



**JOLIET**  
JUNIOR COLLEGE  
1901-

*Dept. of Mathematics*

## *Math 138 Precalculus I: Algebra Spring 2018*

**Instructor's Name:**

**Office Location:**

**Office Hours:**

**Office Phone:**

**E-mail:**

### **Course Description**

Precalculus I is a study of those topics on algebra which are essential in calculus. Topics included are functions, graphs of functions, linear, quadratic polynomial, rational, exponential and logarithmic functions, conic sections, sequences, and the binomial theorem.

**Illinois Articulation Initiative (IAI) number:** N/A

### **Credit and Contact Hours:**

|              |   |
|--------------|---|
| Lecture      | 4 |
| Lab          | 0 |
| Credit Hours | 4 |

**Prerequisites:** Satisfactory placement test score or Math 098 and Math 095 with a grade of "C" or equivalent.

### **Books, Supplies, and Supplementary Materials**

#### **A. Textbooks**

Required: Precalculus: Concepts Through Functions w/o Access Code, 3rd Ed., 2015, Sullivan.  
Publisher: Pearson Education  
ISBN: 9780321931047Pearson

MyMathLab Stand Alone Student Access Kit (Optional),  
ISBN: 9780321199911, Pearson Education  
Publisher: Pearson Education

or Precalculus: Concepts Through Functions w/ Access Code, 3rd Ed., 2015, Sullivan.  
ISBN: 9780321926036, Pearson Education

#### **B. Other Required Materials**

TI-83+ or TI-84+ graphing calculator

### **Methods of Instruction:**

Lecture  
Online

### **Student Learning Outcomes: General Education Student Learning Outcomes:**

Students will demonstrate the ability to accurately apply correct mathematical methods and techniques in various applications such as applied sciences, theoretical mathematics, physics, natural sciences and other applied sciences.

### **Objectives**

Upon completion of this course, the student will be able to:

1. Find the distance between two points.
2. Find the midpoint of a line segment.
3. Graph relations on a calculator using appropriate window settings.
4. Determine symmetries of graphs.
5. Find intercepts of graphs.
  
6. Find slope and equations for a given line.
7. Determine whether two lines are parallel or perpendicular.
8. Find the standard form for the equation of a given circle.
9. (Optional) Use the graphing calculator to draw scatter diagrams, find equation of least squares regression line, find the correlation coefficient, and interpret these results.
10. Work applied variation (proportionality) problems.
  
11. Determine whether a given relation is a function.
12. Use function notation.
13. Determine the domain of a given function.
14. Recognize graphs of prototypical functions.
15. Use the calculator to determine intervals on which a function is increasing or decreasing.
  
16. Find the slope of a secant line to a graph by writing and reducing the difference quotient.
17. Recognize the graph of a function, which was obtained from that of a prototypical function by shifting, stretching, or reflection.
18. Find the sum, product, difference, quotient, and composition of two functions.
19. Determine whether a given function is one-to-one, and if so, determine its inverse.
20. Graph the inverse of a relation, given the graph of the relation.
  
21. Construct a function to model an applied optimization problem and use the graphing calculator to solve it.
22. State the Intermediate Value Theorem and use it to show the existence of a zero of a function on a given interval.
23. Solve quadratic equations graphically and algebraically.
24. Solve literal equations.
25. Solve applied problems using an equation in one variable.
  
26. Perform computations with complex numbers.
27. Solve polynomial and rational inequalities (algebraically and graphically).
28. Solve absolute value equations and inequalities (algebraically and graphically).
29. Find intercepts and vertex of the graph of a quadratic function.
30. Recognize the graph of a polynomial function given its zeroes with their multiplicities.
  
31. Find intercepts and equations of asymptotes to the graph of a rational function.
32. Determine a possible formula for a rational function given its graph.

33. Factor a polynomial given its zeroes.
34. List the possible rational zeroes of a polynomial function using the Rational Zero Theorem.
35. Recognize irrational zeroes (which the calculator approximates) of a polynomial.
  
36. Use the complex conjugate pairs theorem to find zeroes of a polynomial function with real coefficients.
37. Use synthetic division to find zeroes of a polynomial and factor it.
38. Define "exponential function."
39. Define  $e$ .
40. Graph exponential functions using transformations.
  
41. Define "logarithmic function."
42. Convert between log and exponential expressions.
43. Find domains and ranges of log and exponential functions.
44. Find the asymptotes of log and exponential functions.
45. Graph logarithmic functions using transformations.
  
46. Use properties of logarithms to write equivalent expressions and solve equations.
47. Work applied problems involving exponential growth and decay.
48. (Optional) Use the graphing calculator to determine the best-fitting log and exponential functions to a set of data points, and determine which is most appropriate.
49. Define parabola using directrix and focus.
50. Define ellipse and hyperbola using foci.
  
51. Find an equation for a conic section given foci, vertices, asymptotes, etc. (graphically or numerically presented).
52. Given an equation of a conic section determine foci, vertices, and asymptotes, if any.
53. Find terms of a sequence, including those defined recursively. Use appropriate notation.
54. Recognize when a sequence is arithmetic or geometric.
55. Find terms and finite sums of arithmetic and geometric sequences.
  
56. Use mathematical induction to prove statements about sums of sequences and about divisibility.
57. Expand powers of binomials using the Binomial Theorem.
58. (Optional) Solve systems of nonlinear equations.
59. (Optional) Solve systems of inequalities.

### TOPICAL OUTLINE

| <u>Days</u> | <u>Topic or Class Activity</u>  |
|-------------|---|
| 3 days      | Distance and Midpoint Formula; Graphs of Equations; Lines and Circles |
| 6 days      | Functions and Their Graphs  |
| 7 days      | Linear and Quadratic Functions  |
| 6 days      | Polynomial and Rational Functions                                     |
| 4 days      | Zeroes of Polynomials   |
| 8 days      | Exponential and Logarithmic Functions                                 |
| 6 days      | Analytic Geometry   |

|         |   |
|---------|---|
| 6 days  | Sequences, Mathematical Induction, Binomial Theorem     |
| 3 days  | Systems of Nonlinear Equations; Systems of Inequalities |
| 8 days  | Exams & Supplementary Topics                            |
| <hr/>   |   |
| 57 days |   |

### **Graded Assignments and Policies**

#### **Graded Assignments**

|                  |          |
|------------------|----------|
| In class Quizzes | 0 – 20%  |
| Participation    | 0 - 5 %  |
| Projects         | 0 – 20%  |
| Homework         | 0 – 30%  |
| Tests            | 50 - 85% |
| Final            | 15 – 30% |

#### **Grading Policy**

The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly.

Each instructor will set minimum standards for performance on tests.

#### **Grading Scale**

|         |   |
|---------|---|
| 90-100% | A |
| 80-89%  | B |
| 70-79%  | C |
| 60-69%  | D |
| 0-59%   | F |

#### **Major Tests and Quizzes**

The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly. Each instructor will set minimum standards for performance on tests. A comprehensive final examination will be given.

### **Classroom Policies and Procedures**

**Attendance Policy-** each instructor decides on his/her own attendance policy.

**Make-up Policy-**each instructor decides on his/her own make-up policy.

**Extra-credit Policy-**each instructor decides on his/her own extra-credit policy.

#### **Final Exam Information**

A comprehensive final examination will be given.

#### **Academic Honor Code**

The objective of the academic honor code is to sustain a learning-centered environment in which all students are expected to demonstrate integrity, honor, and responsibility, and recognize the importance of being accountable for one's academic behavior.

#### **College Statement about grades of "F" and Withdrawal from Class**

Students may withdraw from a course by processing an add/drop form during regular office hours through the Registration and Records Office at Main Campus or Romeoville Campus, or by phone at 815-744-2200. Please note the withdrawal dates listed on your bill or student schedule. Every course has its own withdrawal date. Failure to withdraw properly may result in a failing grade of "F" in the course.

At any time prior to the deadline dates established, an instructor may withdraw a student from class because of poor attendance, poor academic performance or inappropriate academic behavior, such as, but not limited to, cheating or plagiarism.

### **Intellectual Property**

Students own and hold the copyright to the original work they produce in class. It is a widely accepted practice to use student work as part of the college's internal self-evaluation, assessment procedures, or other efforts to improve teaching and learning and in promoting programs and recruiting new students. If you do not wish your work to be used in this manner, please inform the instructor.

### **Student Code of Conduct**

Each student is responsible for reading and adhering to the Student Code of Conduct as stated in the college catalog.

**Sexual Harassment** Joliet Junior College seeks to foster a community environment in which all members respect and trust each other. In a community in which persons respect and trust each other, there is no place for sexual harassment. JJC has a strong policy prohibiting the sexual harassment of one member of the college community by another. See the Catalog or Student Handbook.

**Student Support** <http://jjc.edu/services-for-students/pages/default.aspx>

- a. Disability Services: <http://www.jjc.edu/disability-services/Pages/default.aspx>.  
Student Accommodations and Resources (StAR): If you need disability-related accommodations, specialized tutoring, or assistive technology in this class, if you have emergency medical information you wish to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class. New students should request accommodations and support by scheduling an appointment with the Student Accommodations and Resources (StAR) Office, Campus Center 1125, (815) 280-2230.
- b. Tutoring: <http://jjc.edu/tlc/Pages/default.aspx>
- c. Counseling and Advising: <http://www.jjc.edu/counselingadvising/Pages/default.aspx>
- d. Academic Resources: <http://www.jjc.edu/academic-resources/Pages/default.aspx>
- e. Support Programs and Services:  
<http://www.jjc.edu/support-programs-services/Pages/default.aspx>
- f. Technology Support: <http://jjc.edu/services-for-students/Pages/technology-support.aspx>
- g. My Degree Progress: My Degree Progress is a computerized system to track a student's progress toward graduation. The report indicates every course and places these courses into their appropriate category as a General Education, Major Course, or Elective, according to the degree requirements. This tool is useful for preparing before an advising appointment, for planning, for registering, and for checking that the student is on track for graduation. <https://eresources.jjc.edu>

**\* Instructor reserves the right to modify, add to or change the syllabus. Any changes to the syllabus or schedule will be announced in class.**

Prepared by:

Reviewed by:

Prof. Elena Catoi  
Mathematics Department

Prof. Jean McArthur  
Department Chair

Date

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