Douglas College

EFFECTIVE: MAY 2003

CURRICULUM GUIDELINES

A: Division: **Science and Technology**

B: Department/ Program Area: **Biology**

Date: **June 2002**

New Course | | Revision | **X**

If Revision, Section(s) Revised: **A, B, C, E, F, M, N, P, Q, R**

Date Last Revised: **March 2, 1993**

C: **Biol 302** (Subject & Course No.) **D:** **Urban Ecology** (Descriptive Title) **E:** **5** (Semester Credits)

F: Calendar Description: A study of the interaction of living organisms with their environment. Population and community dynamics are examined, ending with a consideration of how human activities have an impact on natural systems.

G: Allocation of Contact Hours to Types of Instruction/Learning Settings

Primary Methods of Instructional Delivery and/or Learning Settings:

Lecture/Tutorial/Field Trip

Number of Contact Hours: (per week / semester for each descriptor)

Lecture/Tutorial 4
Field Trip/Laboratory 3

Number of Weeks per Semester:

14

H: Course Prerequisites:
Biol 322

I. Course Corequisites:
None

J. Course for which this Course is a Prerequisite:
None

K. Maximum Class Size:
35

L: PLEASE INDICATE:

- [ ] Non-Credit
- [ ] College Credit Non-Transfer
- [X] College Credit Transfer: Requested [ ] Granted [X]

SEE BC TRANSFER GUIDE FOR TRANSFER DETAILS (www.bccat.bc.ca)

M: Course Objectives/Learning Outcomes

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

1. Human population growth and urbanization trends in terms of their growing impact on natural ecosystems.
2. Major differences between the composition of natural ecosystems in and urban ecosystems.
3. The variety of unique urban habitats created by urban development, the unique composition of urban flora and fauna, and how the urban environment effects their life histories.
4. The impact of urbanization on biodiversity.
5. The effect of urbanization on plant and animal life through air pollution and the urban heat island.
6. Changes in surface and groundwater flows due to urbanization, and the changes to river and lake ecosystems which result.
7. The types of water pollutants found in freshwater and marine environments of urban areas, and their effects.
8. The particular physical and chemical characteristics of urban soils, and their impacts on plant and animal life.
9. The categories of toxic chemicals, including pesticides, in urban environments and how they affect living organisms
10. Land use planning and how it can be used to reduce the impact of cities on natural ecosystems.
11. The concept of sustainability and the major components of sustainable communities in terms of protecting and restoring local natural ecosystems.

N: Course Content

The major topics in the course include the following:

1. Population growth and urbanization trends.
   - history of human population growth and future projections
   - differences between highly developed countries (HDCs) and lesser developed countries (LDCs) in growth and ecosystem impacts
   - global urbanization trends and differences between HDCs and LDCs
   - phases in demographic transition during urbanization
   - urban sprawl - environmental and social consequences

2. Basic characteristics of urban ecosystems:
   - habitat loss
   - change in local climate - albedo effect, heat island, wind
   - impact on water cycle
   - disturbance to soil structure
   - changes in species interactions
   - ecosystems of Greater Vancouver - North Shore Systems, Coastal/Intertidal Systems/Fraser River Systems, Fraser Lowland Systems
   - the effects of introduced species on natural ecosystems

3. Unique urban habitats and their properties
   - forest and shrub communities
   - freshwater landscapes
   - open spaces
   - barren and paved landscapes
   - corridors
   - garden and public landscapes

4. Urban Biodiversity
   - levels of biodiversity
   - native versus introduced species
   - threats to native ecosystems and species
   - indicator species most tolerant and species least tolerant to urban conditions
   - rare and endangered species in urban areas
   - urban areas as reservoirs of genetic diversity

5. Air pollution
   - effects on lichens, mosses, fungi, higher plants
   - effects on invertebrates
   - significance in nutrient availability and on productivity

6. Urban hydrology
   - infiltration, runoff and groundwater recharge
   - impact of impervious surface
   - storm drains and storm water management
   - detention and retention ponds as habitats

7. Water quality
   - point and nonpoint sources of pollution
   - inorganic chemicals and minerals
   - sources and impacts of organic oxygen demanding nutrients
   - petroleum, synthetic organics and urban runoff
   - sewage treatment plants, waterfowl and pathogens
   - sediment loading

8. Soil Structure and composition
   - classification of urban soils
   - urban development and drainage
   - variability, structure, pH, contaminants
   - brick and concrete - physical properties, chemical properties, flora and fauna relationships

9. Toxic chemicals
   - survey and ecosystem effects - PCBs, chlorophenols, didioxins, cadmium, mercury, lead
   - acute and chronic exposure problems
   - mutagenic, carcinogenic, teratogenic agents
   - bioaccumulation, biomagnification and synergistic effects in ecosystems

10. Land use planning
   - categories of land use and conflicts
   - housing options and environmental benefits - intensification, building design
   - transportation - nodal development, town centres, mass transit, bicycle paths
   - green space - parks, sanctuaries, easements, restrictive covenants, edge effects
   - case studies e.g. East Clayton project, Surrey

11. Sustainable communities, protection and restoration of urban ecosystems
   - three legged stool model - environment, economy, social equality
   - sustainability indicators
   - bioregionalism
   - case studies e.g. Greater Vancouver Regional District Liveable Region Strategy, Georgia Basin Ecosystem Initiative

O: Methods of Instruction

This course involves four hours per week of classroom instruction and three hours per week of field trips. Classroom work will include lectures and tutorials, and is integrated with textbook, scientific journal readings and case studies. The field trips are designed to complement the theory content of the course.

P: Textbooks and Materials to be Purchased by Students

Link, Russell. 1999. Landscaping for Wildlife in the Pacific Northwest. University of Washington Press, Seattle. 320 pp.

Lowell, Adams. 1994. Urban Wildlife Habitats: A Landscape Perspective. University of Minnesota Press, Minneapolis. 186 pp.

Schaefer, Valentin, Hillary Rudd and Jamie Vala. 202. Urban Biodiversity: Exploring Natural Habitat and its Value in Cities. Douglas College, New Westminster. 149 pp.

Q: Means of Assessment

Type of evaluation	Points
1. Midterm examination	25%
2. Final examination	25%
3. Field trip reports	30%
4. Term project	20%

GRADES: **A+** 95-100 **A** 90-94 **A-** 85-89 **B+** 80-84 **B** 75-79 **B-** 70-74 **C+** 65-69 **C** 60-64 **C-** 55-59 **P** 50-54 **F** 0-49 **F** 0-49

Notes:
1. Field trip reports will consist of 5 reports worth 5 marks each involving analysis and 5 worth 1 mark each that are descriptions of site visits.
2. The final exam will be comprehensive and cover the entire course.
3. The term project will include an oral presentation and a paper.

R: Prior Learning Assessment and Recognition: specify whether course is open for PLAR

There is no provision for PLAR, other than normally done by examining transcripts and comparing course outlines of Biology courses taken within the last five years to the Biology 302 course outline.

Course Designer(s)

Education Council/Curriculum Committee Representative

Dean/Director

Registrar