment/organism interaction.
Reports and seminar discussions are required of the projects and results from monitoring micrometeorological stations

Reserve Book List

Campbell, G.S. 19 . An introduction to environmental physics. Springer-Verlag, N.Y.
Caulson, K.L. 1975. Solar and terrestrial radiation. Academic Press, N.Y.
Gates, D.M. 1962. Energy exchange in the biosphere. Harper and Row.
Gates, D.M. 1975. Perspectives of biophysical ecology. Springer-Verlag, N.Y.
Geiger, R. 1966. The climate near the ground. Harvard Univ. Press.
----- Handbook of Meteorological Instruments. Part I. Instruments for Surface Observation. H.M. Stationery Office, London.
Lee, Richard 1978. Forest microclimatology. Columbia Univ. Press, N.Y.
Lowry, W.P. 1969. Weather and Life. Academic Press, N.Y.
Montieth, J.L. 1973. Principles of environmental physics. Edward Arnold.

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Reserve Book List (contd.)

Middleton, W.E.K. & A.F.Spilhaus 1953.	Meteorological instruments. Univ. Toronto Press.
Munn, R.E. 1966.	Descriptive micrometeorology. Advances in Geophysics, Suppl.1. Academic Press, N.Y.
Munn, R.E. 1970.	Biometeorological Methods. Academic Press, N.Y.
Platt, R.	Environmental measurement and interpretation.
Tanner, C.B. 1963.	Basic Instrumentation and instrumentation for plant environment and micrometeorology. Dept.Soils Bull. 6., Univ. Wisconsin.
Van Wijk, W.R.(ed.) 1963.	Physics of the plant environment. Wiley, N.Y.
World Meteorol. Organiz. 1971.	Guide to meteorological instruments and observing practices. W.M.O., Geneva.
Canada Soil Survey Committee. 1978.	The Canadian system of soil classification. Agric. Canada, Ottawa.
Millar, C.E., L.M.Turk, H.D.Foth, 1965.	Fundamentals of Soil Science, Wiley, N.Y.
Wilde, S.A.	Forest soils.
Russell, E.J.	Soil conditions and plant growth.

Selected Relevant Periodicals

Soil Science	Scientific American
Soil Science Society of America Proceedings	Nature
Agronomy Journal	J. of Ecology
Bull.Am. Meteorological Scoeity	J. of Applied Ecology
Biometeorology	Can.J. Forestry
J. Applied Meteorology	Can.J. Botany
Ecology	Advances in Ecological Research
Ecological Monographs	Ann.Rev.Ecology & Systematics
Science	Ecological Studies

The BISC 300 course was first offered 1967-1 during early development of the Department of Biological Sciences program in order to cover aquatic and terrestrial environmental factors as related to biological systems to a minimum level on a theoretical, non-laboratory/practical basis. Practical experience with instrumentation, field techniques and protocol required to measure and evaluate environmental parameters was lacking, and it became obvious that this was needed to form an integrated well-rounded course.

It also became apparent that a logical split in the course material, Terrestrial and Aquatic, would provide a better vehicle for providing students with an in-depth exposure to these areas. As a result, the fresh water aquatic material is now covered in the BISC 4xx, Limnology course, and the marine aquatic material is part of or has been integrated into several courses, such as BISC 424, MASC 430 and especially MASC 435.

The proposed replacement course therefore contains the modified and updated material in the area of the Terrestrial environment and incorporates a laboratory with a practical project component.

The revised replacement course has been successfully taught three times as a Special Topics and modified BISC 300 course in 1978-1, 1979-3, and 1980-3, with enrolments of 21, 35, and 28 students. A desirable class size would be in the range of 20 to 25 students.