MAT 135 Course Outline Spring 2019

COURSE OUTLINE

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT135</td>
<td>Intermediate Algebra &amp; Applications</td>
<td>4</td>
</tr>
</tbody>
</table>

**Hours:**

<table>
<thead>
<tr>
<th>lecture/Lab/Other</th>
<th>Co- or Pre-requisite</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 lecture hours</td>
<td>Completion of MAT037 (formerly MAT034) with a grade of C or better or MAT037A and MAT037B with a grade of C or better in both courses, successful completion of a course equivalent to MAT037, an appropriate score on the Higher Mathematics Placement Test, or permission of the department chairperson.</td>
<td>Fall 2009</td>
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</tbody>
</table>

**Catalog description (2014-2015 Catalog):** Topics include function notation; linear, quadratic, and absolute value functions and equations; rational expressions and equations; rational exponents and equations; radicals and radical equations; graphing of linear, quadratic, and polynomial functions; and inequalities. 4 lecture hours

**Is course New, Revised, or Modified?** Revised Fall 2016

**Required texts/other materials:**

1. Intermediate Algebra, Dugopolski, 7th Ed.
2. ALEKS (with or without the eBook)
3. **Calculator:** Students must have at least a scientific calculator. A graphing calculator such as the TI-83 or TI-84 is recommended, especially for students who need to take additional mathematics courses, but is not required. No calculator with a symbolic manipulator is allowed.

**Revision date: Course coordinator:**

Revised Spring 2019  Jamie Beth Fleischner  609-570-3807  fleischj@mccc.edu

**Information resources:** The Mercer County Community College Library has close to 100 reference books that students may use and a collection of problems on CD. Students are also encouraged to utilize the Learning Centers for additional resources and/or tutoring.
Other learning resources: There is an online homework system available for instructors and students.

Course Competencies/Goals:

Students will be able to demonstrate through tests, quizzes, homework, and assigned projects the ability to:
1. solve compound inequalities in one and two variables.
2. solve and graph both linear and quadratic equations.
3. factor a second degree polynomial and some special higher degree polynomials.
4. recognize and work with functions and function notation.
5. perform operations and solve equations involving polynomial, radical and rational expressions.
6. solve a system of two linear equations.
7. solve absolute value equations and inequalities
8. analyze graphs of polynomial functions.
9. solve quadratic and rational inequalities
10. construct and/or analyze both linear and quadratic models of real life phenomenon and predict future data values from these models.
11. apply each of the above techniques in various real world applications.

Course-specific General Education Knowledge Goals and Core Skills:

General Education Knowledge Goals

Goal 1. Communication. Students will communicate effectively in both speech and writing.
Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

MCCC Core Skills

Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.
Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.
Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Goal E. Computer Literacy. Students will use computers to access, analyze or present information, solve problems, and communicate with others.
Units of study in detail:

Unit I – Linear Modeling: Equations, Inequalities, Slopes, Graphs and Functions (3 weeks)

The student will be able to:

1. Define, solve, and graph solutions to compound linear inequalities, as well as compound linear inequalities using “and” & “or” terminology. (Course Goal 1, Gen Ed Goal 2, Core Skill B)
2. Solve absolute value inequalities algebraically and graphically. (Course Goal 7, Gen Ed Goal 2, Core Skill B)
3. Read, interpret, and explain trends in graphs which model applications. (Course Goals 10 & 11, Gen Ed Goals 1 & 2, Core Skills A&B)
4. Determine relationship between slope and horizontal, vertical, parallel, and perpendicular lines. (Course Goal 2, Gen Ed Goals 1&2, Core Skills A&B)
5. Define and graph linear equations in two variables. (Course Goals 2 & 10, Gen Ed Goals 1&2, Core Skills A&B)
6. Express and graph linear equations in slope-intercept form. (Course Goals 2 & 10, Gen Ed Goals 1&2, Core Skills A&B)
7. Use linear modeling to find the equation of a line through two given points, or a slope and y-intercept. (Course Goals 2,10, & 11, Gen Ed Goals 1 & 2, Core Skills A, B, & D)
8. Find equations of lines that are horizontal, vertical, and parallel/perpendicular to given lines. (Course Goal 2, Gen Ed Goals 1&2, Core Skills A&B)
9. Define relations and functions. (Course Goal 4, Gen Ed Goal 2, Core Skill B)
10. Use function notation to evaluate outputs for given inputs. (Course Goal 4, Gen Ed Goal 2, Core Skill B)
11. Identify the domain and range of a function. (Course Goal 4, Gen Ed Goal 2, Core Skill B)
12. Graph simple functions; apply the vertical line test. (Course Goals 2&4, Gen Ed Goal 2, Core Skill B)
13. Determine relative maximum and minimum values of polynomial functions. (Course Goals 8&11, Gen Ed Goal 2: Course Skill B)
14. Analyze and interpret application problems from other disciplines and/or complete assigned project(s). (Course Goals 2,8,10,11, Gen Ed Goals 1, 2, & 4, Core Skills A,B,D, & E)

Unit II – Systems of Linear Equations, Polynomials, Special Factoring, Rational Expressions (3 weeks)

The student will be able to:

1. Solve linear systems of equations having solutions. (Course Goal 6, Gen Ed Goal 2, Core Skill B)
2. Multiply monomials and binomials (using FOIL) and special products (squares of binomials, etc.) (Course Goal 5, Gen Ed Goal 2, Core Skill B)
3. Factor various trinomials. (Course Goal 3, Gen Ed Goal 2, Core Skill B)
4. Factor the difference of two squares, and the sum/difference of two cubes. (Course Goal 3, Gen Ed Goal 2, Core Skill B)
5. Define and solve quadratic equations by the zero product property. (Course Goals 2 & 5, Gen Ed Goal 2, Core Skill B)
6. Define rational expressions and identify where they are undefined. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
7. Simplify rational expressions. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
8. Multiply and divide rational expressions. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
9. Find the LCD (least common denominator) for given rational expressions. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
10. Add and subtract rational expressions. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
11. Analyze and interpret application problems from other disciplines and/or complete assigned project(s). (Course Goals 2,8,10,11, Gen Ed Goals 1, 2, & 4, Core Skills A,B,D, & E)
12. Simplify complex fractions. (Course Goal 5, Gen Ed Goal 2, Core Skill B)

Unit III – Rational Equations, Radical Expressions and Rational Exponents, Operations on Radical Expressions (3 weeks)

The student will be able to:

1. Divide polynomials. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
2. Solve rational equations. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
3. Define and calculate square, cube, and nth root of a number. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
4. Calculate and/or simplify expressions with radicals or rational exponents. (Course Goal 5, Gen Ed Goals 2 & 4, Core Skill B)
5. Add and subtract radical expressions. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
6. Multiply and divide radical expressions. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
7. Analyze and interpret application problems from other disciplines and/or complete assigned project(s). (Course Goals 5,10,& 11, Gen Ed Goals 1, 2, & 4, Core Skills A,B,D, & E)

Unit IV – Operations on Radical Expressions and Equations, Complex Numbers, Quadratic Equations (4.5 weeks)

The student will be able to:

1. Divide radical expressions. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
2. Define the imaginary number \(i\) and complex number \(a + bi\). (Course Goal 5, Gen Ed Goal 2, Core Skill B)
3. Add, subtract, multiply, and divide complex numbers. (Course Goal 5, Gen Ed Goal 2, Core Skill B)
4. Define and solve quadratic equations by completing the square and/or the quadratic formula to get both real and complex solutions. (Course Goals 2 & 5, Gen Ed Goal 2, Core Skill B)
5. Use the discriminant to find the number of real and complex solutions to a quadratic equation. (Course Goal 2, Gen Ed Goals 1 & 2, Core Skills A & B)
6. Graph quadratic equations, identifying the vertex, axis of symmetry, and the maximum/minimum value attained by the function. (Course Goals 2,5, & 8, Gen Ed Goal 2, Core Skill B)
7. Identify the domain and range of a quadratic function. (Course Goals 2& 8, Gen Ed Goal 2, Core Skill B)
8. Solve quadratic and rational inequalities. (Course Goals 8 and 9, Gen Ed Goal 2, Core Skill D)
9. Identify the domain and range of several types of functions. (Course Goals 8 and 9, Gen Ed Goal 2, Core Skill D)
10. Analyze and interpret application problems from other disciplines and/or complete assigned project(s). (Course Goals 2, 8,10,& 11, Gen Ed Goals 1, 2, & 4, Core Skills A,B,D, & E)

**Evaluation of student learning:**

Students should receive regular feedback on their work through tests, projects, and quizzes/homework. 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 text are available from the course coordinators.

Test 1 covers all the learning outcomes from Unit 1.
The Midterm Exam covers all Unit 1 and Unit 2 learning Outcomes.
Test 2 covers all learning outcomes from Unit 3.
The Final Exam covers all learning outcomes for all units.

There are a minimum of 6 quizzes required for the course that are instructor-written.
Quiz One assesses student learning outcomes 3,9,10,11 and 12 in Unit I.
Quiz Two assesses student learning outcomes 1 and 2 in Unit I.
Quiz Three assesses student learning outcomes 1,3,4 and 5 in Unit II.
Quiz Four assesses student learning outcomes 1, 2 and 7 in Unit III.
Quiz Five assesses student learning outcomes 1,2,3 and 4 in Unit IV.
Quiz Six assesses student learning outcomes 4 and 5 in Unit IV.

There are two instructor-written, instructor-graded tests, as well as a common multiple-choice midterm exam. There is also a multiple-choice comprehensive departmental final exam. Final exam reviews have been developed by the department 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.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Unit Tests (2)</td>
<td>20%</td>
</tr>
<tr>
<td>In-class Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>35%</td>
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</table>

**Academic Integrity Statement:**

Under no circumstance should students knowingly represent the work of another as one’s own. Students may not use any unauthorized assistance to complete assignments or exams, including but not limited to cheat-sheets, cell phones, text messaging and copying from another student. Violations should be reported to the Academic Integrity Committee and will be penalized. Please refer to the Student Handbook for more details.