

## SIMON FRASER UNIVERSITY

S 228

## MEMORANDUM

*Curriculum Changes*

To Mr. H. M. Evans

From B. L. Funt

Secretary of Senate

Dean of Science

Subject New Biological Sciences Course  
003-3 - Ecology of the Population  
Explosion

Date April 16, 1969

The Biological Sciences course 003-3 was considered by the Undergraduate Curriculum Committee of the Faculty of Science at its meeting of March 17th. It was recommended that this go forward to Faculty for approval. Faculty approval was obtained at the meeting of April 14th, and this course is now recommended to Senate for consideration. The rather extended outline of the course is included as Paper #1. A further detailed outline is attached as Paper 22-A, but in my opinion need not be reproduced and circulated to all members of Senate.

BLF/cj  
Enclosures (2)

*Lalib Mhu Luvastaru*

Biological Sciences 003-3.

Ecology of the Population Explosion.

The demographic and ecological bases of the population explosion; its biological, economic, and sociological implications; possible solutions and their limitations; and its consequences for the future of mankind.

Purpose of the Course.

The impact of increasing human populations, accompanied by ever increasing demands on the ecosystem and intensified intra-specific interaction is the common root of many of the social, economic, and psychological problems that are of grave concern to many of our students. A student lacking an appreciation of the basic biological and ecological qualities of his own species is ill equipped to deal with problems that arise from human obduracy. An objective is to demonstrate the relevancy of science in general, and biology in particular, to the imperatives of the human condition.

Presentation.

There will be 3 lectures per week. Two will be by members of the Biology Department; the third by guest lecturers drawn from other departments of this university, from other universities, and the non-academic community.

We will deal with concepts rather than detail. Quantitative material will be minimal. Concepts will be developed from first principles eliminating the need for any biological background.

Lectures will be heavily illustrated. Where quantitative material is unavoidable it will be presented as simple graphs using animated film loops. We hope to include two to three episodes of multi-media to maximize emotional as well as intellectual involvement.

Grading.

Grading will be by a final examination, probably of the multi-choice answer type.

Biological Sciences 003-3.

Ecology of the Population Explosion.

Credits.

No similar course is given at this university; thus material presented and its orientation will differ sharply from any courses now available to Simon Fraser students, including biology majors. The subject matter is topical and urgent. As many students as possible should be given every inducement to include the course in their curriculum, and to stick with it.

We therefore propose to award three credit hours for the course. These credits would be available to all students, including biology majors, as a science option.

## "MAN THE REPRODUCER"

## The Relevancy of Ecology to the Human Situation

## Demographic Facts

Judo-Christian ethic-Biblical exhortations  
 Historical growth of Human Populations  
 Post World War II - death control  
 Contemporary populations  
 Predicted populations - estimated maximums  
     the probability of "leveling off"  
     the meaning of "leveling off"  
 Population concentrations  
 Starvation in 1970's?  
 Standing room only  
 Time!

## Population Parameters

Rate on increase  $r_B-D$   
 Birth Rates - crude; age specific  
 Death Rates - crude; age specific  
 Age structure of populations  
 Changes in birth rates with age structure  
 Changes in death rates with age structure  
 Intrinsic rate of increase  
 Natural checks on rates of increase  
     in animals - food  
                     predators and parasites  
                     social interaction  
                     competition  
                     strife  
                     psychological disease  
     in man - disease  
                     starvation  
                     war

## Consequences of population expansion

Food Resources  
     Malthus essay  
     Per capita food production  
     Turning point 1966  
 Energy Resources  
     Principle of energy release  
     Fossil fuels  
     Nuclear fuels  
     Hydro energy  
     Radiation energy

- Dispersal of energy vs accumulation of energy
- Mineral Resources
  - Metals
  - Non metals
- Shelters - space materials
- Human Resources
  - Income per head
  - Labour force - agricultural economy
    - industrial economy
  - Dependency burden
  - Capital accumulation
  - Education
  - Care of aged
  - A productive life-unemployment
    - underemployment
    - alternative activities
  - Crowding - psychological stress
    - social stress
    - civil strife
    - nationalism
  - Escapism - wilderness and conservation
    - psychadelic devices
    - responsibility
    - culture
  - Environment - ecological balance
    - other organisms
    - diversity
    - natural heritage
  - Social Structure - politics
    - decision making
    - freedom
    - individuality

Possible Remedies

- I. Provide for existing and future populations
  - Increase food production
    - Natural foods
      - Conventional agriculture
        - Land utilization
          - Arable lands
          - Tropical lands
          - Marginal lands
      - Fertilizers
      - Pest control
      - Improved crops

- conventional food crops
- New crops
- Forest crops
  - cellulose
  - leaf protein
- Fresh water crops
- Ocean crops
- Hydroponics - etc.
- Energy flow through trophic levels
- Meat eating vs plant eating
- Pollution
  - fertilizers
  - pesticides
    - insecticides
    - fungicides
    - herbicides
- Synthetic foods
  - Industrial processes
  - Fermentation of cellulose
  - Petrochemical products
  - Synthetic molecules
  - Other?
- Increase Industrial Production
  - More and better shelters
    - space
    - materials
    - energy
    - design            skills
    - layout
  - More and better capital goods
    - capital accumulation
    - space
    - materials
    - energy
    - design            skills
    - labour
  - More and better consumer goods
- Increase of Services
  - Medical
  - Education
  - Social
  - Protection - police, fire, sanitation
  - Disposal of wastes
  - Communications
  - Recreation and entertainment
  - Maintenance and repairs

*Curriculum Changes*

Obstacles to providing for existing and future populations

Finite supply of resources

Fuels and energy

Current production of fuels

photosynthesis

Fossil fuels

Nuclear energy

Radiation-solar cells

Hydro-electricity

Others

Minerals

Metals

Non metals

Soil

Atmosphere

Water

Recycling of Resources

Dispersal of use

Recovery

Pollution and Waste Disposal

Sources - Agriculture - pesticides, fertilizers, erosion

Industry-gases, dissolved molecules,

solids, heat

Consumer-containers, excrement, rubbish

Kinds - Atmospheric - CO<sub>2</sub>, inert gases, toxic gases, solid

Land - mine tailings, glass, metal, industrial

wastes, fertilizers, pesticides, etc.

Water - chemical nutrients, toxic chemicals, silt,

decaying organic material, rubbish, etc.

Effects - direct toxicity

carcinogens

CO<sub>2</sub> output - greenhouse effect

turbidity of atmosphere and water filter out

radiation

oxygen deficiency in water-high bacteria pops-

algae, etc.

dead organisms in water

putrification

unsightly, etc.

Loss of Vegetation

Killing plants through pollution

Sprawling cities

Paving roads

Forest exploitation

Open pit mining

Other





Social changes  
Status quo  
Attitudes  
Conditional responses  
Freedom and democracy?  
Change to what?

Possible Remedies

II. Birth Control  
Restrict population growth  
Stable population  
Advantages  
    Economic  
    Social  
The means  
"Family Planning"?  
Effectiveness - time element  
    short-mid-long term  
Obstacles - social mores  
    Religion  
    Economics  
    Custom  
    Prejudice, sloth ignorance

Possible Remedies

III. Abortion

Possible Remedies

IV. Infanticide

Possible Remedies

V. Geronticide

Possible Remedies

VI. The Bomb

Possible Remedies

VII. Starvation, pestilence, strife

Ethical considerations

Crisis is close at hand  
Mass starvation before 1980?  
Panic action and reaction  
What sort of society will emerge?  
What human values?

January 16, 1969.