An introduction to Applied Epidemiology and Biostatistics
E610
Credit Hours: 3
Syllabus

Instructor: Juhua Luo, Assistant Professor, Dept. Epidemiology & Biostatistics, SPH, IUB

Course description:
Introduces basic epidemiological and biostatistical principles, concepts, and procedures for the surveillance and investigation of health-related states or events. Introduces collecting data and analyzing disease incidence and prevalence to provide analyses leading to effective interventions and preventions. Reviews sources of information, associations between diseases and precipitating factors, and statistical representations.

Prerequisites:
No previous background in epidemiology or biostatistics is required or expected. Just bring a lively curiosity and a dedication to learning new things.

Learning Outcomes
Students who successfully complete this course should be able to correctly:

1. Utilize the basic terminology and definitions of epidemiology to define public health problems in terms of magnitude, person, place, and time
2. Describe key features and applications of descriptive and analytic epidemiology.
3. Utilize basic statistical techniques in the analysis and presentation of health-related data.
4. Calculate and interpret ratios, proportions, incidence rates, mortality rates, prevalence.
5. Calculate and interpret mean, median, mode, ranges, variance, standard deviation, and confidence interval.
6. Prepare and apply tables, graphs, and charts such as arithmetic-scale line, scatter diagram, pie chart, and box plot.
7. Describe the processes, uses, and evaluation of public health surveillance.
8. Describe the steps of an outbreak investigation.
9. Identify and comprehend key sources for epidemiologic data
10. Assess & understand public health issues as determinants of population health and illness
11. Apply and interpret measures of disease occurrence and correlates in populations

Course Competencies

1. Identify key sources of data for epidemiologic purposes
2. Apply the basic terminology and definition of epidemiology
3. Apply descriptive techniques commonly used to summarize public health data.

Course materials

- **Textbook:** CDC – downloadable e-book: Principles of Epidemiology in Public Health Practice, Third Edition: An introduction to Applied Epidemiology and Biostatistics U.S. and "The Basic Practice of Statistics, Fourth Edition." David S. Moore (This book can be ordered for a few cents off of Amazon.)
- **Optional readings:**
    - Epidemiology, Fourth Edition, by Leon Gordis, W.B. Saunders Company, Philadelphia, 2004.
    - Epidemiology in Medicine, by Charles H. Hennekins and Julie E. Buring, Lippincott Williams & Wilkins, Philadelphia, 1987.
    - Essentials of Epidemiology in Public Health, by Ann Aschengrau and George R. Seage III. 2003. (ISBN 0-7637-2537-4)

Assessment

Final grades will be based on completion of five homework assignments, a mid-term examination and a final examination.

1. The mid-term examination will count for 20% of the final grade.
2. The final examination will count for 30% of the final grade.
3. The each homework assignment will account for 10% of the final grade. Thus, independent completion of five homework assignments will count for 50% of the final grade.

Final Grade Scale

A. 90-100% B. 80-89% C. 70-79% D. 60-69% F. < 60%

Course Outline and Schedule

Week	Topic	Description of the Topic	Assignments
1	Introduction to Epidemiology	Epidemiology: definition, concept, scope and objectives and functions	
2	Overview of Epidemiological Design Strategies	Descriptive Epidemiology Analytic Epidemiology, including experimental studies, observational studies	Assignment #1
3	Descriptive Statistics – Part 1	Variables Pie charts, bar graphs, histograms Distribution Measuring Center Measuring Spread	
4	Descriptive Statistics – Part 2	Density curves Types of variables Scatterplots	

		Correlation Regression Two-way tables	
5	Measures of Risk	Frequency measures Morbidity, incidence and prevalence Mortality rate Measures of association, including risk ratio and odds ratio Attributable Risk	Assignment #2
6	Producing Data	Confounding Sampling Bias Experiments	
7	Inferential Statistics – Part 1	Probability Sampling Distributions Confidence Intervals Tests of Significance Type I and Type II Errors	Assignment #3
8	Inferential Statistics – Part 2	T-tests Chi-square tests ANOVA	
9	Mid-term exam		
10	Data Ethics	IRBs Informed Consent Confidentiality Clinical Trials Behavioral & Social Experiments	Assignment #4
11	Natural History and Spectrum of Disease	Concepts of Disease Occurrence Chain of Infections Epidemic Disease Occurrence Epidemic Patterns	
12	Public Health Surveillance	Purpose and characteristics of public health surveillance Identifying health problems for surveillance Working with data for surveillance Evaluating and improving surveillance	

13	Investigating an outbreak	Introduction to investigating an outbreak Steps of an outbreak investigation	Assignment #5
14	Course Evaluation		
15	Final exam review		
16	Final exam		