Douglas College

# Course Information



A: Division: INSTRUCTIONAL

DATE: 02 March 1993

B: Department: SCIENCE & TECHNOLOGY

New Course: X

Revision of Course Information form: ____

DATED: ____

| C: | D: | E: |
|---|---|---|
| Environmental Science 302 | Urban Ecology | 5 |
| Subject & Course No. | Descriptive Title | Semester Credit |

F: Calendar Description : This course examines cities and urban lifestyles from an ecosystem perspective. The properties of the city as a natural environment are described. The impact of cities on surrounding natural environments and more remote ecosystems which serve as supply networks are explored. Global examples of urbanization are discussed in general and local examples are considered in detail. The theme of sustainability will be used to analyze options for change.

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

G: Type of Instruction:

| | Hours Per Week/ Per Semester |
|---|---|
| Lecture | 4 Hrs. |
| Laboratory | 3 Hrs. |
| Seminar | ____ Hrs. |
| Clinical Experience | ____ Hrs. |
| Field Experience | ____ Hrs. |
| Practicum | ____ Hrs. |
| Shop | ____ Hrs. |
| Studio | ____ Hrs. |
| Student Directed Learning | ____ Hrs. |
| Other | ____ Hrs. |
| TOTAL | 7 HOURS |

H: Course Prerequisites:
BIOL 110/210 and SCIE 107 or permission of instructor

I: Course Corequisites:

J: Course for which this course is a pre-requisite

K: Maximum Class Size:
20

L: College Credit Transfer X

College Credit Non-Transfer ____

M: Transfer Credit:
Requested X
Granted ____
Specify Course Equivalents or Unassigned Credit as Appropriate

U.B.C.
S.F.U.
U. Vic.
OTHER:

Valentin Schaefer
COURSE DESIGNER(S)

Emanuel Wilson
DEAN

VICE PRESIDENT (Instruction)

REGISTRAR

N: Textbooks and materials to be purchased by students
(Use Bibliographic Form):

Environment Canada and B.C. Ministry of the Environment. 1992 State of the Environment Report for the Lower Fraser Basin. Vancouver, BC

Gilbert, O.L. 1989. The Ecology of Urban Habitats. Chapman and Hall, New York.

Greater Vancouver Regional District. 1992. Greater Vancouver's Ecology. Vols. 1 and 2. Development Services. Burnaby. BC

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Complete Form with Entries Under the Following Headings:

O. Course Objectives; P. Course Content; Q. Method of Instruction;

R. Course Evaluation

O. Course Objectives:

Upon completion of this course, the student should be able to demonstrate a comprehensive understanding of the following:

1. Population growth and urbanization trends in terms of their growing impact on natural ecosystems.
2. The major differences in the composition of natural ecosystems and urban ecosystems.
3. The unique composition of urban flora and fauna, and how the urban environment effects their histories.
4. The variety of unique urban habitats created by urban development and their properties.
5. The implication of urbanization of biodiversity.
6. The effect of a variety of air pollutants on plant and animal life.
7. Changes in surface and groundwater flows due to urbanization, and the changes to river and lake ecosystems which result.
8. The types of water pollutants found in freshwater and marine environments of urban areas and their effects.
9. The special physical and chemical characteristics of urban soils, and their impacts on plant and animal life.
10. The categories of toxic chemicals, including pesticides, in urban environments and how they effect living organisms.
11. Local and global patterns of energy use, and how urbanization affects these patterns.
12. Land use planning and how it can be used to reduce the impact of cities on natural ecosystems.
13. The concept of sustainability and the major components of sustainable communities in terms of structure, infrastructure and lifestyles.

P. Course Content

1. Population growth and urbanization trends.
   a) history of human population growth and future projections
   b) differences between highly developed countries (HDC's) and lesser developed countries (LDC's) in growth and ecosystem impacts
   c) global urbanization trends and differences between HDC's and LDC's
   d) phases in demographic transition during urbanization
   e) urban sprawl - environmental and social consequences

2. Basic characteristics of urban ecosystems.

   a) change in climate - radiation, heat island, wind
   b) impact on the water cycle
   c) disturbance to soil structure
   d) changes in species interactions
   e) ecosystems of Greater Vancouver - North Shore Systems, Coastal/Intertidal Systems/Fraser River systems, Fraser Lowland Systems
   f) the effects on introduced species on natural ecosystems

3. Unique urban habitats and their properties

   a) city parks and their flora and fauna
   b) effects of growth retardants and herbicides
   c) urban woodlands and plantations
   d) allotments and leisure gardens
   e) private gardens and lawns
   f) railway sidings and industrial areas

4. Urban Biodiversity

   a) threats to native ecosystems and species
   b) rare and endangered species in urban areas
   c) urban areas as reservoirs of genetic diversity

5. Air pollution

   a) effects on lichens, mosses, fungi, higher plants
   b) effects on invertebrates
   c) significance in nutrient availability

6. Urban hydrology

   a) river vegetation - bankside, mid-channel
   b) river fauna - invertebrates, fish, mammals, birds
   c) urban ponds, lakes, and reservoirs

7. Water quality

   a) point and nonpoint sources of pollution
   b) inorganic chemicals and minerals
   c) organic oxygen demanding nutrients
   d) synthetic organics
   e) pathogens
   f) sediments

8. Soil structure and composition.

   a) classification of urban soils
   b) variability, structure, pH, contaminants
   c) brick and concrete - physical properties, chemical properties, flora and fauna relationships

9. Toxic chemicals

   a) survey and ecosystem effects - PCB's, chlorophenols, dioxins, cadmium, mercury, lead
   b) acute and chronic exposure problems
   c) mutagenic, carcinogenic, teratogenic agents
   d) bioaccumulation, biomagnification and synergistic effects in ecosystems

10. Land use planning

   a) categories of land use and conflicts
   b) housing options and environmental benefits - intensification, building design
   c) transportation - nodal development, town centres, mass transit, bicycle paths
   d) green space - parks, sanctuaries, easements, restrictive covenants, edge effects

11. Sustainable communities

   a) three legged stool model - environment, economy, social equality
   b) sustainability indicators
   c) lifestyle options
   d) bioregionalism
   e) appropriated carrying capacities and ecological footprints

Q. Methods of Instruction

1. Primarily lectures
2. Weekly field trips
3. Films and slide shows
4. Additional readings may be assigned as required
5. Group discussions and group projects will be encouraged

R. Course Evaluation

The course evaluation will consist of:

| | | |
|---|---|---|
| 1. | Midterm examination | 30% |
| 2. | Final examination | 30% |
| 3. | Field trip reports | 20% |
| 4. | Term project | 20% |