

General Education Course Proposal

Proposed Course: NSCI GEI 125 Revenge of the Killer Microbes Units 03
Prefix No. Title

Department: Biology School: Natural Sciences

GE Category (Indicate one category only):

Foundation: A1___; A2___; A3___; B4___
 Breadth: B1___; B2___; C1___; C2___; D___; E___
 Integration: BXX___; C___; D___; International/Multicultural___

Existing Course___; Revised Course___; New Course XX

Course Included in Current GE Program___

New courses require the Undergraduate Course Proposal form in addition to this form.

Revised courses require the Undergraduate Course Change Request in addition to this form.

Proposed catalog description: Limit course description to 40 words using succinct phrases. Include prerequisites, limitations, lecture/lab hours. Indicate former course number, e.g., (Former Biol 105)

Revenge of the Killer Microbes (3)

Prerequisites: Completion of Physical Sciences (B1) and Life Sciences (B2) General Education course requirements; Courses in Biology and Chemistry (High School or College) strongly recommended. Introduction to the adversarial relationships between disease-causing microorganisms and human affairs, both currently and historically. The unique defense and counter defense mechanisms that have developed in a variety of microbes and the human immune system will be explored. Health care issues related to disease prevention and control will be addressed.

Enrollment limit per section: 50

Expected number of sections per semester – Year 1 1 ; Year 3 2

Attachments:

1. A statement presenting the ways in which this course meets the Specifications provided in the appropriate section of the General Education Policy as well as in the Policies for Inclusion and Evaluation of General Education Courses.
2. A statement of elements common to all sections of this course, identifying content, objectives, required student activities, grading policy, representative texts, and an approximate schedule for the course. Required student activities include such things as papers, research projects, homework, laboratory and/or studio performance, recitations, participation, attendance, and exams.
3. A typical syllabus for a particular offering of the course.
4. Any special cost factors associated with this course.

Approval for Inclusion in General Education

Thomas E. Mallory 5/15/98 Glammser 9/22/98
Department Chair Date School Curriculum Committee Date

Stanley M. Zugh 9/22/98 Peter Ann 12/15/98
School Dean Date General Education Subcommittee Date

Brandt Kehoe 12/22/98
Associate Provost Date

Attachment #2

Common Elements to All Course Sections

The goal of this lecture/seminar course is to familiarize students with disease processes and their impact on biological, medical and social developments, including broad impacts on health care policy. In accordance with the objective to provide an upper division, interdisciplinary course in the natural sciences, the primary emphasis of the course will involve studies of the biology of microorganisms and the mammalian immune system (Outline topics II, III, IV), including the genetics of disease and resistance (V.B, VIII). The course will also use historical medical practices (*Medical Mysteries*, *Silent Enemies*, *Age of Agony* and *The Medicine Show*) and epidemics (*Explaining epidemics and the history of medicine*) to address the geography of disease (*Routes of Contagion*, *Germs and Ideas*, *Historical Geography of Latin America*) and the influence that contagion has on social behavior (*Man Nature and Disease*, *Disease and Social Behavior*) and health care policy (*The Conquest of Epidemic Disease*, *Due Considerations*). Selected diseases and epidemics (*Natural History of Infectious Disease*, *The Race against Lethal Microbes*), including venereal diseases (*Microbes and Morals*), will serve as examples; parallels will be drawn between the processes of natural selection dictating biological diversity and the processes of disease spread and/or the fear of disease spread on the historical directions of society. The "Fear of Science" issue, and how it impedes institution of effective medical treatments, will be addressed (*Epidemics and ideas*, *They all laughed at Christopher Columbus*). Ethical issues related to patient care, particularly of minorities (*Cultural Diversity in Health and Illness*) and the elderly (*Antiinfectives and the Elderly*), will be addressed. Disease preventative measures, e.g. vaccines and pharmaceuticals such as antibiotics (*Antiviral Drugs*, "Post-Polio Syndrome"), and microorganismal countermeasures, e.g. drug and antibiotic resistance ("The Challenge of Antibiotic Resistance"), and their impact on lifestyle and health care will also be a theme. The role of plant disease processes (*The Nature of Disease in Plants*, *Plant Diseases for the Layman*) on agriculture and society (*Famine, Disease and the Social Order in Early Modern Society*, *Famine on the Wind*), including particularly the study of the corresponding biological and chemical preventative measures, e.g. pesticides, and their consequences, e.g. pesticide resistance, will be addressed as a parallel paradigm, time permitting.

Curriculum Outline:

Weeks

2/3 I. The Scourge of Disease

A. Introduction to Historical and Present Day Epidemics and Pandemics

1. Brief Disease descriptions

2. Overview of Social Consequences

2 1/3 II. Microorganisms: Overview of their Biology

A. Bacteria

B. Viruses

C. Protozoa

D. Fungi

E. Worms

- 1 1/3 III. Pathogenic versus Non-pathogenic Microorganisms
 - A. Virulence
 - B. Adherence and Invasion Processes
 - C. Evasion Processes
- 3 IV. Immune System Defenses
 - A. Body Surfaces
 - B. Innate Immunity
 - C. Specific Immunity
 - D. Tolerance
- 1 V. Genetics and Geography of Disease
 - A. Endemic Locales
 - B. Genetics of Evasion
 - C. Case Studies
 - 1. Malaria
 - 2. Sleeping Sickness
 - 3. Schistosomiasis
 - 4. Elephantiasis
- 2 VI. Plagues and Epidemics: Biological Activity and Historical/Social Consequences
 - A. Black Death
 - B. Cholera
 - C. Tuberculosis
 - D. Influenza
 - E. Polio
 - F. AIDS
- 1 VII. Pharmaceuticals and Vaccines
 - A. Small Pox and other Vaccines
 - B. Penicillin
 - C. Viricides
- 1 VIII. Antibiotic and Drug Resistance
 - A. Specific and General Resistance
 - B. Pharmaceutical alternatives
- 2 IX. Health Care/Economics Issues
 - A. Pandemics and the HMO Economy
 - B. Modern Medicine and Developing Nations
- 1 X. Plant Diseases
 - A. Common Pathogens
 - B. Agricultural Preventatives
 - C. Famines/Historical Implications of Plant Diseases
 - D. Resistance

ASSESSMENTS:

Examinations

Newspaper/News Magazine Article Summaries and Critiques--Each student will identify a lay media article related to Disease/disease resistance and summarize and critique its scientific veracity and societal impact based on student's knowledge to date. One assignment will occur early in the semester and one or two during the latter portion of the semester.

Internet Search for compiling a bibliography of Web sites related to a specific disease or health care topic area. Compare and contrast the information from five sites relevant to the issue. Critique the veracity of the sources and identify bias, if any, in the presentation of material at these five sites--Who do you trust and why?

Research Term Paper (about 10 pages) on a disease-related topic approved by the instructor. A defined minimum number of scholarly bibliographic citations will be required by the instructor to insure a "C" grade on the assignment.

Classroom participation in discussion is expected.

GRADING:

Defined achievement levels for specific grades will be identified by the instructor. In general there will be a balance of credit given for examinations, classroom participation and written project assignments. All assignments must be turned in to pass the class. Deadlines for the assignments will be announced by the instructor and late assignments will have their value reduced by 10% per school day. University Policies on Plagiarism or Cheating will be enforced.

REPRESENTATIVE TEXTS:

The Race Against Lethal Microbes edited by Maya Pines, Howard Hughes Medical Institute, Chevy Chase, MD, 1996, 56 pages.

Introducing Immunology by N. Staines, J. Brostoff and K. James, Mosby Yearbook-Europe Limited, London, England, 1993

SUPPLEMENTAL MATERIALS: (Reading Selections from the following)

Howell, Michael and Peter Ford (1985). *Medical Mysteries* [R 133, H68]

Hill, Justina H. (1942). *Silent Enemies: The Story of Diseases of War and their Control* [RC 111, H5, 1942a]

- Williams, Guy (1975). *The Age of Agony: The Art of Healing c 1700-1800* [R 148, W54, 1975]
- Branca, Patricia, editor (1977). *The Medicine Show: Patients, Physicians and the Perplexities of the Health Revolution in (19th Century) Modern Society* [R 149, M37]
- Fiennes, Richard (1964). *Man, Nature and Disease* [RC 112, F48, 1964]
- Burnet, Sir Macfarlane and David O. White (1972). *Natural History of Infectious Disease* [RC 112, B8, 1972]
- Siegfried, Andre (1965). *Routes of Contagion* [RC 111, S4713, 1965a]
- Siegfried, Andre (1965). *Germ and Ideas: Routes of epidemics and ideologies* [RC 111, S4713, 1965]
- Rosenberg, Charles E. (1992). *Explaining epidemics and others studies in the history of medicine* [R 149, R67, 1992]
- Rosebury, Theodor (1971). *Microbes and Morals: The Strange Story of Venereal Disease* [RC 200, R67, 1971]
- Fabrega Jr., Horacio (1974). *Disease and Social Behavior: An Interdisciplinary Perspective* [RA 418, F3, 1974]
- Winslow, Charles-Edward A. (1944). *The Conquest of Epidemic Disease: A Chapter in the History of Ideas* [RA 651, W5, 1943]
- Becker, Yechiel (1976). *Antiviral Drugs: Mode of Action and Chemotherapy of Viral Infections of Man*
- Scientific American* articles, such as "The Challenge of Antibiotic Resistance" (March 1998) or "Post-Polio Syndrome" (April 1998)
- Cooper, James W., editor (1995). *Antiinfectives in the Elderly* [RC 112, A63, 1995]
- Spector, Rachel E. (1979). *Cultural Diversity in Health and Illness* [RA 418 S75]
- Caplan, Arthur (1997). *Due Consideration: Controversy in the Age of Medical Miracles*, John Wiley Press, New York, NY
- Ranger, Terence and Paul Slack, editors (1992). *Epidemics and ideas* [RA 649, E65, 1992]
- Weissmann, Gerald (1987). *They All Laughed at Christopher Columbus* [R 131, W45, 1987]
- Scheffer, Robert P. (1997). *The Nature of Disease in Plants* [SB 601, S28, 1997]

Walter, John and Roger Schofield, editors (1989). *Famine, disease and the social order in early modern society* [HC 260, F3, F36, 1989]

Wellman, Frederick L. (1971). *Plant Diseases: An Introduction for the Layman* [SB 731, W46, 1971]

Carefoot, G. L. And E.R. Sprott (1967). *Famine on the Wind* [SB 732, C37, 1967]

Swann, Michael M. (1980). "The Demographic Impact of Disease and Famine in Late Colonial Northern Mexico" In *Historical Geography of Latin America* [GF 514, H57]

Other appropriate articles, such as: (1) "News and Views" in *Science* and *Nature*, (2) popular press articles on infectious diseases and health care issues, (3) other relevant *Scientific American* articles.

Video Presentations

Attachment #3: Typical Syllabus

GEI 1??
Spring 2000
TTh 11:10-12:25

Dr. Kovacs, Science 334
Office Hrs: MW 14:10-16:00
TTh 9:30-11:00

Revenge of the Killer Microbes

Text: *The Race Against Lethal Microbes*, edited by Maya Pines, 1996
Introducing Immunology by N. Staines, 1993

Additional Materials: On Reserve in the Library

The goal of this course is to describe disease processes and their impact on biological and social developments. The central theme will be the biology of microorganisms and the defense mechanism of man, i.e. the immune system. In addition the roles that human activity and human genetics play in disease processes, as well as how history is influenced by the fact or the threat of disease, will be addressed. Several noted diseases will serve as models to understand these processes; many of these diseases are currently experiencing a resurgence as the miracles of modern medicine or agriculture succumb to adversarial wiles of microorganismal diversity.

| <u>Week</u> | <u>Topics</u> | <u>Assignments</u> |
|-------------|---|---|
| 1 | Introduction to Epidemics and Pandemics Overview of Microorganisms | Pines--Introduction Selected Readings Pines--Atlas of Pathogens |
| 2 | Bacteria and Viruses | Selected Readings |
| 3 | Protozoa, Fungi and Worms Pathogenesis | Selected Readings |
| 4 | Viral and Bacterial Invasion/ Host Evasion Exam #1 | Pines--The Race Staines--Chapter 1 100 pts |
| 5 | The Body Surfaces and Innate Immunity Newspaper/Magazine Critique #1 | Staines--Chapter 2 50 pts |
| 6 | Cells of Specific Immunity Antibodies and Humoral Immunity | Staines--Chapter 3 Staines--Chapter 4,5 |
| 7 | Cell-Mediated Immune Response Tolerance/Autoimmunity Term Paper Topic Decision | Staines--Chapter 7,9 Staines--Chapter 11, 14 |

| | | |
|----|--|--|
| 8 | Geography and Genetics of Disease | Pines--Malaria; Pines-- Trypanosome Diseases Selected Readings |
| | Exam # 2 | 100 pts |
| 9 | Black Death, Cholera Tuberculosis and Influenza | Selected Readings Pines--Return of a Killer |
| 10 | Polio and AIDS Venereal Disease Internet Search Due | Pines--AIDS Selected Readings 100 pts |
| 11 | Vaccines/Viricides | Staines--Chapter 15 Selected Readings |
| 12 | Penicillin and Antibiotic Resistance Pharmaceutical Alternatives Term Paper Due | Selected Readings 200 pts |
| 13 | Health Care and the HMO Health Care for Minorities and the Elderly | Selected Readings |
| 14 | Health Care for Pandemics Newspaper/Magazine Critique #2 | Selected Readings 50 pts |
| 15 | Plant Diseases, Famines, Agriculture, History | Selected Readings |
| | Classroom Discussion | 200 pts |
| | FINAL EXAM | 200 pts |

Assignments: (All typewritten; late assignments will lose 10% value per school day)

Newspaper/Magazine Critiques: Select an article describing disease or resistance, disease process, or social policy related to disease and summarize its findings. Critique the report for scientific and social veracity; support your points with at least two other references. (About 2 pages)

Internet Search: Compile a bibliography of Web Sites related to a specific disease or health care topic. Compare and Contrast the information from five sites relevant to the issue. Critique the veracity of the sources and identify bias, i.e. who do you trust and why? (About 5 pages)

Research Term Paper: Select a topic by the 7th week of the semester for approval of the instructor. Overall paper about 10 pages with a minimum of 8 bibliographic citations in order to obtain a "C" grade or better.

Classroom Participation:

Students should come to class prepared to discuss the material. When a specific question is addressed to the student, an evaluation of the preparedness and thoroughness will be made on a 10 point scale. The average of these evaluations will determine the percentage of the classroom participation points earned by the student, i.e. $\% \times 200 = \text{total participation points}$. Attendance in class is expected; unexcused absences will contribute a 0 to the average for class participation.

Exams:

In-class exams covering aspects of the lecture material will be a mixture of objective, short answer and essay questions; short answer and essay will predominate. The final exam will be comprehensive. **No make-up exams**; for excused exams, the next exam value will double in percentage as a substitute for the missed points. If the final exam is missed for an excusable reason, the student will receive an Incomplete Grade and will generally be expected to take the Final Exam during the subsequent offering of the course.

Grading:

The percentage of total points earned will determine the final grade based on the following general scheme:

| | |
|---------|-----|
| 88-100% | = A |
| 78-87% | = B |
| 65-77% | = C |
| 55-64% | = D |
| <50% | = F |

University Policies on Plagiarism and Cheating will be enforced. Consult School Catalog for details. Students with Disabilities should consult the Schedule of Classes for details about available services in compliance with the ADA.

Attachment #4

Cost Factors:

The usual staffing and supply considerations for a General Education lecture/seminar course should apply. This course could be adapted for an interactive distance learning format which requires additional hardware and technical assistance.

Revenge of the Killer Microbes

Congruency with Area B Objectives for an Upper Division, Integrated Course

| <u>GE Specification</u> | <u>Content Topics</u> | <u>Sample Readings</u> | <u>%Time</u> |
|--|--|--|--------------|
| Imparting Knowledge of Facts and Principles of Living and Non-living Systems | 1]Microorganisms/Overview | <i>Pines, Text</i> | 15.5% |
| | 2]Microbial Pathogenesis | <i>Man, Nature, Disease</i> | 8.8% |
| | 3]Immune System Defenses | <i>Staines et al, Text</i> | 17.7% |
| | 4]Plant Pathogens | <i>Wellman, Diseases</i> <i>Scheffer, Nature Dis.</i> | 2.2% |
| Promote Understanding and Appreciation of Methodologies of Science | 1]Disease Genetics | <i>Pines, Text</i> | 4.4% |
| | 2]Pharmaceuticals/Vaccines | <i>Antiviral Drugs</i> <i>Conquest of Epi. Dis.</i> | 6.7% |
| | 3]Antibiotic Resistance | “Resistance Challenge”; “Post-Polio Syndrome” | 6.7% |
| | 4]Agricultural Preventatives and Resistance | <i>Agricultural Biotech</i> | 2.2% |
| Attention to Influence of Science on World’s Civilizations | 1]Scourge of Disease/Intro | <i>Medical Mys.; Dis. War;</i> <i>Age of Agony; Med. Show;</i> <i>Pines Text</i> | 4.4% |
| | 2]Geography of Disease | <i>Nat. Hist. Infec. Dis.;</i> <i>Routes of Contagion;</i> <i>Hist. Geog/Latin Amer;</i> <i>They all Laughed at Columbus</i> | 4.4% |
| | 3]Plagues/Epidemics-- Biological and Social Issues | <i>Germes and Ideas;</i> <i>Explaining Epidemics;</i> <i>Microbes and Morals;</i> <i>Diseases/Social Behavior;</i> <i>Famine, Disease, Social Order;</i> <i>Famine on the Wind;</i> <i>Epidemics and Ideas</i> | 15.5% |
| | 4]Health Care--Ethics and Economics | <i>Antiinfectives/Elderly;</i> <i>Cultural Diversity/Health;</i> <i>Due Consideration;</i> | 11.1% |