

College of Micronesia – FSM

COURSE OUTLINE COVER PAGE**Title:** Mathematics for Health Sciences**Department No.** PH 109

Course Description: This course is specifically designed for health science majors. It incorporates every aspect of Mathematics relevant to health care and health prevention applications, such as arithmetic computations, algebra, ratios, proportions and systems of measurement. It also covers introductory statistics, necessary for students to analyze and interpret data, and it includes topics essential for health care personnel, such as reading medication labels, dosage calculations, calculations for basic intravenous (IV) therapy, as well as logarithms, ionic solutions and pH.

Course Prepared By: PHTP faculty, with George Mangonon**Campus:** National

	Hours per Week	No. of Week	Total Hours	Semester Credits
Lecture	3	X 16	= 48	= 3
Total Semester Credits				3

Purpose of Course:

Degree Requirement
 Degree Elective
 Certificate
 Other

X

Prerequisite:

MS 099 with a “C” or better

Signature, Chairperson, Curriculum Committee_____
Date Approved by Committee_____
Signature, President, COM-FSM_____
Date Approved by President

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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 will be able to:

1. Perform basic arithmetic operations in health applications

- 1.1 Perform operations with fractions, decimals, percentages
- 1.2 Perform conversions among fractions, decimals and percentages
- 1.3 Apply knowledge of decimals, fractions and percentages to problems in allied health field

2. Perform algebraic manipulations

- 2.1 Solve basic algebraic equations
- 2.2 Solve problems involving ratios, proportions, and percentages
- 2.3 Perform calculations necessary in medical formulas

3. Be familiar with systems of measurements

- 3.1 Describe the concepts related to measurements used in the allied health field, including volume, mass, weight, and temperature
- 3.2 Perform calculations using numbers written in Scientific Notation
- 3.3 Round answers to calculations that contain measurements, using the rules for significant digits

- 3.4 Use the fundamental units of the metric system (SI = System Internationale), household units, and the apothecary system in making measurements and performing calculations related to allied health applications
- 3.5 Use common temperature scales and convert between scales, when necessary
- 4. Understand medication labels, prescriptions and syringe calculations**
 - 4.1 Extract important information regarding medication types or forms, dosage rates, dosage recommendations, medication storage information, expiration dates, and other patient-related information from the medical labels and product inserts
 - 4.2 Read and properly interpret prescriptions for medications and medical orders regarding dosage, type or form of medication, method of administration, and directions referring patient care, as prescribed by physicians
 - 4.3 Do all necessary calculations for parenteral administration of medications
- 5. Model health applications with ratios and proportions**
 - 5.1 Discuss the uses of ratios and proportions in several common areas of allied health work
 - 5.2 Apply and manipulate formulas that are in the form of proportions
 - 5.3 Explain how to approach word problems in the context of work
 - 5.4 Explain the meanings of basic terminology used in the health areas discussed
- 6. Perform calculations for basic intravenous (IV), parenteral therapy**
 - 6.1 Identify the abbreviations used for IV fluid orders and administration charting
 - 6.2 Calculate percentages in IV fluids
 - 6.3 Calculate IV flow rates and infusion times
- 7. Use the basics of statistics in allied health work**
 - 7.1 Define the terms related to basic statistics, such as data, population, sample, average, normal curve, and outlier
 - 7.2 Calculate the value of the mean, median, midrange, and mode of a set of data
 - 7.3 Gather data and create appropriate graphs, such as line graphs and bar charts, to display that data
 - 7.4 Read and interpret various types of graphs including pie charts.
 - 7.5 Interpret the meaning of the range, standard deviation, and the coefficient of variation in data analysis
 - 7.6 Use the normal curve and an empirical rule to understand control charts.
- 8. Perform computations with logarithms, ionic solutions and pH**
 - 8.1 Calculate common logarithms and antilogarithms
 - 8.2 Describe the pH scale and its values as they relate to the acidity of a solution
 - 8.3 Calculate pH values from hydrogen ion concentrations
 - 8.4 Calculate hydrogen ion concentrations given the pH of a solution.

II. COURSE CONTENTS

A. Basic arithmetic computations in health applications

- 1) Introduction to Mathematics as used in allied health work
- 2) A review of operations with fractions, decimals, percentages
- 3) Conversions among fractions, decimals and percentages

B. A Review of algebra

- 1) Signed numbers and the order of operations
- 2) A review of solving linear equations
- 3) A review of ratios and proportions
- 4) Solving percentage problems
- 5) Using formulas
- 6) Modeling medical applications

C. Systems of measurement

- 1) Measurement fundamentals
- 2) Scientific notation
- 3) Significant digits and rounding
- 4) The metric and SI systems
- 5) Household measurement units
- 6) The apothecary system
- 7) Converting between measurement systems
- 8) Temperature scales

D. Medication labels, prescriptions, and syringe calculations

- 1) Reading medication labels and inserts
- 2) Abbreviations used in prescriptions and medical orders
- 3) Reading and interpreting prescriptions and medical orders
- 4) Parenteral medication calculations

E. Modeling health applications

- 1) Introduction
- 2) Ratios and proportions in dosage calculations
- 3) Ratios, proportions, formulas, and dimensional analysis in multi-step dosage calculations
- 4) Ratios and proportions in X-Ray applications
- 5) Ratios and proportions related to inhalation therapy
- 6) Ratios and proportions in preparation of solutions.
- 7) Angle measurement and physical therapy

F. Calculations for basic IV therapy

- 1) Introduction to IV fluids
- 2) IV flow rate calculations
- 3) Calculations of infusion times

G. The basics of statistics

- 1) Introduction to statistics
- 2) Constructing and interpreting graphs and charts
- 3) Measures of central tendency
- 4) Understanding standard deviation and the coefficient of variation
- 5) The normal distribution and control charts

H. Logarithms, ionic solutions, and pH

- 1) An introduction to logarithms and antilogarithms
- 2) Ionic solutions
- 3) Using logarithms to calculate pH and pOH.

III. TEXTBOOK

Timmons DL., Johnson CW. (2008) Math Skills for Allied Health Careers. Pearson/Addison Wesley. (ISBN-13: 978-0-13-171348-5)

IV. REFERENCE MATERIALS

1. Lesmeister MB. (2008) Math Basics for the Health Care Professional, 3rd Edition. Prentice Hall Health. (ISBN-13: 978-0-13-512632-5)
2. Booth KA., Whaley JA. (2007) Math and Dosage Calculations for Medical Careers, 2nd Edition or most recent edition. McGraw Hill. (ISBN-976-0-07-301895-9)
3. Kennamer M. (2005) Math for Health Care Professionals. Thomson-Delmar Learning. (ISBN-978-1-4018-5803-2)
4. Triola MF. (2007) Elementary Statistics Using Excel, 3rd Edition or most recent edition. Pearson/Addison Wesley. (ISBN-13: 978-0-32-1365132)

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. Lecture/discussion
2. Group exercises
3. Practicums, specifically applying Mathematics to health concepts
4. Projects

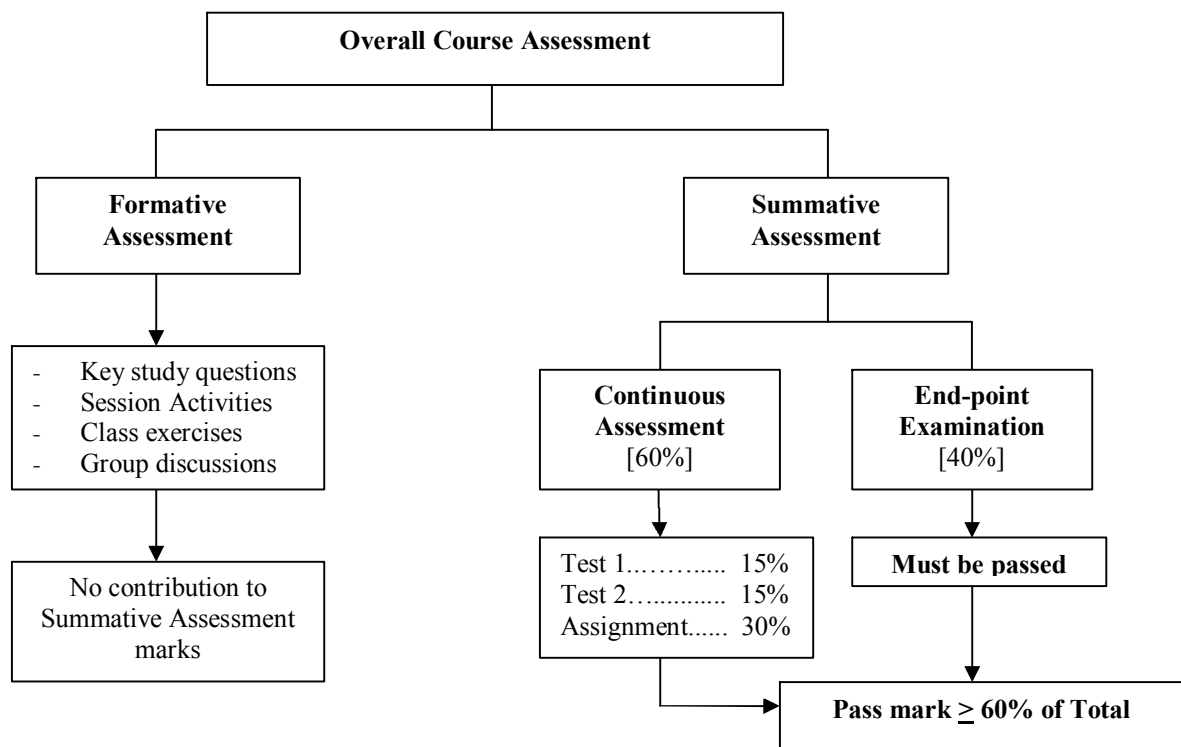
VIII. EVALUATION

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 and quizzes, with or without prior notice.
- ☰ **Summative Assessment:** This type of assessment implies that the marks a student gets contribute towards the final grade. For this course, this assessment consists of the following:

 1. **Continuous Assessment (60%):** comprises 2 practical Tests, each contributes 15% to the total course assessment, and an Assignment which contributes 30% 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.