

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 N. S. S. S.*

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 multiple choice answer type.

*Curriculum Changes*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 - CO₂, 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

CO₂ 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

O_2 - CO_2 imbalance - greenhouse effect

degraded sewage

Food production - agriculture

Housing

Recreation

Conservation

Rivers and streams

Transportation

Recreation

Hydro electricity

Food production

Sewage settling ponds

Clean water

Conservation

Impounding water

Irrigation

Food production

Ocean

Transportation

Recreation

Conservation

Food production

Mining

Cities - Housing

Aesthetics

Services

Planning

Sites

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.