Math 131
College Algebra

JOLIET
JUNIOR COLLEGE
— 1901 —
DEPARTMENT OF MATHEMATICS

Course Description

This course has a minimal review of algebraic skills followed by a study of functions. Functions studied include: polynomial, exponential and logarithmic. Other topics of study include: systems of equations, the theory of equations, matrices, sequences and series, counting techniques, probability, and the Binomial Theorem.

Illinois Articulation Initiative (IAI) number: N/A

Credit and Contact Hours:
Lecture   **4**
Lab   **0**
Credit Hours   **4**

Prerequisites: Appropriate placement score or minimum grade "C" in MATH 095 and MATH 098 or equivalent.

Books, Supplies, and Supplementary Materials

A. **Required Textbooks**
    MyMathLab Direct Digital Access. The eText is included in MyMathLab so if you are comfortable reading the textbook on the computer, you may use the eText alone. **There is no need to purchase a physical textbook for this course; the direct digital access fee for the eText was included in your course fees. Registration instructions are posted in our iCampus/Canvas site.**

B. **Other Required Materials**
    TI-83+ or TI-84+ graphing calculator

C. **Methods of Instruction:**
    Lecture, Hybrid, or Online

General Education Student Learning Outcome
1. Quantitative Literacy: Students possess the ability to reason and solve quantitative problems from an array of contexts.

Course Learning Outcomes (CLOs)
1. Analyze functions algebraically.
2. Analyze functions using technology.
3. Analyze functions graphically.
4. Analyze systems of equations up to three variables.
5. Analyze arithmetic and geometric sequences.

6. Analyze basic counting and probability problems.

Lesson Learning Outcomes (LLOs)
1. Graph an equation in two variables by plotting points.
2. Graph an equation in two variables using a graphing calculator.
3. Use appropriate window settings, zoom settings and table features on a graphing calculator.
4. Determine the slope of a line passing through two points, or given the equation or graph of the line.
5. Write equations for lines given two points on a line or a point and the slope of the line.
6. Write equations for lines that are parallel or perpendicular to a given line through a given point.
7. Graph linear equations in two variables using intercepts.
8. Use the graphing calculator to draw scatter diagrams, find equation of least squares regression line.
9. Find the correlation coefficient, and interpret these results.
10. Solve applied problems using an equation in one variable.
11. Solve absolute value and nonlinear equations and inequalities in one variable using interval notation.
12. Solve quadratic equations graphically and algebraically in the real number system.
13. Define a complex number.
14. Solve quadratic equations algebraically in the complex number system.
15. Define a function and apply function notation.
16. Determine the domain and range of a function.
17. Determine whether a given relation is a function.
18. Find intercepts given the graph of a function.
19. Find the relative minima and relative maxima of a function with and without a graphing calculator.
20. Define even and odd function and determine whether a function is even or odd or neither.
21. Determine symmetries of graphs.
22. Determine the intervals where a function is increasing, decreasing, or constant with and without a graphing calculator.
23. Sketch graphs from this library of functions: linear, quadratic, cubic, square root, cube root, constant, absolute value, reciprocal and piecewise.
24. Apply transformations (shifting, stretching, reflections) of a given functions.
25. Compute an average rate of change using secant lines and function notation.
26. Evaluate and find the domain for the sum, difference, product, quotient, and composition of functions.
27. Define and graph a quadratic function.
28. Given a quadratic function, find the intercepts and the vertex.
29. Construct a quadratic function to model an applied optimization problem and use the graphing calculator to solve it.
30. Define and graph polynomial functions.
31. Determine the end behavior of a graph of a polynomial function.
32. Define a zero of a polynomial.
33. State a polynomial function given its zeros.
34. Find the rational zeros of a polynomial using the Rational Zero, the Remainder and Factor theorems.
35. Perform long or synthetic division for polynomials to determine rational zeros, their multiplicities and factors of the polynomial.
36. Determine all real zeros of a polynomial function.
37. Solve polynomial inequalities algebraically or graphically.
38. Define a rational function.
39. Find the domain of a rational function.
40. Define and find vertical, horizontal, and oblique asymptotes, if they exist, for graphs of rational functions.
41. Find the intercepts of a rational function.
42. Graph rational functions with and without a graphing calculator.

43. Solve rational inequalities algebraically and graphically.
44. Given a function, define and graph its inverse, if it exists.
45. Define and graph exponential functions including base e.
46. Graph exponential functions using transformations.
47. Define and graph logarithmic functions including base e.
48. Convert between log and exponential expressions.
49. Graph logarithmic functions using transformations.
50. Use properties of logarithms to write equivalent expressions.
51. Solve exponential and logarithmic equations.
52. Solve application problems involving exponential growth and decay.
53. Solve compound interest problems.
54. Solve systems of equations graphically and algebraically.
55. Define a matrix and state its dimensions.
56. Solve linear systems of equations in two and three variables using Gauss-Jordan elimination.
57. Perform basic operations (addition, subtraction, scalar multiplication, multiplication) on matrices.
58. Define and find, if it exists, the inverse of a square matrix with and without row operations.
59. Solve linear systems of equations using matrix inverses.
60. Solve applied problems using systems of equations.
61. Use appropriate notation and recognize when a sequence is arithmetic or geometric.
62. Define and find the terms of a sequence, including those defined recursively.
63. Determine the formula for the nth term of a sequence, including those defined recursively.
64. Define and use summation notation.
65. Find sums of arithmetic and geometric sequences.
66. Define and use factorials.
67. Define and apply the fundamental counting principle, permutations, and combinations.
68. Solve simple probability problems.

Final Course Grading Scale

Grade	Percentage
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	lower than 60%

Faculty Commitment
Faculty members are committed to providing a quality learning experience through thoughtful planning, implementation, and assessment of course activities. They are also committed to being readily available to students throughout the semester by returning e-mails and phone calls within 48 hours and to returning graded course work within a week. Furthermore, they are committed to selecting appropriate course materials and making them available in an organized and timely manner.

Student Commitment
For every credit hour a student is enrolled in, they should expect to spend at least 2 hours outside of class studying, working on assignments, and preparing for class each week of the fifteen-week semester. For example, for this four credit-hour class, students can expect to spend four hours per week in class actively engaged in learning the material by participating in face-to-face classes or viewing lectures and instructional material online. In addition, students should expect to spend another eight hours per week outside of class completing homework and assignments, posting to discussion boards online, or studying for quizzes and tests. This means students should spend a minimum of 12 hours per week engaged in achieving the learning outcomes for this course. If you are not achieving your desired results in this class, you should consider increasing your prep

time outside of class, in addition to using available resources such as instructor office hours and tutoring services.

By registering for this course, you commit yourself to active participation in course activities as well as the submission of all assignments and exams on time. Furthermore, you commit to accessing the course site and checking your JJC e-mail several times a week.