

**Hostos Community College
Department of Mathematics**

MAT 105 MATHEMATICS FOR ALLIED HEALTH SCIENCES

Credits Hours: 3.0

Equated Hours: 3.0

Class Hours: 3.0

Pre-requisite: Passing Score on the Compass/CMAT Test

Pre/Co-requisite ENG091 or ESL091

Required Text(s): MATHEMATICS FOR ALLIED HEALTH SCIENCES
AUTHOR: Lacay, J., Baker, W., Gibbons, D.
PEARSON CUSTOM PUBLISHINGS 2008 2nd Ed.

Description: The course is designed for Radiography professionals and will aid them in applying mathematical concepts to “on job situations” as well as in their development of proportional thinking. The course will include an integrated review of mathematical skills and concepts required in radiography, in particular the topics pertaining to formation and manipulation of analog and digital images.

Mathematics of the course will address, units of measurements, formula equations, proportionality, inverse proportionality, direct square and inverse square proportionality. Proportionality and involved proportional thinking will have three representations: algebraic, geometric and percent. Each particular formula equation originating in radiology will be generalized to at least one other domain. For example together with Coulombs force, there also will be examples of gravitational force which has the same algebraic structure but different physical meaning.

Instructional Objectives:

The course is designed to:

- 1) To reinforce students' knowledge of basic mathematics and algebra
- 2) To familiarize students with the common systems of measurements used in the medical field
- 3) To familiarize students with customary and SI radiographic units
- 4) To expose students to the use of direct, direct square, inverse and inverse square proportions in solving variation problems, i.e. evaluating how technique changes effect the imaging process in radiography
- 5) To expose students to calculating injection rate, total volume injected, injection duration of the radiographic contrast media
- 6) To familiarize students with the use of exponents and scientific notation in solving application problems
- 7) To enable students to calculate factors affecting spatial resolution in digital imaging

Learning Outcomes:

At the completion of this course the student should:

- 1) Demonstrate proficiency with the use of conversion between systems of measurements as well as within a given system of measurement
- 2) Demonstrate ability to navigate smoothly between and within three representations of proportional thinking with understanding.
- 3) Formulate and solve proportional thinking problems involving: direct, inverse, direct squared, and inverse squared proportions
- 5) Perform elementary mental proportional calculation
- 6) Demonstrate good problem-solving habits, including:
 - a. estimating solutions and recognizing unreasonable results.
 - b. considering a variety of approaches to a given problem, and selecting one that is appropriate.
 - c. interpreting solutions correctly, and answering the questions that were actually asked
- 7) Generate solutions through modeling real-on the job situations.
- 8) Will use virtual reality technology to enhance their mathematical thinking and understanding, solve mathematical problems, and judge the reasonableness of their results
- 9) Determine the correct flow rate, injection duration, total volume injected of the contrast media

Examinations: A Midterm 20% and Departmental Final 40% will be given along with two partial exams.

Grades: A, A-, B+, B, B-, C+, C, F

Course Outline:

Week One: Review of Basic Mathematics Skills with applications to Measurement and Ratio, Rates, Proportions & applications to Radiology

Week two: Dimensional Analysis

English System & Metric system of measurements

Application to Radiology

Conversion between Measurement System Temperature Conversion Fahrenheit and Celsius

Week 3 & 4: Introduction to Radiographic concepts and terminology

Direct and Direct Square Variations

Grid Ratios (and Grid Conversion)

Direct Proportions using: mAs, mA and Time(seconds)

Direct Square Proportions & Distance (Exposure Maintenance Formula)

Week five: Review and Test #1

Week 6 & 7: Introduction to Radiographic concepts and terminology –continued

Inverse and Inverse Square Variations

Inverse Proportions such as: Screen Speed and mAs

Intensity and Distance (Inverse Square Law)

Midterm Exam

Week 8: Radiographic concepts- Units of Exposure

Week 9: *15% rule (Digital)*

Week 10: Review and test 2-Midterm

Week 11 Fundamentals of Physics

Literal Equations and their Applications (*formulas*)

Fundamentals of Mechanics and Electromagnetism

Electrostatics and Magnetism (Coulomb's Law)

Electrodynamics (Ohms Law and Electric Power)

Electromagnetism-Transformer Law

Week twelve Review and test #3

Week thirteen Exponents, Scientific Notation and Logarithms

1. Rules of exponents, Powers of 10 and Scientific Notation

2. Definition of Logarithms, Characteristic and Mantissa

3. Properties of Logarithms and Determining Logarithms using Tables

Week fourteen Review for Final Exam