COURSE OUTLINE

Course Number
MAT 038

Course Title
Intermediate Algebra for STEM

Credits
4

Hours:
lecture/Lab/Other
4 lecture hours

Pre-requisite
Completion of MAT 037 with a grade of C or better OR MAT 041 with a grade of B OR MAT 042 with a grade of C

Implementation
Fall 2019

Catalog Description: Developmental mathematics course designed for students needing an introduction to Intermediate Algebra. Topics include: Graphing linear equations in two variables, systems of two linear equations, rational expressions and equations, radicals and rational exponents, and linear and quadratic functions. Those who complete this course with a grade of C or better may register for MAT 146

[This course does not fulfill mathematics elective requirements.]

Is course New, Revised, or Modified? Revised

Required texts/other materials:
1. ALEKS Software
2. Calculator: Students must have at least a scientific calculator. A graphing calculator is recommended for students who need to take additional mathematics courses but is not required. No calculator with a symbolic manipulator is allowed.

Revision date: Spring 2020
Course coordinator: Elizabeth Carr 609.570.3409 carre@mccc.edu

Information resources: The Mercer County Community College Library has a wide assortment of reference books that students may use. Tutors are available at the West Windsor and James Kerney Learning Center.

As this is a foundations level mathematics course, the objective of the course is to prepare students to take a college-level mathematics course. Crucial to success in a mathematics course is the ability to think "algebraically"; that is, to be able to demonstrate an ability to move beyond following prescribed algorithms into abstract reasoning.

A minimum grade of "C" is required for movement from one developmental course to another and for the completion of developmental requirements to qualify for credit-bearing mathematics courses.
Course Competencies/Goals:

Students will be able to demonstrate through tests, quizzes, and assignments the ability to:

1. Solve and graph both linear and quadratic equations. (Goals 2 and 11)
2. Solve a system of two linear equations. (Goals 2 and 11)
3. Perform operations and solve equations involving rational expressions. (Goals 2 and 11)
4. Perform operations and solve equations involving radical expressions and rational exponents. (Goals 2 and 11)
5. Recognize and work with functions and function notation. (Goals 2 and 11)
6. Analyze graphs of polynomial functions. (Goals 2 and 11)
7. Solve quadratic inequalities. (Goals 2 and 11)

Course-specific Institutional Learning Goals (ILGs) / General Education Goals:

General Education Knowledge Goals

Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Units of study in detail:

Unit I  
Graphing Linear Equations in Two Variables

The student will be able to:

- Read, interpret, and explain trends in graphs which model applications. (CG1)
- Determine the relationship between slope and horizontal, vertical, parallel, and perpendicular lines. (CG1)
- Define and graph linear equations in two variables. (CG1)
- Express and graph linear equations in slope-intercept form. (CG1)
- Use linear modeling to find the equation of a line through two given points, or a slope and y-intercept. (CG1)
- Find equations of lines that are horizontal, vertical, and parallel/perpendicular to given lines. (CG1)

Unit II  
Systems of Two Linear Equations
The student will be able to:

- Solve systems of two linear equations having real number solutions, using a variety of methods, such as graphing and algebraic solving. (CG2)
- Identify systems of two linear equations as consistent and inconsistent. (CG2)
- Solve application problems that involve systems of two linear equations. (CG2)

Unit II  
Rational Expressions and Equations

The student will be able to:

- Define rational expressions and identify where they are undefined. (CG3)
- Simplify rational expressions. (CG3)
- Multiply and divide rational expressions. (CG3)
- Find the LCD (Least Common Denominator) for given rational expressions. (CG3)
- Add and subtract rational expressions. (CG3)
- Simplify complex fractions. (CG3)
- Solve rational equations. (CG3)

Unit IV  
Radicals and Rational Exponents

The student will be able to:

- Define and calculate square, cube, and $n$th root of a number. (CG4)
- Calculate and/or simplify expressions with radicals or rational exponents. (CG4)
- Add and subtract radical expressions. (CG4)
- Multiply and divide radical expressions. (CG4)
- Divide radical expressions. (CG4)
- Solve radical equations. (CG4)
- Define the imaginary number $i$ and complex number $a + bi$. (CG4)
- Add, subtract, multiply, and divide complex numbers. (CG4)

Unit V  
Functions: Linear and Quadratic

The student will be able to:

- Define and solve quadratic equations with all solution types using a variety of solving methods. (CG4)
- Use the discriminant to find the number of real and complex solutions to a quadratic equation. (CG5, CG6)
- Graph quadratic equations, identifying the vertex, axis of symmetry, and the maximum/minimum value attained by the function. (CG5, CG6)
- Solve quadratic inequalities. (CG5, CG7)
- Identify the domain and range of relations and functions. (CG5, CG6)
- Identify the domain and range of several types of functions. (CG5, CG5)

Evaluation of student learning:

Students should receive regular feedback on their work through tests and quizzes. The syllabus for this course should describe the schedule for classes and assessments. A suggested day-to-day schedule and a list of minimum suggested homework exercises from the textbook are available from the course
There is a minimum of five quizzes recommended in the course to allow for student feedback. There are two instructor-written, instructor-graded tests that will be returned to students. The midterm exam and the final exam are departmental multiple-choice exams, with the final exam being a comprehensive exam. Test reviews have been developed and will be available to all instructors. A suggested grading scheme for the course is provided below, and all instructors are strongly encouraged to use it.

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<thead>
<tr>
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<tbody>
<tr>
<td>Unit Tests (2)</td>
<td>30%</td>
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<tr>
<td>Quizzes (minimum of 5)</td>
<td>10%</td>
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<tr>
<td>Midterm Exam</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
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**Academic Integrity Statement:**

Mercer County Community College is committed to academic integrity – the honest, fair and continuing pursuit of knowledge, free from fraud or deception.

Students should never:

- knowingly represent the work of others as their own
- knowingly represent previously completed academic work as current
- fabricate data to support academic work
- use or obtain unauthorized assistance in the execution of any academic work
- give fraudulent assistance to other students
- unethically use technological means to gain academic advantages

Violators of the above actions will be penalized. The student will be reported to the Academic Integrity Committee. The student has right to a hearing and to appeal any decisions. These rights are outlined in the student handbook.