

**JEFFERSON COLLEGE**

**COURSE SYLLABUS**

**MTH141**

**PRECALCULUS**

5 Credit Hours

Prepared by:  
John M Johnny  
August 2012

Revised by:  
John M Johnny  
January 2015

Dr. Robert Brieler, Division Chair, Math & Science  
Dr. Shirley Davenport, Dean, Arts & Science Education

## MTH141: Pre-calculus

### I. CATALOG DESCRIPTION

- A. Prerequisite: Course pre-requisites/co-requisites: ACCUPLACER Elementary Algebra score of 75 or higher, ACCUPLACER College Math score of 20 or higher, COMPASS Algebra score of at least 42, or COMPASS College Algebra score of at least 31 within the past two years, or Math ACT score of 18 or higher within the past two years, or MTH128 Intermediate Algebra with a grade of “C” or better or, MTH110 Introductory Algebra with a grade of “C” or better, or MTH002 Beginning Algebra with a grade of “C” or better, and reading proficiency.

NOTE: Students with ACCUPLACER Elementary Algebra score less than 116, ACCUPLACER College Math score less than 46, COMPASS Algebra score less than 66, COMPASS College Algebra score less than 31, Math ACT score less than 22, or using MTH002 Beginning Algebra as a prerequisite must also enroll in MTH094 Support for College Algebra.

- B. 5 semester credit hours
- C. Precalculus covers the College Algebra and Trigonometry topics required for the Calculus I, II, III sequence. This course will meet the mathematics requirement for the Associate of Arts degree. Students may not apply both MTH141 and MTH133 or both MTH141 and MTH134 toward graduation. A graphing calculator is required. (F, S, Su)
- D. Fulfills Mathematical Sciences CORE requirement for AA, AAT, AFA, and select AAS degrees: MOTR MATH 150 Pre-Calculus equivalent.  
Elective course applies toward AA and AAT degree requirement.  
May not apply both MTH133 and MTH141 toward graduation.

### II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

Expected Learning Outcomes	Assessment Measures
Students will graph with and without a calculator and will recognize and use transformations in graphing. Students will further be able to determine, the domain, range, intercepts and relative extrema of a function from the graph of a function using the calculator and without using the calculator	Homework Quizzes/Tests/Exams Class works
Students will graph polynomial functions by using the zeros, y-intercepts and end behavior of the function. They will graph the rational functions by finding the intercepts and asymptotes. They will solve polynomial	Homework Quizzes/Tests/Exams Class works

and rational function inequalities. They will verify their work by using a graphing calculator.	
Students will analyze exponential and logarithmic functions and will apply them, especially in the growth and decay models. They will solve exponential and logarithmic equations. They will solve problems using Summation notation, the Arithmetic Series and Geometric Series	Homework Quizzes/Tests/Exams Class works
Students will solve linear and non-linear systems of equations by applying various algebraic methods and will use systems to solve application problems. They will analyze Matrices and their properties and solve linear system of linear equations using Gauss Elimination method /Gauss-Jordan Elimination Method. They will verify their work by using graphing calculators	Homework Quizzes/Tests/Exams Class works
Students will recall from memory, in a timely fashion, the exact trigonometric functions of standard (multiples of $30^\circ$ and $45^\circ$ ) angles given in degree and radian measure. They will use appropriate identities to find the exact trigonometric functions of non-standard angles	Homework Quizzes/Tests/Exams Class works
Students will solve right triangles using trigonometric ratios and oblique triangles using the Law of Sine and Law of Cosines	Homework Quizzes/Tests/Exams Class works
Students will solve linear and quadratic trigonometric equations and graph trigonometric functions that are shifted horizontally and vertically, with modified, amplitude, and period, determine equations of such graphs.	Homework Quizzes/Tests/Exams Projects Class works
Students will convert rectangular coordinates into polar coordinates, and vice versa. They will analyze and draw polar graphs They will convert complex numbers from rectangular to polar form and vice versa. They will use DMoivre's theorem to find the powers and roots of complex numbers	Homework Quizzes/Tests/Exams Class works
Students will use the concepts of vectors (sum and dot products) to solve problems.	Homework Quizzes/Tests/Exams Class works

### III. OUTLINE OF TOPICS

- A. Functions
  - 1. Functions
  - 2. Graphs of functions
  - 3. Average rate of change: increasing and decreasing functions
  - 4. Transformations of functions

5. Extreme values of functions
  6. Combining functions
  7. One-to-one functions and their inverses
- B. Polynomial and rational functions
1. Polynomial and rational inequalities
  2. Polynomial functions
  3. Dividing polynomials
  4. Real zeros of polynomials
  5. Complex numbers
  6. Complex zeros and the fundamental theorem of algebra
  7. Rational Functions
- C. Exponential and logarithmic functions
1. Exponential functions
  2. Logarithmic functions
  3. Properties of logarithms
  4. Exponential and logarithmic equations
  5. Exponential growth and decay
- D. Trigonometric functions
1. Angle measure
  2. Trigonometry of right triangles
  3. Trigonometric functions
  4. Solving right triangles
  5. Graphs of trigonometric functions
  6. Inverse trigonometric functions
  7. The law of sines
  8. The law of cosines
- E. Analytic trigonometry
1. Trigonometric identities
  2. Addition and subtraction formulas
  3. Double-angle, half-angle, and product-sum formulas
  5. Trigonometric equations
  6. Polar form of complex numbers: DeMoivre's Theorem
  7. Vectors
  8. Dot product
- F. Systems of equations
1. Systems of equations
  2. Systems of linear equations in two variables
  3. Systems of linear equations in several variables
  4. Systems of linear equations: matrices
  5. The algebra of matrices
  6. Inverses of matrices and matrix equations

7. Determinants and Cramer's Rule
8. Systems of inequalities
9. Partial fractions

- G. Sequences and series
1. Sequences and summation notation
  2. Arithmetic sequences
  3. Geometric sequences
  4. The binomial theorem

#### IV. METHODS OF INSTRUCTION

- A. Lecture
- B. Class discussion
- C. Textbook

#### V. REQUIRED TEXTBOOK

Blitzer, Robert. *Pre-calculus with MML Access Code* (Current Edition). Boston: Pearson.

#### VI. REQUIRED MATERIALS

Graphing calculator (TI 83 /83 Plus)  
Symbolic Manipulators are not permitted

#### VII. SUPPLEMENTAL REFERENCES

Student Solution Manual

#### VIII. METHODS OF EVALUATION

- A. Homework 10-20%  
Students will submit homework in MyMathLab. Additional problems may also be assigned
- B. Classwork & Projects 0-20%  
Additional worksheets and projects may be assigned at the discretion of the instructor to reinforce various concepts
- C. Quizzes 0-20%  
Both in-class and online quizzes may be used to evaluate mastery of concepts
- D. Tests 30-60%

There will be a minimum five unit tests, each covering no more than 2 chapters of material. These exams may be administered on paper or online

- E. Comprehensive final examination 15-25%  
All students will be required to take a comprehensive final exam

#### IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Technology Center 101; phone 636-481-3169).

#### X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, <http://www.jeffco.edu>).

#### XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

#### XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.