

PHC 6001 (Sec 3289) PRINCIPLES OF EPIDEMIOLOGY
Fall SEMESTER 2007
Time: 2-5PM Tuesday
Location: 1404 HPNP Building

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Tuesdays and Thursdays from 9-11 a.m.

PHC 6001 Principles of Epidemiology
Schedule, Fall 2006

DATE	LECTURE	TOPICS TO BE PRESENTED/DISCUSSED	READINGS	LECTURER
8/28/07	1	<ul style="list-style-type: none"> • Introduction to Course • Epidemiology/Science of Public Health • Basic Terminology/ Epidemiologic Method 	Gordis: Chapter I pp 3-14 or Aschengrau Chapter 1pp 1-32	Asal
9/04/07	2	<ul style="list-style-type: none"> • Descriptive Epidemiology Person, place, and time 	Gordis: Chapters II & III pp 15-47 or Aschengrau Chapter 5pp 99-138	Asal
9/11/07	3	<ul style="list-style-type: none"> • Vital Statistics • Sources of Data for Epidemiology 	Aschengrau Chapter 4pp 77-98	Asal
	4	<ul style="list-style-type: none"> • Classification of Disease • Certification of Cause of Death 	Gordis: Chapter IV, pp 58-60 or Aschengrau Chapter 4pp 79-84	
9/18/07	5	<ul style="list-style-type: none"> • Measures of Disease Frequency rates, ratios, proportions 	Gordis: Chapters IV & V pp 32-70 or Aschengrau Chapter 2pp 33-58	Asal

9/25/07	6	<ul style="list-style-type: none"> • Rate Adjustment: Direct & Indirect Methods 	Gordis: Chapter IV pp 60-68 or Aschengrau Chapter 3 Pp 59-76	Asal
10/02/07	7	<ul style="list-style-type: none"> • Investigation of Infectious Disease Outbreaks 	Gordis: Chapter II pp 15-31	Asal
10/9/07	8	<ul style="list-style-type: none"> • Outbreak Epidemiology 	Gordis: Chapter II pp 15-31	Asal
10/16/07		<ul style="list-style-type: none"> • Examination I 		Asal
10/23/07	9	<ul style="list-style-type: none"> • Study Design in Epidemiology • Overview- ecologic, cross-sectional Studies 	Gordis: Chapter X pp 159-176; 173-176; or Aschengrau Chapter 6pp 139-168	Asal
10/30/07	10	<ul style="list-style-type: none"> • Study Design in Epidemiology I • Case-control Studies 	Gordis: Chapter X & XIII, pp 159- 173; 199- 202; or Aschengrau Chapter 9pp 229-260	Asal
11/06/07	11	<ul style="list-style-type: none"> • Study Design in Epidemiology II • Cohort studies <p>135TH ANNUAL MEETING AND EXPOSITION, AMERICAN PUBLIC HEALTH ASSOCIATION, NOV 3-7, 2007 Washington, DC</p>	pp 166-176 Gordis: Chapter IX & XIII pp 149-158; 199-202; or Aschengrau Chapter 8pp 201-228	Asal
11/13/07	12	<ul style="list-style-type: none"> • Study Design in Epidemiology III • Experimental Studies/Randomized Trials 	Gordis: Chapter VII & VIII pp 115-129; 130-146; or Aschengrau Chapter 7pp 169-200	Asal

11/20/07	13	<ul style="list-style-type: none"> • Measures of Association <ul style="list-style-type: none"> ○ Relative Risk, Risk Ratio ○ Relative Odds, Odds Ratio ○ Attributable Risk, Population Attributable Risk 	Gordis:Chapters XI & XIV pp 177-190; 203-223; or Aschengrau Chapter 15 pp 383-410	Asal
11/27/07	14	<ul style="list-style-type: none"> • Bias and Confounding in Epidemiologic Research 	Gordis: Chapter XV pp 224-239 ; Aschengrau Chapters 10 & 11 pp261-306	Asal
12/04/07	15	<ul style="list-style-type: none"> • Screening In Disease Detection <ul style="list-style-type: none"> ○ Sensitivity, Specificity ○ Predictive Value Positive/Negative ○ False Positive/False Negative 	Gordis: Chapters V & XVIII pp 71-94;281-300; or Aschengrau Chapter 16 pp 411-440	Asal
12/11/07		<ul style="list-style-type: none"> • Examination II • Course Evaluation by Students 		Asal

Read also Chapters:

XII More on Risk: Estimating The Potential for Prevention,
pp 191-198

XVI Identifying the Roles of Genetic and Environmental Factors
In Disease Causation pp 240-262

XVII Using Epidemiology to Evaluate Health Services pp 265-280

XIX Epidemiology and Public Policy pp 301-313

XX Ethical and Professional Issues in Epidemiology pp 314-324

Course Description: An introduction to epidemiology for students majoring in any aspect of the health sciences. The principles and methods of epidemiology investigation, both of infectious and non-infectious diseases are included.

Course Objectives:

General Objectives: The purpose of this course is to explain the place of epidemiology in the general health thinking and to communicate some understanding of the basic principles of epidemiology. Examples of the use of the principles of epidemiology will be presented so that the student will have sufficient understanding to apply such principles in future health work. It is hoped that the course will allow the student to critically read and evaluate his/her public health

work using epidemiological principles. This course is not intended to present the epidemiological aspects of the major diseases.

Specific Objectives:

1. Identify key sources of data for epidemiologic purposes
2. Identify the principles and limitations of public health screening programs
3. Describe a public health problem in terms of magnitude, person, time and place
4. Explain the importance of epidemiology for informing scientific, ethical, economic, and political discussions of health issues
5. Identify basic ethical and legal principles pertaining to the collection, maintenance, use, and dissemination of epidemiologic data
6. Apply the basic terminology and definitions of epidemiology
7. Calculate basic epidemiology measures
8. Communicate epidemiologic information to lay and professional audiences
9. Draw appropriate inferences from epidemiologic data
10. Evaluate the strengths and limitations of epidemiologic reports
11. Apply basic infectious disease methods and data
12. Apply basic chronic disease method and data

Conduct of Course:

1. **Lecture** - for general orientation.

2. **Reading** – Teaching will generally follow the required textbook- Gordis, “Epidemiology,” 2004, Updated Third Edition; however, additional textbooks of epidemiology are recommended to supplement the lectures.

3. **Examinations:** Students are expected to take the examinations on the scheduled date and time. Make up examinations are not allowed except under very unusual and convincing circumstances. Students who fail to take the examinations on the scheduled date and time period without a written permission of the instructor will receive a grade of F on the examination. This policy will be strictly enforced.

There will be two (two hour) examinations. Each examination will count 40% of the grade for a total of 80% of the Final course grade.

Another 5% of the Final course grade will be assigned for attendance and participation in class discussion.

4. **Home work:** assignments, turned in on time and correctly, will count 15% of the Final course grade. Home work assignments for the completed lecture are due at the beginning of the next class session.

5. **Grades:** The Grading scale for this course consists of the standard scale below: A= 90% - 100%, B+= 84.9%- 89.9%, B= 80%- 84.9%, C+= 75%-79.9%, C= 70-74.9, D+= 65% -69.9%, D=60%-64.9%, E= Below 60.9%

a. Assignments = 15%

- b. Attendance/discussion = 5%
- c. Exam I = 40%
- d. Exam II = 40%

6. Counseling Resources: Counseling Center, UF, 301 Peabody Hall, 392-1575
www.counsel.ufl.edu . Student Mental Health Services, UF, 392-1171
www.health.ufl.edu/schcc/smhs.htm (24-hour phone consultation)

7. Recommended Text books

Leon Gordis, "Epidemiology", 2004, Updated Third Edition. W. B. Saunders Company, Philadelphia.

Ann Aschengrau and George R. Seage, "Essentials of Epidemiology in Public Health" , 2007, Second Edition. Jones and Bartlett, Boston.

Purchase of the textbook is required. It is strongly recommended that you read all of the assigned required readings. Use the index to read up on topics covered in class, preferably before each class lecture.

Additional readings can be found from the list of other books and special readings assigned by the instructor(s).

8. Requirements: Students are responsible for all course material, including reading all required materials prior to each class.

9. Classroom etiquette: Please come to class on time and be prepared to stay until the time scheduled at the end of class. We think your investment in the degree is worth my maximizing your in-class experience, and we usually provide materials that extend the full, scheduled class times. Pagers and cell phones should not be used in class. The use of cell phones, text messaging, and pagers is one of the most common complaints I have from students in recent years. Please turn them off. Or, if you expect urgent calls, set them to "vibrate."

10. Academic Integrity: Each student is bound by the academic honesty guidelines of the University and the student conduct code printed in the Student Guide and on the University website. The Honor Code states: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." Cheating or plagiarism in any form is unacceptable and inexcusable behavior.

11. Class Attendance: Class attendance is mandatory (required). Excused absences follow the criteria of the UFL Graduate Catalogue (e.g., illness, serious family emergency, military obligations, religious holidays), and should be communicated to the instructor prior to the missed class day when possible. UFL rules require attendance during the first two course sessions, and students also must attend all course sessions for this class. Missing more than three scheduled sessions will result in a failure. Regardless of attendance, students are responsible for all material presented in class and meeting the scheduled due dates for class assignments. Finally, students should read the assigned readings prior to the class meetings, and be prepared to discuss the material except for the first class session.

12. Policy on Make-Up Work: Students are allowed to make up work ONLY as the result of illness or other unanticipated circumstances warranting a medical excuse and resulting in the student missing a homework or project deadline, consistent with College policy. Documentation from a health care provider is required. Work missed for any other reason will receive a grade of zero.

13. Accommodations for Students with Disabilities: Students requiring accommodations must first register with the Dean of Students' Office. The Dean of Students' Office will provide documentation to the student who must then provide this documentation to the faculty member when requesting accommodation. The College is committed to providing reasonable accommodations to assist students in their coursework. We all learn differently: however, if you have experienced problems in university classes with writing, in-class exams, understanding or concentrating in class, please talk to me or access a learning or education testing resource at the University or in another professional setting.

Definitions

Many definitions of Epidemiology in dictionaries, medical dictionaries, public health texts, and epidemiology texts.

Simply -- "The study of the occurrence and distribution of health and disease in groups."

May be looked upon as the "Diagnostic Discipline of Public Health" or the "Basic Science of Public Health".

Derived from 3 Greek Words - EPI - down, on, upon, (EPIdermis, the outer layer of the skin). DEMOS - people (DEMOCRACY, government by the people. LOGY - study, knowledge (psychology study of the mind.

Therefore, by its derivation, Epidemiology is not confined to community disease. It is literally "The study of anything which descends upon the people."

What is Epidemiology?

1. "Epidemiology is the study of the distribution and determinants of disease prevalence in man." MacMahon, B., and Pugh, T.F. Epidemiology Principles and Methods.
2. "Epidemiology may be defined as the study of the determinants of the incidence and prevalence of disease." Alderson, M., An Introduction to Epidemiology.
3. "Epidemiology is the study of disease occurrence in human populations. The primary units of concern are groups of persons, not separate individuals." Friedman, G.D., Primer of Epidemiology.
4. "Epidemiology is the basic science of preventive medicine"

because Epidemiology deals with problem solving, "Epidemiologic problems are concerned with explaining the occurrence of disease in human populations and with exploiting explanations discovered for development of methods to protect man against disease." Fox, J.P., Hall, C.E., and Elveback, L.R. *Epidemiology Man and Disease*.

5. "Epidemiology is defined as the study of the factors determining the frequency and distribution of disease in human population."

Lowe, C.R. and Kostrzewski, J., *Epidemiology A Guide to Teaching Methods*.

6. "Epidemiology may be defined as the study of the distribution and determinants of diseases and injuries in human populations. That is, epidemiology is concerned with the frequencies and types of illnesses and injuries in groups of people and with the factors that influence their distribution." Mausner, J.S. and Kramer, S., *Epidemiology An Introductory Text*.

7. "Epidemiology is defined as the study of the distribution and dynamics of disease in populations. Several words in this definition require elaboration. Distribution implies the selection of people for attack by a disease in relation to age, sex, race, occupational and social characteristics, and place of residence, susceptibility, exposure to specific agents or whatever other characteristic is pertinent. Dynamics refers to the distribution in time and is concerned with trends, cyclic or secular patterns, and intervals between exposure to inciting factors and onset of disease." Sartwell, P.E. and Last, J.M., in John M. Last, Maxcy-Rosenau *Public Health and Preventive Medicine*.

8. "Epidemiology is the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems. There have been many definitions of epidemiology. In the past 50 years or so, the definition has broadened from concern with communicable disease epidemics to take in all phenomena related to health in populations."

The Oxford English Dictionary gives as a definition: "That branch of medical science which treats of epidemics" and cites Parkin (1873) as a source. However, there was a "London Epidemiological Society" in the 1850s. The identity of the Scholar who first used the word at that time has been lost. *Epidemiologia* appears in the title of a Spanish history of epidemic, *Epidemiologia Espanala*, Madrid, 1802.

Epidemic is much older. The word appears in Johnson's Dictionary (1775), and OED gives a citation dated 1603. The word was, of course, used by Hippocrates.

Last, J.M., *A Dictionary of Epidemiology*, Second Edition.

Community disease may be in any of 3 phases- ENDemic, EPIIdemic, PANdemic.

Endemic: The habitual presence of a disease within a given geographic area.

Epidemic: Is the occurrence in a community or a region of a group of illnesses of similar nature, clearly in excess of normal expectancy (derived from a common or propagated source).

Pandemic: The world wide spread of epidemic disease.

Epizootic: Occurrence as an epidemic disease among animals.

Enzootic: Occurrence as an endemic disease among animals.
Zoonosis: Disease primarily of animals but transmitted to man.
Epiphytic: Occurrence as an epidemic disease among plants.

PHC 6001 Principles of Epidemiology, continues

LECTURE OVERVIEWS/LEARNING OBJECTIVES

Topic 1

Introduces the student to some landmarks in the history of epidemiology as well as some basic definitions of epidemiology and terms used in the study of epidemiology. Description and aims, the role of epidemiology, the natural history of diseases, dynamics of disease, and models of causation are also presented. The epidemiologic method is introduced and specific types of studies used in epidemiology are defined, briefly discussed and their unique features are noted. These studies will be discussed in more details later in the course.

Lecture Objective(s):

- a. Identify the major landmarks in the field of epidemiology.**
- b. Define key epidemiology terms and know how they are used in the context of epidemiology.**
- c. Know the basic concepts of epidemiology such as the multi factorial nature of all diseases, the interaction of agent, host and environment and the chain of transmission and be able to describe, explain and defend these concepts.**
- d. Discuss the phases/stages of the Epidemiologic Method and identify appropriate study designs used in each stage.**

Topic 2

In this topic the focus will be on descriptive epidemiology and its three major characteristics of person, place and time. Person characteristics such age, gender, and race will be presented and their impact on morbidity and mortality will be discussed using examples from the literature. Place variable or geography will also be presented noting the importance of administrative vs natural boundaries in comparing data on disease occurrence by place. The study of disease occurrence by time will also be presented comparing and contrasting differences in time trends between infectious and chronic diseases.

Lecture Objective(s):

- e. List the descriptive epidemiology variables used under each of the broad categories of person, place, and time and identify key data sources for descriptive epidemiology.**

Topic 3

Vital statistics such as birth and death certificate data and other sources of data such as the census as a source of denominator data, medical records, surveillance, surveys, and other routinely collected data will be presented and discussed. Leading health indicators will also be identified and presented. Methods of displaying data using table and graphs will be presented and discussed.

Lecture Objective(s):

- f. Explain the evolution of the International Classification of Disease System used in coding mortality and morbidity data and know the most recent revision currently in use.**

Topic 4

This topic covers the use and purpose of the death certificate and the importance of correctly following the method and process of selecting the underlying cause of death when completing the certificate of cause of death. The roles of the funeral director and physician, medical examiner or coroner will be noted. The methods used to classify morbidity and mortality data will be emphasized and the evolution of the International Classification of Disease (ICD) system will be presented and discussed from the first to the presently used Tenth Revision of the ICD Code.

Lecture Objective(s):

- g. Define each of the causes of death listed in the cause of death section of the certificate of death and know who is responsible of completing information on the certificate of death. Specifically, define the underlying cause of death counted in U.S. Vital Statistics.**

Topic 5

This topic covers commonly used measures of frequency such as rates ratios and proportions associated with disease, exposure, and other indicators of health status in the community. Measures of morbidity such as incidence, attack and prevalence measures and rates will be defined, calculated and examples presented. Emphasis will be placed on the appropriateness of selecting a numerator, denominator, and K values. Measures of mortality, such as infant mortality, proportionate mortality, maternal mortality, neonatal mortality, crude mortality, cause specific mortality, and case fatality will be defined, calculated and examples presented. Other rates such as crude birth rates and fertility rates will also be defined and presented.

Lecture Objective(s):

- h. Discuss how to calculate basic epidemiology measures such as rates, ratios, and proportions. Have knowledge of specific terms and formulae used in calculating morbidity measures such as incidence and prevalence rates and all types of mortality measures and rates presented in class. Know the appropriate use of numerator, denominator, and K values for each of the rates used in epidemiology.**

Topic 6

The purpose and uses of rate adjustments will be presented and discussed including the direct and indirect methods of adjustment by such important variables as age. Selection of a standard population and calculation of adjusted rates using the direct and indirect methods will be presented and discussed.

Lecture Objective(s):

- i. Identify the formulae and methods used to calculate adjusted rates by the direct and indirect methods. Discuss how to interpret adjusted vs crude death**

rates. Know how the selection of a Standard Population influences the calculated adjusted rate produced.

Topic 7

A systematic outline of the steps involved in the investigation of an epidemic referred to as an outbreak will be presented and discussed. These steps include the identification of a team of qualified investigators, obtaining the appropriate clearance, and the establishment of the existence of an outbreak or epidemic. Constructing a case definition, identifying additional cases, developing a line listing and using the information gathered to perform descriptive epidemiology for the purpose of formulating a hypothesis. Calculation of attack rates, drawing and interpreting epidemic curves will be emphasized. Implementing control measures, maintaining surveillance, and appropriate communication of findings will be presented and emphasized. At the conclusion of this presentation, the student should be able to conduct a successful outbreak investigation.

Lecture Objective(s):

- j. Identify the steps used in an outbreak investigation. Know how to draw, label and interpret an epidemic curve. Discuss how to calculate attack rates, attack rate ratios. Be familiar with the Line Listing used in outbreak investigation.**

Topic 8

This topic reviews the methods used to investigate and control outbreaks of infectious disease. Emphasis is placed on surveillance and more in depth review of the methods of outbreak investigation.

Lecture Objective(s):

- k. Understand and know the methods used in epidemiologic investigation such as reporting and surveillance, and surveys. descriptive, cross-sectional, case-control (retrospective), cohort (prospective), and experimental (quasi experimental, randomized controlled trials, and community intervention studies) studies and outbreak investigation. Discuss how to design each kind of study, and how to analyze and interpret the data. Discuss the advantages and disadvantages of each type of study design.**

Topic 9

Overview of study designs used in epidemiology with a focus on cross-sectional studies which can be either descriptive or analytical as well as ecological studies. Covers issues to be considered with cross-sectional and ecological studies; issues will include selecting study populations, ascertaining risk factor/exposure status, measuring outcomes, and methods of analysis.

Lecture Objective(s):

- l. Understand and know the methods used in epidemiologic investigation**

such as descriptive, cross-sectional, case-control (retrospective), cohort (prospective), and experimental (quasi experimental, randomized controlled trials, and community intervention studies) studies. Discuss how to design each kind of study, and how to analyze and interpret the data. Discuss the advantages and disadvantages of each type of study design.

Topic 10

Covers specific issues encountered in the design, conduct, and analysis of data from case-control studies. Issues will include selection of cases and control populations, comparability and representative nature of the cases and controls, type and number of controls per case, ascertainment of risk factor/exposure status, and methods of analysis. Estimation of the measure of association using the odds ratio and confidence intervals.

Lecture Objective(s):

- m. Describe the anatomy of the epidemiologic study design and be able to explain and defend the approach to sampling for a case-control study. Be able to discuss the advantages and disadvantages of a case-control study design.**

Topic 11

Covers specific issues encountered in the design, conduct, and analysis of data from cohort studies. Issues will include selection of exposed and non exposed groups, ascertainment of risk factor/exposure status, measuring outcome, and method of analysis. Estimation of the measure of association using the relative risk and confidence intervals.

Lecture Objectives:

- n. Describe the anatomy of the epidemiologic study design and be able to explain and defend the approach to sampling for the cohort studies by type. Be able to discuss the advantages and limitations of a cohort study design.**

Topic 12

Covers specific issues related to experimental studies and randomized trials. This includes design features and key elements such as the research question, random allocation, avoidance of bias, outcome assessment, sample size, and methods of analysis.

Lecture Objectives:

- o. Describe the anatomy of the epidemiologic study design and be able to explain and defend the approach to sampling for a randomized controlled trial, community intervention study, and quasi-experimental designs associated with each. Know the advantages and limitations of each.**

Topic 13

Reviews measures of risk and confidence intervals, defines association and causation, and discusses their contribution to health policy and promotion. Discusses the influence of error and bias on the interpretation of the association.

Lecture Objective(s):

- p. Identify and discuss the three types of associations likely to be produced when examining the relationship between exposures and outcomes, the difficulty encountered, and criteria required in sifting causal association from indirect and spurious associations. Draw appropriate inferences from epidemiologic data and differentiate causal from non-causal inference.**
- q. Discuss how to calculate and interpret measures of association such as relative risk (risk ratio), odds ratio (relative odds), attributable risk and population attributable risk.**

Topic 14

Discusses the definition of bias and the two major categories of bias that must be addressed in study design: selection bias and information bias; confounding will also be defined and examples provided, along with suggestions for controlling confounding variables.

Lecture Objective(s):

- r. Identify the limitations of morbidity and mortality data; the distortion produced by confounding factors; and the weaknesses of prevalence and cause-specific mortality when used as substitutes for incidence.**
- s. Identify and be able to describe, explain, and defend the major sources of error and bias in epidemiological data especially in retrospective and prospective studies. The awareness should be adequate to enable the student to recognize these problems in the literature and reserve judgment about conclusions reached.**

Topic 15

This topic covers the general principles and methods used in detecting disease early using screening tests applied to asymptomatic individuals to sort out those who have the disease from those who do not have the diseases. Screening will be defined and the qualities of the screening tests such as sensitivity, specificity, predictive value positive and negatives will be defined, calculated and examples used. Ethical issues associated with screening will be discussed as well bias associated with screening –programs such as selection bias, lead time bias, length bias sampling, and over-

Lecture Objective(s):

- t. Identify basic principles and limits of public health screening programs. Define and calculate measures used in screening and early detection of**

disease such as reliability, validity, sensitivity and specificity, predictive value positive and negative.

Other Helpful Specific Lecture sub-objectives

- u. Evaluate strengths and limits of epidemiology reports and have some understanding of the uses of epidemiology in health policy and clinical decision making.**
- v. Draw appropriate inferences from epidemiologic data.**
- w. Communicate epidemiology to lay and professional audiences.**
- y. Incorporate ethical and legal principles for data collection, maintenance, use, and dissemination.**
- z. Recognize and use appropriate basic infectious and chronic disease methods and data.**
- a.1 Choose appropriate epidemiologic measures.**
- b.1 Become aware of current epidemiologic and public health problems.**

