



Course Number and Title: MAT 173 Math for Teachers II: Rational Numbers and Probability

Campus Location:

Georgetown, Dover, Stanton, Wilmington

Effective Date:

2022-52

Prerequisite:

MAT 172

Co-Requisites:

None

Course Credits and Hours:

3.00 credits

3.00 lecture hours/week

0.00 lab hours/week

Course Description:

Math for Teachers 2 explores the concept development in rational numbers, operations with rational numbers, proportional reasoning, and probability.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

None

Schedule Type:

Classroom Course

Video Conferencing

Web Conferencing

Hybrid Course

Online Course

Hyflex

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Develop an understanding of rational relationships, including equivalency, and fractions as measurements. (CCC 1, 2)
2. Use strategies to order rational numbers. (CCC 1,2)
3. Represent addition and subtractions of fractional quantities in story, diagrams, and symbolic representations. (CCC 1,2)
4. Relate models for fraction multiplication to algorithms and percent problems. (CCC 1,2)
5. Relate conceptual understandings of division of fractions to algorithms. (CCC 1,2)
6. Use ratios to solve proportional problems. (CCC 1,2)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Develop an understanding of rational relationships, including equivalency, and fractions as measurements.
 1. Develop an understanding of the role of the basic measuring unit (BMU) in representing rational numbers.
 2. Interpret fractions through the part-whole
 3. Represent fractions with fraction strips.
 4. Determine the relative size of various unit fractions and relate them to others.
 5. Explain how any fractional amount is a collection of a number of unit fractions.
 6. Distinguish between the role of a numerator and denominator.
 7. Compare mixed and improper fractions conceptually.
 8. Extend understandings of fractional relationships to complex fractions.
 9. Use different fractions to represent the same quantity of items of various sizes.
2. Use strategies to order rational numbers.
 1. Compare and order rational number using various strategies including the use of benchmarks, diagrams, place value, distance to and from, common numerators, converting to another representation.
 2. Compare fractions using reasoning about different sized pieces and the different number of pieces.
 3. Determine how and why the strategies for comparing and ordering fractions work.
3. Represent addition and subtractions of fractional quantities in story, diagrams, and symbolic representations.
 1. Determine when to apply addition/subtraction operations in a story problem and/or a number sentence.
 2. Determine how to represent addition and subtraction of fractional quantities by decomposing quantities and exchanging measuring units for other measuring units
 3. Connect story, diagram, and symbolic representations of rational number addition/subtraction.
4. Relate models for fraction multiplication to algorithms and percent problems.
 1. Relate the "of" interpretation of multiplication to the "groups of" interpretation of multiplication with fractions.
 2. Model fractions as an operator with diagrams when the multiplier is a unit fraction or a mixed number with a unit fraction.
 3. Model fractions as an operator with diagrams that involve non-unit fractions multipliers and mixed fraction multipliers involving non-unit fractions.
 4. Use the all-at-once and by-place meaning of multiplication to model fraction multiplication problems when the multiplier is greater than 1.
 5. Explain why the multiplication of fraction algorithm works.
 6. Identify story problems using the three different interpretations of multiplication of rational numbers – repeated addition, multiplicative comparison, rectangular array.
 7. Write story problems using repeated addition and multiplicative comparison interpretations of multiplication.
 8. Interpret "percent of" problems as multiplication in which the percent acts as the operator.
 9. Represent and solve percent increase and decrease problems.
5. Relate conceptual understandings of division of fractions to algorithms.
 1. Distinguish the difference between dividing by $\frac{1}{2}$ and dividing in half.
 2. Connect taking half of a quantity and dividing a quantity by 2.
 3. Develop the repeated subtraction meaning for division of fractions by writing story problems and drawing diagrams that connect to that meaning.
 4. Distinguish between repeated subtraction and portioning as the meaning of division.
 5. Write story problems for division with fractions for the measurement model of division and the portioning model of division.
 6. Interpret the repeated subtraction meaning of division when the divisor is a non-whole number.
 7. Interpret and represent the remainder in division of fractions/decimal problems for the measurement model of division.
 8. Write story problems for division of fractions and decimals that align with both the measurement and partitioning meanings of division.
 9. Connect story problems, diagrams and number sentences for division problems.
 10. Draw a diagram that show that $1 \div \frac{a}{b} = \frac{b}{a}$ for any positive rational numbers a and b.
 11. Relate the meaning of reciprocal to how many times a fraction fits into 1 BMU.
 12. Justify the invert and multiply algorithm.
 13. Understand division in terms of partitioning.
 14. Write story problems for division of fractions/decimals for the partitioning (equal sharing) meaning of division.
 15. Connect story problems, diagrams, and number sentences for partitioning division problems.
 16. Use the dual number line representation for partitioning to model distributing equally or spreading out equally.
 17. Explain partitive division when the divisor is a non-integer rational number using a distributing equally representation (dual number line representation).
6. Use ratios to solve proportional problems.
 1. Use four strategies for solving missing-value proportion problems: unit rate, scale factor, scaling up and down, and cross-multiplication and determine where it is most appropriate to use which strategy.
 2. Distinguish missing-value proportion problems (given three quantities related multiplicatively, find the missing fourth quantity) from "ratio comparison" proportion problems (given four quantities, related in two ratios, compare the ratios and determine which is greater).
 3. Identify and apply the five strategies (unit rate, within-units and across-units scale factor, scaling up and down, and cross-multiplication) to ratio comparison problems.
 4. Distinguish decrease/increase by x% problems from decrease/increase to x% problems.
 5. Connect story, diagram, and symbolic representation of percent problems.

Evaluation Criteria/Policies:

The grade will be determined using the Delaware Tech grading system:

90	-	100	=	A
80	-	89	=	B
70	-	79	=	C
0	-	69	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:

Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Exams-Summative (Equally Weighted)	40%
Quizzes -Summative (Equally Weighted)	15%
Projects-Summative (Equally Weighted)	15%
Formative Assessment	30%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

1. Implement developmentally appropriate practices based on theories, norms and milestones associated with development in early childhood.
2. Communicate information about student learning and behaviors in a collaborative manner with school, family and community members.
3. Plan developmentally appropriate curriculum for quality infant/toddler, preschool and kindergarten through second grade programs in multicultural settings.
4. Maintain a healthy, safe environment for children by following licensing requirements and legal issues affecting Early Childhood programs.
5. Apply knowledge of the physical, social, emotional, cognitive and language development of birth to second grade children in a classroom setting.
6. Access and implement educational technology.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.