

## College of Micronesia – FSM

**COURSE OUTLINE COVER PAGE**

**Title:** Introduction to Basic Epidemiology  
and Biostatistics

**Department No.** PH 111

**Course Description:** This course introduces the epidemiological principles and their application in the occurrence of health-related events in the population. An introductory overview of biostatistics concepts and skills that are necessary for epidemiological practice will also be addressed. Public health activities seek to protect, promote, rehabilitate or maintain the health of not just individual, but of the whole population or of some specific groups. Epidemiology works along similar lines through studies that try to identify, describe and measure the *distribution* of health and disease, and their *determinants*, in a specific *population*.

**Course Prepared By:** Dr Hien Do Cuboni

**Campus:** National

	Hours per Week		No. of Week		Total Hours		Semester Credits
<b>Lecture</b>	3	x	16	=	48	=	3
<b>Field Visit</b>							
<b>Workshop</b>							
<b>Total Semester Credits</b>							<b>3</b>

**Purpose of Course:**

Degree Requirement  
Degree Elective  
Certificate  
Other

X

**Prerequisite:**

None

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**Signature, Chairperson, Curriculum Committee**

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**Date Approved by Committee**

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**Signature, President, COM-FSM**

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**Date Approved by President**

## College of Micronesia – FSM

**COURSE OUTLINE****I. LEARNING OUTCOMES****A. Program Learning Outcomes:**

1. Recognize, describe and discuss the basic public health science facts and principles;
2. List and discuss the essential public health functions and their interrelationships at community and district level;
3. Describe and discuss adult, children and family health issues;
4. Discuss and demonstrate an understanding and practice of some generic public health competencies;
5. Demonstrate proper public health skills for public health practice in the community as a state or local public health officer;
6. Discuss and demonstrate community and cultural sensitivity in the health care environment;
7. Describe and discuss the health determinants and problems of adults, children and families;
8. Demonstrate proper cardio-pulmonary resuscitation (CPR) and first aid techniques;
9. Demonstrate the ability and discuss how to make a community diagnosis based on the determinants of health;
10. Identify and demonstrate good public health practice;
11. Have had work experience at a public health facility at community and district levels.

**B. Course Learning Outcomes:**

Upon completion of the course, students are expected to:

1. Identify health-related problems or phenomena in communities and describe their epidemiological distribution and possible determinants
  - 1.1 Define Epidemiology and its uses
  - 1.2 Discuss the purposes and goals of Epidemiology
  - 1.3 Describe some major historical achievements in Epidemiology
  - 1.4 Describe some examples of the use of epidemiological concepts in health settings
  - 1.5 Discuss the application of epidemiology principles in quantitative health research
  - 1.6 Describe and discuss the concept of *determinants* and *causation*
  - 1.7 Describe the four stages of the *natural history* of disease
  - 1.8 Define the concepts of “normality” and “abnormality” in the context of clinical Epidemiology
  - 1.9 Briefly discuss the concept of *diagnostic testing* and the relationship between diagnostic test results and the occurrence of disease
  - 1.10 Describe the different levels of prevention and explain what stage of disease each level of prevention aims to address

- 1.11 Give examples of prevention activities within the population to target a given disease or health-related condition
2. Describe basic measures of morbidity and mortality and calculate them
  - 2.1 Describe basic methods of health measurements
  - 2.2 Define and calculate commonly used morbidity (incidence and prevalence) and mortality rates (crude and specific death rates)
  - 2.3 Illustrate the concept of numerator, denominator and errors associated with these in calculating rates
  - 2.4 Discuss factors that influence rates in an observed disease occurrence
3. Employ appropriate statistical methods in health data analysis; organize and present analyzed data in logical and meaningful ways
  - 3.1 Define *statistics* and explain the role of statistics in health care
  - 3.2 List the categories of statistics and what they are used for
  - 3.3 Explain the types of data
  - 3.4 Calculate and interpret the measures of central tendency and measures of dispersion of different quantitative data sets
  - 3.5 Organize and display, appropriately, different types of data
  - 3.6 Explain the Normal Distribution Curve
  - 3.7 Estimate population dynamics using samples
  - 3.8 Calculate and interpret confidence intervals
  - 3.9 Explain hypothesis testing
  - 3.10 Identify appropriate data display techniques to present analyzed data
4. Discuss the importance of basic concepts and principles of public health surveillance systems, including screening programs, in monitoring the health status of a population
  - 4.1 Explain the concept of Public Health Surveillance (PHS)
  - 4.2 Describe the different types of PHS
  - 4.3 Distinguish the use of surveillance, investigation and evaluation in monitoring the health of a community
  - 4.4 Discuss why PHS is necessary in health systems
  - 4.5 Describe the criteria for deciding which diseases to place under surveillance
  - 4.6 Discuss the *surveillance wheel* and some of the issues surrounding data collection and Health Information System (HIS) in Pacific island and Micronesian settings
  - 4.7 Identify sources of bias/ error in surveillance data and how these can be minimized
  - 4.8 Identify and recommend practical activities for improving local surveillance systems
  - 4.9 Explain the different types of screening and their specific aims
  - 4.10 Describe and discuss the Wilson & Jünger (1968) criteria for instituting a screening program
  - 4.11 Use a 2 x 2 table contingency and calculate screening test indices
  - 4.12 Explain what the indices of a screening test validity mean

5. Describe and discuss the concept of disease outbreak and its detection, investigation and control
  - 5.1 Discuss the importance of surveillance data and its relation to outbreak detection
  - 5.2 Define and confirm an outbreak
  - 5.3 Describe the steps of an outbreak investigation and its management
  - 5.4 Explain the importance of establishing a case definition before the counting of cases
  - 5.5 Describe with examples the classification of case definitions
  - 5.6 Interpret the various components of an epidemic curve
  - 5.7 Calculate and interpret attack rates
  - 5.8 Initiate an environmental assessment and guide the setting up of relevant epidemic control measures
  - 5.9 Assist with an epidemic report and manage an epidemic checklist
  
6. Explain how epidemiological studies contribute towards the overall health and well being of population groups and communities.
  - 6.1 Describe and differentiate the epidemiological principles of descriptive, ecological, cross-sectional, case-control and cohort studies; randomized controlled, field and community trials
  - 6.2 Discuss advantages and disadvantages of these study designs
  - 6.3 Explain different rates used in these studies
  - 6.4 Propose examples of where such studies can be applied
  - 6.5 Discuss some bias factors which can influence the results of a study
  - 6.6 Explain the use of the 2x2 contingency table in each study design
  - 6.7 Calculate and interpret odds ratio (OR) and measures of risk [e.g. relative risk (RR); risk difference/ absolute risk (RD or AR); population attributable risk (PAR), and others]
  - 6.8 Define environmental Epidemiology and give examples of environmental hazards associated with adverse human health effects
  - 6.9 Explain the study designs employed in environmental epidemiology and some methodological drawbacks
  - 6.10 Explain with examples the ‘dose-effect’ and ‘dose-response’ relationships and their importance
  - 6.11 Describe with examples the steps of risk assessment and risk management
  - 6.12 Discuss how to use epidemiological principles for planning, evaluating and monitoring health services

## **II. COURSE CONTENTS**

### **A. Introduction to Epidemiology**

- 1) Epidemiology and its uses
- 2) Purposes and goals of Epidemiology
- 3) A brief history of Epidemiology
- 4) Application of epidemiological concepts and principles in quantitative health research and in health settings

**B. Basic Measurements in Health**

- 1) Basic methods of health measurements: ratios, proportions and rates
- 2) Rates - commonly used morbidity and mortality rates
- 3) Calculation of rates
- 4) Factors influencing rates

**C. Study Types – An Overview, Observational and Experimental Epidemiology**

- 1) Descriptive, ecological, cross-sectional, case-control and cohort studies
- 2) Randomized controlled, field and community trials
- 3) Advantages and disadvantages of each study type
- 4) Rates used in these studies and their characteristics
- 5) Applications of these study designs

**D. Study Types – Case-Control and Cohort studies: in greater details**

- 1) Epidemiological principles and applications of case-control studies
- 2) Epidemiological principles and applications of cohort studies
- 3) Advantages and disadvantages of each study design
- 4) Bias factors
- 5) The use of the 2 x 2 contingency table
- 6) Odds ratio (OR) – calculation and interpretation
- 7) Measures of risk – calculation and interpretation

**E. Basic Statistics for Epidemiology**

- 1) Statistics and its role in health care
- 2) Categories of statistics
- 3) Types of data
- 4) Measures of central tendency and dispersion
- 5) Data organization and display
- 6) Normal Distribution Curve
- 7) Populations dynamics – samples and estimates
- 8) Confidence intervals
- 9) Hypothesis testing

**F. Causation, Clinical Epidemiology and Prevention**

- 1) Disease causation
- 2) The natural history of disease
- 3) Clinical Epidemiology - concepts of “normality” and “abnormality”
- 4) Diagnostic testing - relationship between diagnostic test results and disease occurrence
- 5) Levels of prevention

**G. Screening and Case Finding**

- 1) Screening – types and specific aims
- 2) The Wilson & Jünger (1968) criteria for screening
- 3) Screening test indices – what they mean and how to calculate them
- 4) Validity of a screening test

**H. Overview of Public Health Surveillance and Data for Decision Making**

- 1) What is Public Health Surveillance (PHS)
- 2) Types of PHS
- 3) The use of surveillance, investigation and evaluation in monitoring health of a community
- 4) The role of PHS in health systems
- 5) The criteria for deciding which diseases to place under surveillance
- 6) The *surveillance wheel* - issues related to data collection and HIS in Pacific Island and Micronesian settings
- 7) Sources of bias/ error in surveillance data

**I. Infectious Diseases and Investigating an Outbreak**

- 1) Surveillance data and detection of disease outbreak
- 2) Disease outbreak – definition and confirmation
- 3) Steps of outbreak investigation and management
- 4) Case definitions and their classification
- 5) Epidemic curve
- 6) Attack rates
- 7) Environmental assessment and epidemic control measures
- 8) Epidemic investigation report and management of an epidemic checklist

**J. Environmental and Occupational Epidemiology**

- 1) Environmental Epidemiology, environmental hazards and human health effects
- 2) Study designs used in environmental epidemiology and their methodological drawbacks
- 3) Dose-effect and dose-response relationships
- 4) Risk assessment and risk management

**K. Epidemiology – Health Services and Health Policy**

- 1) The planning cycle and health care planning process
- 2) Burden of illness
- 3) Cost-effective and cost-benefit analysis
- 4) Using epidemiological principles for planning, evaluating and monitoring health services

**L. Continuing Education in Epidemiology**

- 1) Critical reading of published medical/ health literature
- 2) Critical appraisal of medical literature
- 3) Steps involved in research planning
- 4) Searching for further reading and training

**III. TEXTBOOK**

Beaglehole R., Bonita R., Kjellstrom T. (2007) Basic Epidemiology, 2<sup>nd</sup> Edition or most recent edition. World Health Organization, Geneva. (ISBN-13: 978-9241547079)

#### IV. REFERENCE MATERIALS

1. Friis RH., Sellers TA. (1999) Epidemiology for Public Health Practice, 2<sup>nd</sup> Edition or most recent edition, Aspen Publishers, Maryland.
2. Last JM. (1998) A Dictionary of Epidemiology. Oxford University Press, New York.
3. Lilienfeld DE., Stolley PD. (1994) Foundations of Epidemiology, 3<sup>rd</sup> Edition or most recent edition. Oxford University Press, New York.
4. MacMahon B., Trichopoulos D. (1996) Epidemiology: Principles and Methods, 2<sup>nd</sup> Edition or most recent edition. Little, Brown, and Company.
5. Mausner, Shira (1985) Epidemiology: An Introductory Text, 2<sup>nd</sup> Edition or most recent edition. WB Saunders: Philadelphia.
6. Park K. (2000) Park's Textbook of Preventive and Social Medicine, 16<sup>th</sup> Edition or most recent edition. M/s Banarsidas Bhanot, Jabalpur
7. Clark JM., Randal JA. (2004) A First Course in Applied Statistics-with applications in biology, business and the social sciences. Pearson, NZ.

#### V. REQUIRED COURSE MATERIALS

1. Prescribed textbook. Furthermore, perusal of reference materials is encouraged.
2. Personal pocket Calculator: fx-82TL or later version

#### VI. INSTRUCTIONAL MATERIALS/ EQUIPMENT AND COST FOR THE COLLEGE

There is no special instructional material/ equipment required for this course.

#### VII. METHODS OF INSTRUCTION

1. Lectures: in-class lectures, followed by group discussions and activities relevant to the topics presented.
2. Tutorials: review and revising of the learning objectives; discussions on outcomes of group activities assigned after lectures.
3. Group presentations: students' presentations on selected readings and group discussion/ activities.

#### VIII. EVALUATION

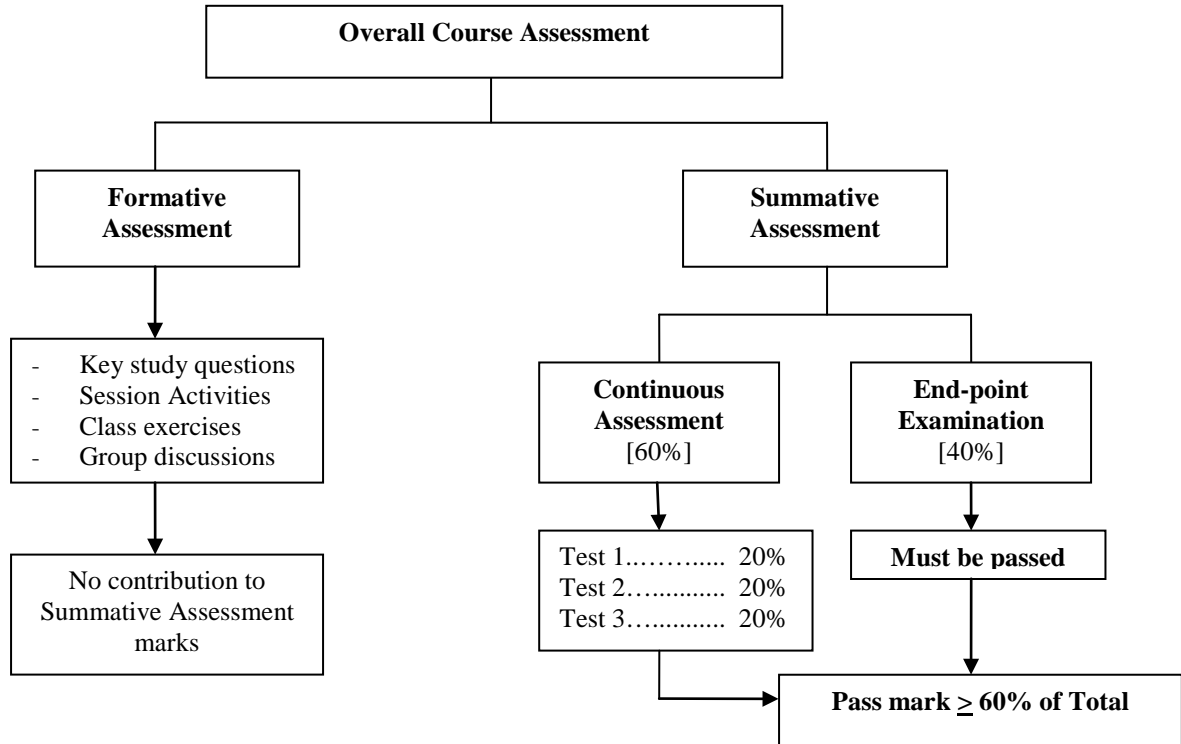
A. Grading scheme: there are two components: Formative and Summative Assessment.

☐ **Formative Assessment:** This type of assessment evaluates how students progress in class. With feedback from the Instructor, the student would be able to answer these questions: *Am I doing well in class? What have I missed? What should I concentrate more on?* This assessment will take the form of tests/ quizzes, with or without prior notice.

☐ **Summative Assessment:** This type of assessment implies that the marks a student gets contribute towards the final grades. For this course, this assessment consists of the following:

1. **Continuous Assessment (60%):** comprises 3 written Tests, each contributes 20% to the total course assessment.
2. **Final Exam (40%):** a 3-hour written paper, at the end of the course.

The Assessment is illustrated in the following diagram:



## B. Grading system

Grade	Percentage	Outcome
A	90-100%	Superior
B	80-89%	Above Average
C	70-79%	Average
D	60-69%	Passing
F	Below 60%	Failure

## IX. CREDIT-BY-EXAMINATION

None.

## X. ATTENDANCE POLICY

As per college policy.

## XI. ACADEMIC HONESTY POLICY

As per college policy.