

Module title/code: Biostatistics and Epidemiology

Course code: Stat-3101

Academic Year: 2020

Semester: II

Student's College/Faculty/School: Natural Sciences

Department/Program/course team: Statistics

Study Program: Undergraduate

Enrollment: Regular

Module Team Leader's Name: _____

Address: _____

Instructor's Name: Dr. A.S.Kadi (Professor of Statistics)

Address: _____

Class Hours: _____

Length of time to complete the course: 16 Weeks

Student's work Load

| Lecture | Tutorial | Assessment | Lab works | Home study | Total |
|---------|----------|------------|-----------|------------|-------|
| 48 | 16 | 15 | 16 | 40 | 135 |

Course description

Review of probability and statistics with applications in biomedical sciences: probability and odds, estimation, parametric and nonparametric tests; 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 trails; 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 and 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.

Course outline:

1. Principles and Methods of Epidemiology (14 lecture hours)

- 1.1 The Uses of Epidemiology
- 1.2 Some Epidemiologic Concepts: Mortality Rates
- 1.3 Age-Adjusted Rates
- 1.4 Incidence and Prevalence Rates
- 1.5 Measures of Relative Risk
- 1.6 Odds Ratio
- 1.7 Response Bias
- 1.8 Confounding Variables
- 1.9 Matching

2. Designing Research (14 lecture hours)

- 3.1 Introduction
- 3.2 Categories of research design
- 3.3 Design of experiments
- 3.4 Random allocation
- 3.5 Minimization
- 3.6 Observational studies
- 3.7 Case-control study
- 3.8 Cohort study
- 3.9 Cross-sectional study
- 3.10 Studies of change over time
- 3.11 Choosing a study design
- 3.12 Research Ethics and Statistics
 - 3.12.1 Introduction
 - 3.12.2 Protection of human research subjects
 - 3.12.3 Informed consent
 - 3.12.4 Research integrity
 - 3.12.5 Authorship policies
 - 3.12.6 Data and safety monitoring

Teaching and learning methods

Lectures, assignments and computer labs.

Modes of Assessment

Continuous Assessment 50%

Final Exam 50%

| Method | Assignment | Test | Quiz | Final |
|-----------|------------|------|------------|-------|
| Percent | 20 | 20 | 10 | 50 |
| Frequency | 2 | 2 | At least 2 | 1 |