A: Division: **INSTRUCTIONAL**

B: Department: **SOCIAL SCIENCES**

Program:

Date: **January 15, 1996**

New Course:

Revision of Course Information form: **February 1982**

C: **GEOGRAPHY 110** (Subject & Course No.) D: **Weather and Climate** (Descriptive Title) E: **3** (Semester Credit)

F: Calendar Description: This course introduces the student to meteorology, climatology and biogeography. Energy concepts and radiation laws are used to examine atmospheric and oceanic circulation. Weather elements and patterns, severe weather, climate patterns and classification, as well as past and future climate change are studied. Plant and animal distribution patterns and their causes are examined along with some human impacts on the atmosphere and biosphere.

Summary of Revisions: (Enter date & section)
Eg: Section C,E,F

F,G,J,M,O,P

G: Type of instruction: Hrs per week / per semester

Lecture:	2	Hrs.
Laboratory:	2	Hrs.
Seminar:		Hrs.
Clinical Experience:		Hrs.
Field Experience:		Hrs.
Practicum:		Hrs.
Shop:		Hrs.
Studio:		Hrs.
Student Directed Learning:		Hrs.
Other (Specify) :		Hrs.
Total:	4	Hrs.

H: Course Prerequisites:

NIL

I: Course Corequisites:

NIL

J: Course for which this Course is a Prerequisite:

Geog 210, Geog 230, Geog 321

K: Maximum Class Size:

35

L:

College Credit Transfer	x
College Credit Non-Transfer	
Non-Credit	

M: Transfer Credit: Requested: | Granted: **X**

Specify Course Equivalents or Unassigned Credit as appropriate:

SFU **3 unassigned credits in Physical Geography With Geog 120=SFU 111(3) + EASC 101(3)**

UBC **UBC 102(3) With Geog 120=UBC 101(6)**

UVIC **203B**

OTHER

Susan Smythe
Course Designer(s)

Elizabeth Peerless
Director/Chairperson

Divisional Dean

P. H. Rogers
Registrar

N. Textbooks and Materials to be Purchased by Students (Use Bibliographic Form):

Christopherson, R.W. (1994) Geosystems. An Introduction to Physical Geography (2nd Ed.) Toronto, Maxwell Macmillan

Text will be updated periodically.

Complete Form with Entries Under the Following Headings: O. Course Objectives; P. Course Content; Q. Method of Instruction; R. Course Evaluation

O. COURSE OBJECTIVES

At the conclusion of the course the student will be able to:

1. Describe and give examples of the 'scientific method'.
2. Construct, analyze and interpret graphs and maps displaying meteorological and climatic data.
3. Define different types of energy and perform calculations using energy balances.
4. Define and describe electromagnetic radiation and perform calculations with radiation balances.
5. Define and describe the orbit of the Earth about the Sun and its implications.
6. Describe changes which have occurred in the Earth's atmosphere over time.
7. List and describe fundamental controls on temperature, and spatial and seasonal temperature variation.
8. Define and describe various measures of water vapour in the atmosphere, including types of vapour pressure and humidity.
9. Define and describe adiabatic processes, atmospheric stability and cloud development.
10. Define, describe and explain the formation of dew, fog, frost and precipitation.
11. Define the forces that produce wind, and list and describe types of global, regional and local winds.
12. Define and describe air masses and fronts, and the weather associated with each.
13. Describe the development and evolution of middle latitude cyclones, and weather associated with them.
14. Decode weather station information and interpret surface and upper air weather maps.
15. List and describe the characteristics and possible causes of thunderstorms, tornadoes and hurricanes.
16. List and describe fundamental controls of climate, the global pattern of climate, and the Koppen and Thornthwaite systems of climate classification.
17. List and describe periods of past climate change, and their possible causes.

O. Course Objectives - cont'd

18. List, give evidence for, and possible implications of, present and future anthropogenic-induced climate change.

19. List and describe the components, structure and energy flows of an ecosystem.

20. Define and describe the concepts of ecological stability and succession.

21. List and describe plant growth requirements and limiting factors.

22. List and describe major biomes of the Earth, and discuss the relationships between climatic gradients and vegetation types.

P. COURSE CONTENT

1. Introduction to Physical Geography
Physical Geography Within The Discipline of Geography
Climatology, Meteorology and Biogeography Within Physical Geography
History and Development of Climatology, Meteorology and Biogeography

2. Energy Concepts
Kinetic, Potential, Nuclear, Radiant and Heat Energy
First and Second Law of Thermodynamics
Latent Heat and Sensible Heat
Energy Balance

3. Electromagnetic Radiation
Characteristics: Wavelength and Frequency
Electromagnetic Spectrum
Principles of Radiation
- Blackbodies
- Kirchoff's Law
- Wien's Displacement Law
- Stefan-Boltzmann Law
- Inverse Square Law

Solar Constant
Solar and Terrestrial Radiation
Radiation Balance

4. The Atmosphere
Evolution of the Earth's Atmosphere
Earth's Modern Atmosphere
- Structure
- Physical Properties
- Functions

P. Course Content - cont'd

5. Earth/Sun Relationships
Earth's Orbit About the Sun
Seasons
Impacts of Latitudinal Variation on the Receipt of Solar Energy

6. Heat and Temperature
Principle Temperature Controls
Global Temperature Patterns

7. Atmospheric Moisture
Properties of Water
Hydrologic Cycle
Measures of Atmospheric Moisture:
- Actual Vapour Pressure
- Saturation Vapour Pressure
- Absolute Humidity
- Specific Humidity
- Relative Humidity
- Dew Point Temperature

8. Stability and Precipitation
Types of Stability and the Conditions Which Promote Them
- Absolute Stability
- Absolute Instability
- Conditional Instability
- Neutral Stability

Saturated Air and Precipitation
- Dew
- Frost
- Radiation, Advection, Upslope and Evaporation Fog
- Cloud Types, Nomenclature and Cloud Cover Measurement
- Ice-Crystal Precipitation Process
- Collision-Coalescence Precipitation Process
- Acid Deposition

9. Atmospheric and Oceanic Circulation
Atmospheric Motion
- Driving Forces
- Newton's Laws of Motion and Vector Analysis
- Global Patterns of Motion at the Surface and Aloft
- Regional and Local Winds

Oceanic Motion
- Driving Forces
- Global Patterns of Surface Motion
- Gyres
- Deep Currents

P. Course Content - cont'd

10. Air Masses, Fronts and Middle Latitude Cyclones

Air Masses
- Source Regions
- Identification Codes
- Air Mass Weather
- Air Mass Modification

Fronts
- Stationary
- Warm
- Cold
- Occluded

Atmospheric Lifting Mechanisms

Middle Latitude Cyclones
- Cyclogenesis and Essential Ingredients for Formation
- Structure
- Dissipation

11. Interpretation of Surface Weather Maps

Acquisition of Weather Data

Weather Station Information Decoding

Weather Forecasting Using Surface Charts

12. Severe Weather

Thunderstorms

Tornadoes

Hurricanes

13. Global Climate

Controls of Climate

Global Patterns

Classification Systems
- Koppen
- Thornthwaite

14. Climate Change

Past Climate Change
- Evidence
- Possible Causes

Current and Future Climate Change
- Evidence
- Air Quality
- Urban Heat Island
- Atmospheric Greenhouse Effect and Global Warming
- Potential Impacts

P. Course Content - cont'd

15. Ecosystems
Components
Structure
Energy Flows

16. Plant Growth
Growth Requirements and Limiting Factors
- Abiotic
- Biotic

17. Biomes
Major Divisions
Relationships Between Climatic Gradients and Vegetation Types

Q. METHOD OF INSTRUCTION

This course will employ a number of instructional methods to accomplish its objectives, including some of the following:

- Lectures
- Labs
- Field Work
- Seminar Presentations
- Slides, Videos
- Small Group Discussions

R. COURSE EVALUATION

The instructor will present a written course outline with specific evaluation criteria at the beginning of the semester. Evaluation will be carried out in accordance with Douglas College policy and will be based on some of the following:

1. Laboratory assignments with a combined value of up to 50%.
2. Multiple choice and/or short answer tests with a combined value of up to 50%.
3. Field work with a value of up to 20%
4. A term project with a value of up to 25%.
5. An individual or group presentation on an assigned topic with a value of up to 15%.

An example of one possible evaluation scheme would be:

Laboratory Assignments	10%
2 Laboratory Exams	30%
Mid Term Examination	25%
Final Examination	25%
Term Project	10%
	100%