

WOLLO UNIVERSITY

COLLEGE OF NATURAL SCIENCE

SEMESTER COURSE DELIVERY PLAN

DEPARTMENT: STATISTICS **SEMESTER:** II **A.YEAR:** 2012 (E.C)

COURSE NAME: BIOSTATISTICS & EPIDEMIOLOGY **CORSE CODE:** Stat3101

INSTRUCTOR NAME: AMSALU AREGA

Credit hours: 3hrs (3 hrs lecture +1 hrs tutorial+1 lab)

Course Description

Basic principles and methods of epidemiology; measures of disease occurrence: incidence rates, prevalence rates, odds ratio and relative risks; disease screening: sensitivity and specificity; and study designs: case-control, cohort and cross-sectional studies; survival analysis; clinical trials; research ethics.

Objectives

- ✓ To introduce the application of probabilistic and statistical ideas and methodologies to biological and medical researches;
- ✓ To introduce basic principles and methods of epidemiology and demonstrate their applications to basic biological, medical and public health problems.

Learning outcomes

Upon successful completion of this course, students are expected to:

- ✓ Describe different types of studies used in biomedical research;
- ✓ Recognize the advantages and limitations of the different study designs;
- ✓ Identify sources of bias in different study designs;
- ✓ Define time-to-event data;
- ✓ Understand why survival (time- to-event) data requires special analytic techniques;
- ✓ Construct the kaplan-meier estimate for survival function to describe the survival experience of a cohort of subjects;
- ✓ Interpret the result of a log-rank test in the context of comparing the survival experience of multiple cohorts;
- ✓ Define & calculate sensitivity, specificity, negative predictive value and positive predictive value;
- ✓ Calculate and interpret odds ratios, risk ratios and hazard ratios;
- ✓ Understand research ethics in clinical studies.

Weeks	Content	Objectives	Teaching Methods	Teaching aids	Evaluation Method	Remark
1-2	1. Principles & Methods of Epidemiology (14 hrs) 1.1 The Uses of Epidemiology 1.2 Some Epidemiologic Concepts: Mortality Rates 1.3 Age-Adjusted Rates 1.4 Incidence and Prevalence Rates	At the end of this lesson, students will be able to: - Define biostatistics & Epidemiology - State the use of epidemiology - Calculate & Interpret about prevalence & Incidence rate	Lecture Group discussions	Computer LCD projector	Oral questions Exercise Exam Assignment	
3-4	1.5 Measures of Relative Risk 1.6 Odds Ratio 1.7 Response Bias 1.8 Confounding Variables 1.9 Matching	At the end of this lesson, students will be able to: - Define ,calculate & interpret the measures of association - Identify the bias in epidemiologic measures	Lecture Group discussions	Computer LCD projector	Oral questions Exercise Exam	
5-6	2. Research Design (14 hrs) 2.1 Introduction 2.2 Categories of research design 2.3 Design of experiments 2.3.1 Random allocation 2.3.2 Minimization	At the end of this lesson, students will be able to: Differentiate the main types of epidemiologic research designs	Lecture Group discussions	Computer LCD projector	Oral questions Exercise Exam	
7-8	2.4 Observational studies 2.5 Case-control study 2.6 Cohort study 2.7 Cross-sectional study 2.8 Choosing a study design	At the end of this lesson, students will be able to: - State the merit & demerits of each design - Chose the appropriate study designs	Lecture Group discussions Lab practice	Computer LCD projector	Oral questions Exercise Home take Exam	

9	2.9 Research Ethics and Statistics 2.9.1 Introduction 2.9.2 Protection of human research subjects 2.9.3 Informed consent 2.9.4 Research integrity 2.9.5 Authorship policies 2.9.6 Data and safety monitoring	At the end of this lesson, students will be able to: • State different types of research ethics • Differentiate the each types of research ethics	Lecture Reading Assignment	Computer LCD projector	Oral questions Exercise Exam Assignment	
10-11	3. Survival Data Analysis (14 hrs) 3.1 Introduction: time-to event, censoring, hazard function and survival function 3.2 Kaplan-Meier estimates of survival probabilities 3.3 Comparing survival curves in two groups	At the end of this lesson, students will be able to: • Define time to event data • State types of censoring • Define & Estimate the survival & Hazard functions	Lecture Group discussions Lab practice	Computer LCD projector	Oral questions Exercise Exam Lab report	
12	4. Disease Screening (3 hrs) 4.1 Sensitivity and specificity 4.2 Negative predictive value, positive predictive value and related concepts 4.2 Cutoff point and its effects on sensitivity and specificity	At the end of this lesson, students will be able to: • Define and estimate sensitivity & Specificity • Estimate & Interpret negative & Positive predictive values	Lecture Group discussions	Computer LCD projector	Oral questions Exercise Exam	
13	<u>5. CLINICAL TRIALS (3 hrs)</u> 5.1 Features of randomized clinical trials 5.2 Purposes of randomization 5.3 Randomized assignment 5.5 Clinical trial as "Gold Standard" 5.6 Sample size for clinical trials	At the end of this lesson, students will be able to: • Define clinical trials • Understand random allocation • Understand the meaning of "Gold Standard"	Lecture Group discussions	Computer LCD projector	Oral questions Exercise Exam	

Textbook

Wassertheil-Smoller, S. (2004). Biostatistics and Epidemiology: A Primer for Health and Biomedical Professionals (3rd edition). Springer, New York

References

Campbell, M .J. and Machin, D. (1999) Medical Statistics: A Commonsense Approach (3rd edition). John Wiley & Sons, Chichester.

Altman, D.G. (1991). Practical Statistics for Medical Research. Chapman and Hall, London.

Gordis, L. (2004). Epidemiology (3rd edition), Saunders, Philadelphia.

Lee, E.T. and Wang, J.W. (2003) Statistical Methods for Survival Data Analysis (3rd Edition) Wiley Series in Probability and Statistics

Everitt, B.S. (2007). Medical Statistics from A to Z: A Guide for Clinicians and Medical Students (2nd edition). Cambridge University Press

Riffenburgh, R.H. (2005). Statistics in Medicine (2nd edition) Academic Press

Rosner, B. (2005). Fundamentals of Biostatistics (6th edition). Duxbury Press.

Glantz, S. (2005) Primer Biostatistics (6th edition). McGraw- Hill Medical

Rothman, K.J., Greenland, S. and Lash, T. L (2008). Modern Epidemiology (3rd edition). Lippincott Williams and Wilkins.

Jewell, N.P (2003). Statistics for Epidemiology. Chapman and Hall/CRC

Teaching and learning methods

Lectures, assignments and computer labs

Modes of Assessment

Continuous Assessment 50%, Final Exam 50%