



Scope and Sequence

Cluster:	Health Science		
Course Name:	World Health Research (One Credit)		
Course Description:	This course examines major world health problems and emerging technologies as solutions to these medical concerns. The course is designed to improve students' understanding of the cultural, infrastructural, political, educational, and technological constraints and inspire ideas for appropriate technological solutions to global medical care issues.		
Course Requirements:	This course is recommended for students in Grades 11-12. Recommended prerequisites: Biology and Chemistry.		
Equipment & Supplies	Required: Computers, monitors, telephone, voice mail system, tv/dvd player, internet access, email Recommended: Fax machine, multimedia projector		
Units of Study	Knowledge and Skills	Student Expectations	Resources
I. History of Disease and Technology			
A. Prehistoric times B. Primary Societies (Mesopotamia, Ancient Egypt, Ancient India, Ancient China) C. Secondary Societies (Ancient Greece, Ancient Rome) D. Early to High Middle Ages E. Renaissance F. 17th - 21st Centuries	(1) The student explores and discusses current major human health problems in the world. The student is expected to:	(B) discuss history of diseases and the evolution of medical technology over time.	Biomedical Engineering for Global Health
II. World Health Problems			
A. Functions of CDC and WHO B. Challenges in global health C. Statistical analysis	(1) The student explores and discusses current major human health problems in the world. The student is expected to:	(A) describe the pathophysiology of the three leading causes of death in developing and developed countries; (B) discuss history of diseases and the evolution of medical technology over time; (C) contrast health problems in developing and developed countries; (D) describe the function of the World Health Organization; (E) define and calculate incidence, morbidity, and mortality; and (F) identify and describe the challenges in global health, which can have the greatest impact on health in developing nations.	Biomedical Engineering for Global Health WHO website; CDC Morbidity and Mortality Weekly Report; http://en.wikipedia.org/wiki/list_of_death_by_rate ; www.yourdiseaserisk.harvard.edu
III. Payment for World Healthcare			
A. Beveridge Model B. Bismark Model C. National Health Insurance Model	(2) The student explains who pays for health care in the world today. The student is expected to:	(A) compare the availability of health care in developing and developed countries;	Biomedical Engineering for Global Health WHO website

Units of Study	Knowledge and Skills	Student Expectations	Resources
D. Out-of-Pocket Model		(B) discuss and contrast the four basic health care system models such as the Beveridge Model, Bismarck Model, National Health Insurance Model, and the Out-of-Pocket Model; (C) explain how countries such as the United Kingdom, Japan, Germany, Taiwan, Switzerland, and the United States of America pay for health care; (D) describe how health care expenditures have changed over time; and (E) identify the major contributors to the rising health science industry costs.	
IV. Epidemiology			
A. Infectious Diseases B. Vascular Diseases C. Cancer	(1) The student explores and discusses major human health problems in the world today. The student is expected to:	(A) describe the pathophysiology of the three leading causes of death in developing and developed countries; (B) discuss history of diseases and the evolution of medical technology over time; (C) contrast health problems in developing and developed countries; (E) define and calculate incidence, morbidity, and mortality; and (F) identify and describe the challenges in global health, which can have the greatest impact on health in developing nations.	
V. Technology			
A. Types of Medical Technologies 1. Preventative Medical Technology 2. Screening Technology 3. Diagnostic Technology 4. Interventional Medical Technology 5. Therapeutic Technology B. Medical Technology Developments 1. Infectious Diseases 2. Cancer 3. Heart Disease	(3) The student describes the engineering technologies developed to address clinical needs. The student is expected to: (6) The student explains how medical technologies are managed. The student is expected to:	(A) describe technologies that support the prevention and treatment of infectious diseases; (B) explain the implication of vaccines on the immune system; (C) investigate technologies used for the early detection of cancer; (D) investigate technologies used for the treatment of several different types of cancers; (E) explain the cardiovascular system and the technologies used in the diagnosis and treatment of heart disease; and (F) describe and discuss technologies developed to support vital organ failure. (A) describe how health science research is funded; (B) explain the role of the Food and Drug Administration in approving new drugs and medical devices; and (C) analyze factors that affect the dissemination of new medical technologies.	Biomedical Engineering for Global Health WHO website; CDC website; www.or-live.com
VI. Human Clinical Trials			
A. Randomized Controlled Trial B. Population C. Incidence	(4) The student explores how human clinical trials are designed, conducted, and evaluated. The student is expected to:	(A) identify types of clinical trials; (B) define and calculate a sample size; and	Biomedical Engineering for Global Health FDA website

Units of Study	Knowledge and Skills	Student Expectations	Resources
D. Specificity E. Sensitivity F. False Positive G. Lead Time Bias H. Length Time Bias I. Selection Bias J. Over-Diagnosis Bias		(C) analyze quantitative methods used to describe clinical trials.	
VII. Ethics			
	(5) The student recognizes the ethics involved in clinical research. The student is expected to:	(A) define informed consent; (B) explain who can give informed consent; (C) identify issues in research that influence the development of ethical principles and legal requirements currently governing research with human subjects; and (D) explain the ethical guidelines for the conduct of research involving human subjects.	Biomedical Engineering for Global Health
VIII. Research Project			
	(7) The student applies research principles to create a project that addresses a major health problem. The student is expected to:	(A) construct charts and graphs in facilitating data analysis and in communicating experimental results clearly and effectively using technology; and (B) present the project to classmates, health professionals, parents, or instructors.	Biomedical Engineering for Global Health

Resources: Books

Global	Biomedical Engineering for Global Health: Applications in World Health Care, Cambridge University Press.	521877970
APA	World's Easiest Guide to Using the APA: A User Friendly Manual for Formatting Research Papers According to the American Psychological Association, 4E, Stargazer Publishing Company.	9.78193E+12
MLA	Modern Language Association of America. MLA Handbook for Writers of Research Papers, 6E	9.78087E+12

Resources: Web Sites

World Health Organization	http://www.who.int/en/
National Public Radio	http://www.npr.org/
Food and Drug Administration	http://www.fda.gov/
Centers for Disease Control	http://www.cdc.gov/
Online Surgical and Healthcare Video	http://www.or-live.com/
Your Disease Risk	http://www.yourdiseaserisk.harvard.edu/
Medline Plus	http://medlineplus.gov/
Pubmed	http://www.pubmed.gov/
Global Health Research Online	http://www.uniteforsight.org/research-course/
Morbidity and Mortality Weekly Report	http://www.cdc.gov/mmwr/
The President's Council on Bioethics	www.bioethics.gov
Ethics in Medicine	www.depts.washington.edu/bioethx/topics/resrch.html