# MATH M19: MATH FOR HEALTH SCIENCES

**Originator**
dbutler

**Co-Contributor(s)**

| Name(s) |
| --- |
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**College**
Moorpark College

**Discipline (CB01A)**
MATH - Mathematics

**Course Number (CB01B)**
M19

**Course Title (CB02)**
Math for Health Sciences

**Banner/Short Title**
Math for Nursing Science

**Credit Type**
Credit

**Honors**
No

**Start Term**
Fall 2021

**Catalog Course Description**
Covers ratios, fractions, decimals and percents. Includes unit conversions, metric and household abbreviations, use of formulas, proportion and unit simplification. Coaches how to perform mental estimations and mental calculations. May be taken before entrance to the Nursing Program or after acceptance to the Nursing Program. This is an optional course.

**Taxonomy of Programs (TOP) Code (CB03)**
1702.00 - Mathematics Skills

**Course Credit Status (CB04)**
D (Credit - Degree Applicable)

**Course Transfer Status (CB05) (select one only)**
C (Not transferable)

**Course Basic Skills Status (CB08)**
N - The Course is Not a Basic Skills Course

**SAM Priority Code (CB09)**
E - Non-Occupational

**Course Cooperative Work Experience Education Status (CB10)**
N - Is Not Part of a Cooperative Work Experience Education Program

**Course Classification Status (CB11)**
Y - Credit Course

**Educational Assistance Class Instruction (Approved Special Class) (CB13)**
N - The Course is Not an Approved Special Class

**Course Prior to Transfer Level (CB21)**
Y - Not Applicable

**Course Noncredit Category (CB22)**
Y - Credit Course

**Funding Agency Category (CB23)**
Y - Not Applicable (Funding Not Used)

**Course Program Status (CB24)**
2 - Not Program Applicable

**General Education Status (CB25)**
Y - Not Applicable

**Support Course Status (CB26)**
N - Course is not a support course

**Field trips**
Will not be required

**Grading method**
(L) Letter Graded

**Alternate grading methods**
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

**Does this course require an instructional materials fee?**
No

**Repeatable for Credit**
No

**Is this course part of a family?**
No

## Units and Hours

**Carnegie Unit Override**
No

## In-Class

**Lecture**
**Minimum Contact/In-Class Lecture Hours**
17.5
**Maximum Contact/In-Class Lecture Hours**
17.5

**Activity**

**Laboratory**

## Total in-Class

**Total in-Class**
**Total Minimum Contact/In-Class Hours**
17.5
**Total Maximum Contact/In-Class Hours**
17.5

## Outside-of-Class

**Internship/Cooperative Work Experience**

**Paid**

**Unpaid**

## Total Outside-of-Class

**Total Outside-of-Class**
**Minimum Outside-of-Class Hours**
35
**Maximum Outside-of-Class Hours**
35

## Total Student Learning

**Total Student Learning**
**Total Minimum Student Learning Hours**
52.5
**Total Maximum Student Learning Hours**
52.5

**Minimum Units (CB07)**
1
**Maximum Units (CB06)**
1

**Prerequisites**
MATH M03 or two years of high school algebra or placement as determined by the college's multiple measures assessment process.

## Entrance Skills

**Entrance Skills**
MATH M03

**Prerequisite Course Objectives**
MATH M03-solve linear and literal equations for a specified variable.
MATH M03-solve absolute value equations and absolute value inequalities.
MATH M03-determine if a relation is a function using the vertical line test and identify the domain.
MATH M03-graph linear equations and test whether two lines are parallel, perpendicular, or neither.
MATH M03-write the equation of a line in point-slope form, slope-intercept form, and standard form.
MATH M03-solve a system of equations in three variables by substitution or by the elimination method and solve applications.
MATH M03-factor polynomials including the sum and difference of cubes.
MATH M03-evaluate polynomial functions and solve polynomial equations by factoring and using the zero factor property.
MATH M03-simplify rational expressions, perform operations with rational expressions, simplify complex fractions, and determine the domain of a simple rational function.
MATH M03-divide by a polynomial using long division.
MATH M03-solve equations containing rational expressions and applications.

MATH M03-simplify rational exponent expressions using the properties of exponents and convert to radical notation.
MATH M03-put radical expressions into simplest radical form, perform operations with radicals, solve equations containing radical expressions, and determine domain of a simple radical function.
MATH M03-add, subtract, multiply and divide complex numbers.
MATH M03-solve quadratic equations by each of the following methods where applicable: factoring, the square root method, completing the square, and the quadratic formula.
MATH M03-solve equations that are in quadratic form and solve quadratic equations involving radicals and substitution.
MATH M03-solve non-linear inequalities in one variable.
MATH M03-graph quadratic functions showing the vertex and intercepts.
MATH M03-find the sum, difference, product, quotient, and composition of two functions.
MATH M03-identify one-to-one functions and use the horizontal line test to determine whether or not a function is one-to-one, and find the inverse of a one-to-one function.
MATH M03-describe the relationship between the function and its inverse geometrically and algebraically.
MATH M03-graph exponential and logarithmic functions, and convert equations from exponential form to logarithmic form and vice versa.
MATH M03-use logarithmic properties to rewrite logarithmic expressions and solve logarithmic and exponential equations and related applications.

## Requisite Justification

**Requisite Type**

Prerequisite

**Requisite**

MATH M03 or two years of high school algebra or placement as determined by the college's multiple measures assessment process.

**Requisite Description**

Other (specify)

**Specify Other Requisite Description**

MATH M03 is a requirement for admission to the nursing program. It is assumed that students will have completed MATH M03 or two years of high school algebra, before enrolling in this course.

**Level of Scrutiny/Justification**

Content review

**Student Learning Outcomes (CSLOs)**

| | Upon satisfactory completion of the course, students will be able to: |
|---|---|
| 1 | perform a conversion of volume or weight measurement from one unit to another within the metric system and solve for the proper value in a ratio or proportion equation. |
| 2 | estimate a measurement given certain conditions without the use of a calculator. |

**Course Objectives**

| | Upon satisfactory completion of the course, students will be able to: |
|---|---|
| 1 | simplify fractions, ratios, and proportions. |
| 2 | evaluate and round decimals. |
| 3 | convert measurements within the metric system and the household system. |
| 4 | compute proper liquid measurements. |
| 5 | apply proper abbreviations to metric measurements. |
| 6 | apply proper abbreviations to household measurements. |
| 7 | determine proper measurements using ratios and proportions. |
| 8 | determine proper measurements using dimensional analysis. |
| 9 | convert differing measurements to the same weight measure. |
| 10 | clear decimals within fractions. |
| 11 | identify and order special types of oral solids and liquids. |

| | |
|---|---|
| 12 | estimate measurements without the use of a calculator. |
| 13 | perform mental calculations without the use of a calculator. |

## Course Content

**Lecture/Course Content**

**A. (25%) Arithmetic Needed for Dosage**

1. Fractions
2. Decimals and Decimal rounding rules
3. Percents
4. Fractions, Ratios and Proportions

**B. (25%) Metric and Household Systems of Measurement**

1. Metric System (volume and weight conversions only, no linear conversions)
2. Household System
3. Liquid Measures
4. Other Conversions

**C. (10%) Drug Abbreviations, Labels and Packaging**

1. Metric and SI Abbreviations
2. Household Abbreviations

**D. (40%) Calculations of Oral Medications-Solids and Liquids (Introduction to Formulas, Proportion and Dimensional Analysis)**

1. Oral Solids (Formula Method, Proportion, Dimensional Analysis)
2. Converting Order and Supply to the Same Weight Measure
3. Clearing Decimals (within Fractions and Unit Simplification)
4. Special Types of Oral Solid Orders
5. Oral Liquids (Formula Method, Proportion, Dimensional Analysis)
6. Special Types of Oral Liquid Orders
7. Common Sense Calculations (Mental Estimations and Mental Calculations)

**Laboratory or Activity Content**

n/a

## Methods of Evaluation

**Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):**

Problem solving exercises
Skills demonstrations
Written expression

**Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):**

Computational homework
Group projects
Individual projects
Objective exams
Oral presentations
Problem-solving exams
Quizzes
Skills demonstrations
Skill tests or practical examinations

## Instructional Methodology

**Specify the methods of instruction that may be employed in this course**

Computer-aided presentations
Collaborative group work
Class activities
Class discussions
Distance Education
Lecture

Small group activities

**Describe specific examples of the methods the instructor will use:**

1. Lecture on the problems in the course material.
2. Have the students work in small groups to solve arithmetic problems and measurement systems.
3. Class discussions on how to use formulas, proportions, and dimensional analysis.

## Representative Course Assignments

**Writing Assignments**

1. Stating the answer to a mathematical problem in any of various forms, such as stating the answer to a ratio or proportion problem.
2. Writing a short answer explaining the result of a conversion of one metric measurement to another.
3. Writing the interpretation of an answer to a mathematical computation, such as indicating the accuracy of a mental estimation.

**Critical Thinking Assignments**

1. Interpret and describe the meaning of the solution to a mathematical application problem, such as an applying ratios and proportions to the computations of oral medication dosage.
2. Describe and analyze the steps in solving a problem, such as identifying the steps in solving a dimensional analysis problem.
3. Compare and contrast methods of solving a mathematical problem, such as when to clear fractions, set up a proportion, or use unit fractions to determine a measurement.

**Reading Assignments**

1. Reading concepts from the textbook, such as the differences between the metric system and household measurements.
2. Reading instructor created materials, such as a prepared handout describing oral liquid medications and oral solid medications.
3. Reading resource materials from the library or online concerning the importance of determining proper dosage measurements.

**Skills Demonstrations**

1. Demonstrate computational skills such as operations with fractions and decimals.

2. Demonstrate understanding the meaning of an answer, such as the application of a metric system measurement to the amount of active ingredient in an oral medication.

3. Perform a mental estimate of a measurement given certain conditions within a certain given accuracy.

## Outside Assignments

**Representative Outside Assignments**

1. Graded problem solving assignments, such as practice on operations on fractions, decimals, ratios and proportions.

2. Reading assignments from the textbook, such as identifying and understanding the different unit measurements for volume and weight, in the Metric system, and household measurements.

3. Additional research assignments from library resources or internet articles on the importance of accuracy in the administering the correct dosage of various medications.

## Articulation

**Equivalent Courses at other CCCs**

| College | Course ID | Course Title | Units |
|---|---|---|---|
| Riverside Community College | NRN-93 | Calculations for Health Care Providers | 1 |
| College of San Mateo | NURS 610 | Basic Medication Dosage Calculations for Nurses | 1 |
| Danville Community Colleg | NUR 135 | Drug Dosage Calculations | 1 |
| West Hills College Lemoore | HS090 | Medical Mathematics | 2 |

**District General Education**

**A. Natural Sciences**

**B. Social and Behavioral Sciences**

**C. Humanities**

**D. Language and Rationality**

**E. Health and Physical Education/Kinesiology**

**F. Ethnic Studies/Gender Studies**

**CSU GE-Breadth**

**Area A: English Language Communication and Critical Thinking**

**Area B: Scientific Inquiry and Quantitative Reasoning**

**Area C: Arts and Humanities**

**Area D: Social Sciences**

**Area E: Lifelong Learning and Self-Development**

**Area F: Ethnic Studies**

**CSU Graduation Requirement in U.S. History, Constitution and American Ideals:**

**IGETC**

**Area 1: English Communication**

**Area 2A: Mathematical Concepts & Quantitative Reasoning**

**Area 3: Arts and Humanities**

**Area 4: Social and Behavioral Sciences**

**Area 5: Physical and Biological Sciences**

**Area 6: Languages Other than English (LOTE)**

## Textbooks and Lab Manuals

**Resource Type**
Textbook

**Classic Textbook**
Yes

**Description**
Boyer, Mary Jo. *Math For Nurses: A Pocket Guide to Dosage Calculation and Drug Preparation.* 10th ed., Wolters Kluwer, 2019.

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**Resource Type**
Textbook

**Classic Textbook**
Yes

**Description**

Buchholz, Susan. *Henke's Med-Math: Dosage Calculation, Preparation, & Administration.* 9th ed., Wolters Kluwer, 2019.

**Resource Type**

Textbook

**Classic Textbook**

No

**Description**

Hassen, Chase, and Bradley J. Wojcik. *Dosage Calculations for Nursing Students*. 2nd ed., Independent Publishing, 2019.

## Library Resources

**Assignments requiring library resources**

Use of textbooks on reserve at Circulation Desk. Projects involving use of library resources to investigate applications of the metric system, household system, conversions or other related topics.

**Sufficient Library Resources exist**

Yes

**Example of Assignments Requiring Library Resources**

Research assignments utilizing library resources on the importance of accuracy in administering the correct dosage of various medications.

## Distance Education Addendum

## Definitions

**Distance Education Modalities**

Hybrid (51%–99% online)
Hybrid (1%–50% online)
100% online

## Faculty Certifications

**Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.**

Yes

**Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.**

Yes

## Regular Effective/Substantive Contact

**Hybrid (1%–50% online) Modality:**

| Method of Instruction | Document typical activities or assignments for each method of instruction |
|---|---|
| Asynchronous Dialog (e.g., discussion board) | Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups. |
| E-mail | Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class. |

| | |
|---|---|
| Face to Face (by student request; cannot be required) | Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures. |
| Other DE (e.g., recorded lectures) | Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet. |
| Synchronous Dialog (e.g., online chat) | Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests. |

**Hybrid (51%–99% online) Modality:**

| Method of Instruction | Document typical activities or assignments for each method of instruction |
|---|---|
| Asynchronous Dialog (e.g., discussion board) | Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups. |
| E-mail | Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class. |
| Face to Face (by student request; cannot be required) | Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures. |
| Other DE (e.g., recorded lectures) | Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet. |
| Synchronous Dialog (e.g., online chat) | Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests. |

**100% online Modality:**

| Method of Instruction | Document typical activities or assignments for each method of instruction |
|---|---|
| Asynchronous Dialog (e.g., discussion board) | Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups. |
| E-mail | Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class. |
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| Synchronous Dialog (e.g., online chat) | Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests. |

## Examinations

**Hybrid (1%–50% online) Modality**
On campus

**Hybrid (51%–99% online) Modality**
On campus

**Primary Minimum Qualification**
MATHEMATICS

## Review and Approval Dates

**Department Chair**
02/25/2021

**Dean**
03/04/2021

**Technical Review**
03/18/2021

**Curriculum Committee**
04/06/2021

**DTRW-I**
04/08/2021

**Curriculum Committee**
MM/DD/YYYY

**Board**
05/11/2021

**CCCCO**
MM/DD/YYYY

**DOE/accreditation approval date**
MM/DD/YYYY