Clarendon College
Course Syllabus

MATH 1314 – College Algebra Online
Fall 2nd 2026

Instructor: Dr. Jeremy Sain
Office: 201A e-mail: jeremy.sain@cctx.edu

Office Hours: I will check my email 3 to 4 times a day.

Required Text: None. The text is a set of video lectures in OpenLMS (aka Moodle).

Recommended Readings: These books don't really have to do with the class, but they are fun and give either some nice mathematics history or show you what mathematics is about from a bigger picture standpoint:

- Number: The Language of Science, Tobias Dantzig. Gives a very comprehensive history of number systems up to our own and beyond, as well as a history of 16^{th} to 19^{th} century mathematics.
- Mathematics From the Birth of Numbers, Jan Gullberg. A mathematics overview book. Is fun to flip through and look at all the pictures.
- Flatland, A Romance of Many Dimensions. Edwin Abbott. A whimsical book designed to help people imagine a world with more than three dimensions.
- The Language of Mathematics, Making the Invisible Visible, Keith Devlin. One of any number of "popular math" books, which are written to give the reader a sense of higher mathematics and its relationship to the world, without the rigorous diction of a regular mathematics text.
- Anything by Lewis Carroll. While most famous for his two books about Alice, Lewis Carroll's primary vocation a mathematician. He wrote many logic puzzle books that are quite challenging.
- Democracy, the God that Failed, Hans Herman Hoeppe. This is a political science book, and a difficult read, but is an excellent example of deductive reasoning at its finest.

Supplies: Reliable internet access.

Purpose of the Course: College Algebra partially satisfies the requirements for the Associates Degree at Clarendon College and is designed for transfer to a senior college.

Course Description: In-depth study and applications of polynomial, rational, radical, exponential and logarithmic functions, and systems of equations using matrices. Additional topics such as sequences, series, probability, and conics may be included.

Prerequisites: Student must be TSI complete in Mathematics.

Core Objectives:

Critical Thinking Skills

- to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

Communication Skills
- to include effective development, interpretation and expression of ideas through written, oral and visual communication

Empirical and Quantitative Skills
- to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

Learning Outcomes:

Upon successful completion of this course, students will:

1. Demonstrate and apply knowledge of properties of functions, including domain and range, operations, and inverses. (Assesses EQS with Quiz for Student Understanding of THECB Learning Outcome One)
2. Recognize and apply polynomial, rational, radical, exponential and logarithmic functions and solve related equations. (Assesses CT, EQS, and COM with Quizzes to Demonstrate Mastery of THECB Learning Outcome Two and Learning Outcome Three B)
3. Apply graphing techniques. (Assesses CT, EQS with Quiz to demonstrate Mastery of THECB Learning Outcome 2)
4. Evaluate all roots of higher degree polynomial and rational functions. (Assesses CT and EQS with Quiz to demonstrate Mastery of THECB Learning Outcome Four)
5. Recognize, solve and apply systems of linear equations using matrices. (Assesses EQS with homework assignment followed by a quiz to check for understanding and mastery)

Methods of Instruction:

1. Online video lectures.
2. Problem assignment.
3. Discussion of problems.

Grading Policies:

All assignments must be completed on OpenLMS (aka Moodle) at https://cctx.mrooms.net/.

Homework: 45%	Math takes practice, and the importance of homework cannot be exaggerated. I will drop the lowest homework assignment. You must make at least a 30 on a homework in order to attempt the quiz for that unit. Of course, I suggest trying to make as high as possible on each assignment.
Practices: 5%	Practice Quizzes are available for each of the regular quizzes and the Midterm and Final Exams. They are generated with the exact same parameters as the real test, and you can take them up to 20 times to get as much practice as you need. Only the highest grade on each practice counts. You must also make at least a 1 on the practice before taking the corresponding quiz or exam.
Quizzes: 30%	Each unit will have a quiz with problems randomly selected from the problems in that homework set. I will drop the lowest quiz grade.
Midterm: 10%	The midterm covers units 1 through 7.
Final: 10%	The final covers units 8 through 12.

For those of you who like formulas, the above says that your numerical grade will be computed using the formula

Your grade = .45 (HW ave, excludes 1 drop) +
.05 (Practice Quiz Average) +
.3 (Quiz Average, excludes 1 drop)+
.1 (Midterm) +
.1 (Final).

Grading Scale:	90-100	A
	80-89	B
	70-79	C
	60-69	D
	<60	F

All work is to be turned in on time. All assignments except the final exam are already open. If you know you are going to be busy around the due date of an assignment, then do the assignment a few days early. (Part of the reason that I drop the lowest homework and quiz is to not penalize students who miss an assignment due to unforeseen issues.) There are no makeups on the exams, so I strongly encourage you to take them early.

STUDENT ACADEMIC INTEGRITY AND CLASSROOM ETHICS

Clarendon College is committed to a philosophy of honesty and academic integrity. It is the responsibility of all members of the Clarendon College community to maintain academic integrity at Clarendon College by refusing to participate in or tolerate academic dishonesty. Any act of academic dishonesty will be regarded by the faculty and administration as a serious offense. Academic dishonesty violations include, but are not limited to:

1. obtaining an examination, classroom activity, or laboratory exercise by stealing or collusion;

2. discovering the content of an examination, classroom activity, laboratory exercise, or homework assignment before it is given;

3. observing the work of another during an examination or providing answers to another during the course of an examination;

4. using an unauthorized source of information during an examination, classroom activity, laboratory exercise, or homework assignment;

5. entering an office, classroom, laboratory, or building to obtain an unfair advantage;

6. taking an examination for another person;

7. completing a classroom activity, laboratory exercise, homework assignment, or research paper for another person;

8. altering grade records;

9. using any unauthorized form of an electronic communication device during an examination, classroom activity, or laboratory activity; and/or,

10. plagiarism. (Plagiarism is defined as the using, stating, offering, or reporting as one's own an idea, expression, or production of another person's work without proper credit. This includes, but is not limited to, turning in a paper purchased or acquired from any source, written by someone other than the student claiming credit, or stolen from another student.)

Students are responsible for reporting known acts of academic dishonesty to a faculty member, the program coordinator, the vice president, and/or dean. Any student with knowledge of a violation who fails to report it shall him/herself be in violation and shall be considered to have committed an act of academic dishonesty.

While academic integrity and honesty are the responsibility of the individual student, each individual faculty member, teaching assistant, and/or laboratory instructor is responsible for classroom management and for maintaining ethical behavior within the classroom and/or laboratory. Faculty who discover or suspect a violation should discuss the matter with the suspected violator(s) and attempt to resolve the case at that point. In cases of convincing evidence, the faculty member should take appropriate action. The faculty member and student should complete a Counseling Sheet regarding the violation. (The Counseling Sheet should contain at a minimum the date and time of the violation, the course, the instructor's name, the student's name, an explanation of the infraction or facts of the case, and the resolution to the incident.) This form should be signed by the student, faculty member, program coordinator, and the Vice President of Academic Affairs. The Vice President of Academic Affairs will maintain a file on all violations. If a faculty member prefers to report the case directly to Vice President of Academic Affairs, it remains his/her prerogative to do so. Additionally, if the faculty member and the accused student cannot reach a resolution or if the faculty member believes that suspension from school is the only fair sanction, the case should immediately be reported, by the faculty member, in writing, to the Vice President of Academic Affairs. If the Vice President of Academic Affairs observes any trends in student behavior which involve more than one violation or act of academic dishonesty, the Vice President of Academic Affairs is responsible for notifying all faculty members involved, for contacting the student(s) involved, and after consultation with the faculty member(s) involved for taking the appropriate action. The Vice President of Academic Affairs is responsible for the timely notification (normally within two weeks) to all parties of an action taken.

Students wishing to appeal a disciplinary decision involving academic integrity or acts of academic dishonesty may do so through the Student Appeals and Grievance Procedure.

Classroom Policies:

1. **Online Attendance Policy**: Weekly attendance is mandatory in all online courses. Specific activities will be identified each week that must be completed in order for students to be considered "in attendance." Students are expected to log into their online course(s) at least twice a week. Progress towards satisfactory completion of weekly assignments is expected on a weekly basis. No progress could jeopardize good standing and financial aid.

   My Policy: For this course, I will submit an attendance report each *Wednesday morning*. I will mark as student "present" if they completed at least 30% of the HW assignment due for that week. Students can be placed on academic probation or lose financial aid for non-attendance or failure to work through the course assignments.

1. **Final Exams:** The schedule of final exams times is published at the beginning of the semester. You can find the schedule for final exams at:

https://www.clarendoncollege.edu/studentservices/student-resources-forms.html
Do not make plans to leave school before your scheduled final exam. In exceptional circumstances if a student needs to take a final exam early, he/she may request early final exams by filling out the form at:
https://www.clarendoncollege.edu/studentservices/student-resources-forms.html

2. **Scholastic Honesty:** I adhere to a strict policy regarding academic honesty. Anyone who is dishonest in any way will receive a zero on that assignment or exam with no opportunity to make up the zero and may be dropped from the course with a grade of F. That student, if allowed to remain in the course, will not be allowed to receive any extra credit points from the time of the infraction through the remainder of the course. Furthermore, that student will not be allowed to drop their lowest quiz grade or exam grade. A second act of dishonesty will result in an F for the course. Students who commit an act of academic dishonesty will not be allowed to withdraw from the course with a "W." Note that dishonest behavior includes both the act of copying someone else's work as well as allowing someone to copy your work. Both students are equally guilty and will be equally punished.

3. **Course Withdrawal**--Students desiring to make schedule changes after their initial registration each semester must do so during the designated "Drop and Add" period as scheduled in the College Catalog. Students will be required to pay tuition and fees applicable to any class(es) added to their schedule.

   Official withdrawal from a course is initiated in the Office of the Registrar. However, each student should consult with his/her academic advisor or the Associate Dean of Enrolment before officially withdrawing from a course. A student who stops attending a class without officially dropping it may receive a grade of "F" for that class.

4. **Grievance/Appeals:** If you have a dispute concerning your grade or policies in this class, it is the student's responsibility to contact the instructor to discuss the matter. Should things remain unresolved, please follow the procedures described in the Clarendon College Student Handbook or College Policy Manual.

5. **Accommodation Statement** REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT: In accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, any student who feels that he or she may need any special assistance or accommodation because of an impairment or disabling condition should contact the Associate Dean of Enrollment Services at 806-874-4837 / janean.reish@clarendoncollege.edu or visit the Clarendon campus at Clarendon College. It is the policy of Clarendon College to provide reasonable accommodation as required to afford equal educational opportunity. It is the student's responsibility to contact the Associate Dean of Enrollment Services.

6. **Nondiscrimination Policy**
   Clarendon College, in accordance with applicable federal and state law, prohibits discrimination, including harassment, on the basis of race, color, national or ethnic origin, religion, sex, disability, age, sexual orientation, or veteran status. It is the policy of Clarendon College not to discriminate based on gender, age, disability, race, color, religion, marital status, veteran's status, national or ethnic origin, or sexual orientation. Harassment of a student in class, i.e., a pattern of behavior directed against a particular student with the intent of humiliating or intimidating that student will not be tolerated. The mere expression of one's ideas is not harassment and is fully protected by academic freedom, but personal harassment of individual students is not permitted.

The full details of **Student Rights and Responsibilities** policies can be viewed on Clarendon College's website at: https://www.clarendoncollege.edu/Sites/ClarendonCollegeNew/Resources/Legal/24-25/StudentRightsResponsibilities.pdf

Course Schedule:

All assignments are due at 11:55pm **Central Time,** because that's when OpenLMS (aka Moodle) ends the day. Notice that the "due date" does not mean the day that you are supposed to submit an assignment. The "due date" is the last possible day to submit an assignment.

I encourage you to stay a few days ahead of the due dates. You never know when computers/internet will crash or when life situations will prevent you from being able to work on an assignment. If you are a few days ahead of the due dates, you won't be stuck with the possibility of missing an assignment due to unforeseen issues.

This is an especially fast term. In the regular semester, each unit would be a week's worth of work. In this short session, we cover a unit every two to three days. This makes it all the more important to not get behind.

November 4	Last day to Add/Drop
November 6	HW 1 due
November 6	HW 1 Quiz and Practice due
November 8	HW 2 due
November 8	HW 2 Quiz and Practice due
November 11	HW 3 due
November 11	HW 3 Quiz and Practice due
November 13	HW 4 due
November 13	HW 4 Quiz and Practice due
November 16	HW 5 due
November 16	HW 5 Quiz and Practice due
November 18	HW 6 due
November 18	HW 6 Quiz and Practice due
November 21	HW 7 due
November 21	HW 7 Quiz and Practice due
November 23	Midterm Exam and Practice Exam due
November 24	Last day to drop with a "W"
November 25	HW 8 due
November 25	HW 8 Quiz and Practice due
November 28	HW 9 due
November 28	HW 9 Quiz and Practice due
November 30	HW 10 due

November 30	HW 10 Quiz and Practice due
December 3	HW 11 due
December 3	HW 11 Quiz and Practice due
December 5	HW 12 due
December 5	HW 12 Quiz and Practice due
December 6	Final Exam becomes available
December 8	Final Exam and Practice Exam due

Course Outline:

Note: This course is designed to stress not only algebraic techniques, but also the vast real-world applications of algebra. Each unit is approximately one-third application problems. Some of these problems are standard "textbook" type applications, but most are taken from physics and engineering, economics and finance, analytic and algebraic geometry, coding and data science, cryptography, and related fields.

Unit 1: Polynomial Basics and Linear Equations

- The Distributive Property
- Adding and Subtracting Polynomials
- Multiplying Polynomials
- Linear Equations in One or Two Variables

Unit 2: Factoring and Quadratic Equations

- Factor by Grouping
- Factoring Trinomials
- Solving Quadratics By Factoring
- Solving Quadratics By Graphing With Rational Roots Theorem

Unit 3: Rational Functions and Equations

- Domain and Simplifying Rational Functions
- Multiplying and Additional Rational Functions
- Solving Rational Equations
- Inverting Rational Functions

Unit 4: Radicals and Complex Numbers

- Simplifying Radicals
- Arithmetic in Quadratic Fields
- Complex Numbers and Arithmetic
- Solving Radical Equations

Unit 5: General Quadratic Equations and Optimization, The Binomial Theorem

- Completing the Square
- The Binomial Theorem
- Solving Quadratic Equations

- The Quadratic Formula
- Discriminants
- Optimizing Quadratic Functions

Unit 6: Division and Higher Degree Polynomial Equations

- Long and Synthetic Division
- Vieta's Formulae
- Rational Roots, Conjugate Roots, and Descartes Rule of Signs
- Polynomial Shifting
- Solving Polynomial Equations

Unit 7: Exponents and Logarithms

- Converting Between Equations
- Expanding and Combining Logarithmic Expressions
- Exponential Equations
- Logarithmic Equations

Unit 8: Graphs and Equations for Real and Complex Lines

- Slope Of Lines
- Point-Slope and Slope-Intercept Forms
- Complex Lines
- Parallel and Perpendicular Lines

Unit 9: Graphs and Equations for Real Conics

- Parabolas--Focus and Directrix
- Ellipses and Hyperbolas--Foci and Eccentricity

Unit 10: 2x2 Linear and Non-linear Systems of Equations

- Solutions of Systems
- Intersection of Lines
- Intersections of Conics
- Equations With Restricted Domains--Lines, Segments, and Rays

Unit 11: Higher Order Linear Systems and Determinants

- Row-Reduced Echelon Form
- Determinants
- Solving Linear Systems--Unique Solutions
- Solving Linear Systems with Parametric Solutions

Unit 12: Matrix Algebra Overview and Applications

- Scalar Multiplication and Matrix Addition
- Matrix Multiplication
- Trace, Transpose, and Hermitian Conjugate
- Matrix Inverses
- Eigenvalues and Eigenvectors Introduction
- Commutators

Applications List:

Unit 1:

0: Speed of lightning
1: SeeSaw Balance
1: Budget before taxes
1: The Tortoise and Hare
2: Hooke's Law
2: Infusion Rate
2: What do I need to make?
2: Plant Growth
2: Saving for Laptop
2: What selling price?
3: Better Delivery App
3: Chemistry Mixture
3: Seesaw Revisited
3: Switching Operating Systems
3: Bonus on Bonus
3: Investing in Stock Market
3: Real Cost Of College
3: Supply and Demand
3: Trains Passing
4: Cost of Improving Employee Retention

Unit 2:

0: Volumes from High School Geometry
1: Break-Even Point
1: Width of a Sidewalk
1: Throwing a ball
2: Satellite Dish Focus
2: Difference of Squares
2: Difference of Powers
2: Sum Of Odd Powers
2: Sum of an Arithmetic Sequence
3: A Surprising Pythagorean Connection
3: Lots of Money
4: Springs
4: Logistic Model
4: Logistic Model Continued
4: Stopping Your Car

Unit 3:

0: Average Cost of Production
0: Making Up Zeros
1: Average Speed
1: Diluting an IV
1: Three pipes
2: A Rectangle In a Triangle

2: City Traffic
2: Effect of a Current
2: Working Together
3: Effectiveness of Armor
3: Distribution Efficiency Ratios
3: Harmonic Bundles In Art
4: Cassegrain Telescope Optics
4: Partial Fractions 1
4: Partial Fractions 2

Unit 4:

0 A Ladder on a Wall
1 Some Rotations With Complex Numbers
1 Sound and Phasors
1 Sum of Squares
1 Two Wires
2 A World of Mean Numbers
2 AC Current
2 Area of a Triangle, Imaginary Part of the Dot Product
2 Crossing a River
3 Illumination, the Real Part of the Dot Product
3 Partial Fractions 2.1
3 Partial Fractions 2.2
4 Quaternions Part 1
4 Quaternions Part 2
4 The Spider and the Fly

Unit 5:

0 Sum and Product of Roots of a Quadratic Equation
0 Your Mind's in the Gutter
1 Dual-Compartment Storage Layout
1 Hotel Optimization
2 Airline Optimization
2 Width of a Track
2 Throwing a Ball, Part 2
3 Partial Fractions 3.1
3 Partial Fractions 3.2
3 True Definition of Discriminant
3 Cauchy Schwarz Inequality
4 Lagrange Interpolation 1
4 Lagrange Interpolation 2
4 Range of a Quadratic Fractional Transformation
4 Minimizing a 2 Variable Quadratic Function

Unit 6:

0 Volume of a Cone
1 Volume of a Box
1 The Bend in a Beam

2 Buoyancy
3 Lexicographic Monomial Order
3 Multivariable Division
3 The Euclidean Algorithm
4 Affine Shift Cryptography
4 The Euclidean Algorithm for Polynomials

Unit 7:

1 Benford's Law
1 Exponential Growth
1 Logistic Growth
1 Radioactive Decay
1 The Prime Number Theorem
2 Compound Interest-Student Loans
2 Computing Large Exponents
2 Newton's Law of Cooling
2 Sum of a Geometric Sequence
2 The Present Value of Money
3 Annuities
3 Discovering a Power Law
3 Mortgages
3 Stirling's Approximation
4 Shannon Entropy

Unit 8:

0 Midpoint and Distance Formulas
0 Parametric Equation for a Line Segment
1 Aiming A Billiards Shot
1 Midsegment of a Triangle
1 Parallelogram Squared Lengths
1 Perpendicular Bisector
2 Distance Between Parallel Lines
2 Distance from a Point to a Line
2 Reflecting a Point About a Line
2 Varignon's Quadrilateral Theorem
3 Triangle Altitudes
3 Triangle Medians
3 Triangle Perpendicular Bisectors
4 Circle Through Three Points
4 The Euler Line

Unit 9:

0 Kidney Stones Shockwave Treatment
1 A Semi Truck Overpassing
1 Focused Ears Play Tricks
1 Cassegrain Telescopes
1 Tangent Line to Circle
2 Complex Equation of a Circle
2 Conics With an xy-term
2 Directrix of an Ellipse
2 Tangent Slope to a Parabola no algebra skip

2 Tangent Slope to an Ellipse with algebra skip
2 Tangent Slope to an Hyperbola with algebra skip
2 Hyperbolic Triangulation
3 The Radical Axis of Two Circles
4 Complex Equation of a Hyperbola
4 Complex Equation of an Ellipse

Unit 10:

1 Area and Perimeter
1 Cutting Across the Grass
1 Radio Signal Reception
1 Restaurant Planning
1 Stocks and CDs
2 Algebraic Group Law on the Circle
2 Apogee and Perigee
2 Markov Chains and Market Share
2 Rational Points on a Parabola
3 Group Law on an Elliptic Curve
3 Rational Points on an Ellipse, One Square Denominator
4 Pascal's Mystic Hexagon
4 Rational Points on a Hyperbola, no denominator squares
4 Recursive Sequences With Constant Coefficients
4 Recursive Sequences With Constant Coefficients 2

Unit 11:

0 Balancing Chemical Equations (not randomized)
1 A Bake Sale
1 Kirchhoff's Laws
1 Solving Multiple Linear Systems With the Same Matrix
1 Three Investments
2 Area of a Triangle 1
2 Area of a Triangle 2
2 Volume of a Parallelepiped
3 Partial Fractions 4.1
3 Partial Fractions 4.2
3 Polynomial Fitting 1
3 Polynomial Fitting 2
4 Cofactor Expansion 1--A Line
4 Cofactor Expansion 2--A Plane
4 Cofactor Expansion 3--A Conic

Unit 12:

0 Inverse of a 2x2 Matrix
1 Population Growth
1 Complex Numbers as Real Matrices
2 A Particular Inverse
2 An Open Input-Output Model
2 A Closed Input-Output Model
2 Quaternions as Complex Matrices
3 Best Fit Solution 1

3 Best Fit Solution 2
3 Square Root of a Matrix
3 Affine Shift Cryptography 2
4 Connection With Linear Fractional Transformations 1
4 Connection With Linear Fractional Transformations 2
4 Connection With Linear Fractional Transformations 3
4 Octonions As Quaternion Matrices