	WESTERN OREGON UNIVERSITY **Course Syllabus Math 111**

Course Name: College Algebra

Term: Fall Semester, 2021-22	**Class Days:** Monday-Thursday	**Class Time:** **9:05-10:02 a.m.**	**Class Location:** Room 804	**Credit Hours: 4**
Teacher: AJ Rise		**Phone:** 541-369-3485	**Email:** aj.rise@centrallinn.k12.or.us	

OFFICE HOURS

Before or after school. I will get to the school around 7:00 AM and leave around 5:00 PM daily. No appointment necessary, just stop by :).

COURSE DESCRIPTION

Math 111 College Algebra:

Study of linear, polynomial, rational, exponential, logarithmic and power families of functions; representation of these functions symbolically, numerically, graphically and verbally; develop regression and modeling for these function families; use of inverse functions symbolically, numerically, graphically and verbally; and a rudimentary study of complex numbers.

COURSE STANDARDS

Standard 1	**Objectives**	
Sets, Intervals, Features of Function Graphs, Average Rate of Change, Difference Quotient, Continuity	1.1	Use set builder notation
	1.2	Use interval notation
	1.3	Identify intervals where a function is increasing, decreasing, or constant
	1.4	Compute the average rate of change over an interval
	1.5	Compute the difference quotient of a function
	1.6	Identify functions as continuous or not
	1.7	Identify a point of discontinuity
	1.8	Find extrema using the graph of a function

Standard 2	Objectives	
Piecewise Functions	2.1	Evaluate piecewise functions
	2.2	Graph piecewise functions

Standard 3	Objectives	
Graph Transformations & Symmetry	3.1	Identify and perform transformations in function notation
	3.2	Understand how transformations affect properties of functions
	3.3	Know the parent functions: $f(x) = x, x^2, x^3, \ldots x^n$ for n a natural number $f(x) = \lvert x \rvert$, $f(x) = \sqrt{x}$, $f(x) = \frac{1}{x}$ $f(x) = ab^x$, $f(x) = \log_b x$
	3.4	Graph functions using transformations of the parent functions
	3.5	Prove whether or not a function is even, odd, or neither
	3.6	Understand the symmetry involved in even and odd functions

Standard 4	Objectives	
Polynomials (General)	4.1	Find the degree and leading coefficient of a polynomial
	4.2	Understand the relationship between the degree of a polynomial and the number of x-intercepts and turning points
	4.3	Understand how the leading coefficient and degree affect the tail end behavior of polynomials and find the tail end behavior
	4.4	Use the Division Algorithm to rewrite polynomials as products and sums of ``lesser'' polynomials
	4.5	Perform long and synthetic division
	4.6	Understand and use the Remainder Theorem

Standard 5	Objectives	
Polynomials **(Roots/Zeros)**	5.1	Understand and use the Factor Theorem
	5.2	Understand and use the concept of Complete Factored Form of a polynomial
	5.3	Use zeros, multiplicity, and behavior near zeros to graph polynomials in complete factored form
	5.4	Use the Rational Roots/Zeros Test in conjunction with long or synthetic division to write polynomials in complete factored form
	5.5	Understand the Fundamental Theorem of Algebra and what it implies about the number of roots of a polynomial
	5.6	Understand and use the Conjugate Roots Theorem
	5.7	Completely factor any polynomial
	5.8	Find examples of polynomials satisfying specific conditions
	5.9	Solve polynomial equations
	5.10	Solve polynomial inequalities: graphically and algebraically

Standard 6	Objectives	
Rational Functions	6.1	Find vertical and horizontal asymptotes
	6.2	Find the domain of a rational function
	6.3	Find examples of rational functions satisfying specific conditions
	6.4	Graph rational functions by hand including horizontal/vertical asymptotes and holes
	6.5	Find basic features of a rational function

Standard 7	Objectives	
Power Functions	7.1	Solve equations that involve any power of x
	7.2	Solve radical equations: index 3 or higher
	7.3	Graph power functions

Standard 8	Objectives	
Function Operations	8.1	Find the domain of sum, difference, product, quotient, and composite functions
	8.2	Evaluate sum, difference, product, quotient, and composite functions algebraically
	8.3	Evaluate sum, difference, product, quotient, and composite functions using tables and graphs
	8.4	Find sum, difference, product, quotient, and composite functions

Standard 9	Objectives	
Inverses	9.1	Understand that an inverse undoes the actions of its inverse
	9.2	Determine whether a function is one-to-one
	9.3	Determine whether a function is invertible
	9.4	Use the Horizontal Line Test
	9.5	Understand the relationship between the domain and range of a function and its inverse
	9.6	Determine whether two functions are inverses of each other
	9.7	Find the inverse of a given function
	9.8	Find the graph of the inverse function using the graph of the original function

Standard 10	Objectives	
Exponential Functions	10.1	Recognize whether or not data is exponential
	10.2	Understand the relationship between the base and increasing or decreasing the input by 1
	10.3	Know the graphs/properties of f(x)=ab^x for b>1 and 0<b<1
	10.4	Graph exponential functions using transformations
	10.5	Determine whether data/a function is exponential growth or decay

Standard 11	Objectives	
Logarithmic Functions	11.1	Understand the relationship between b^x and
	11.2	Find the domain of a logarithmic function
	11.3	Convert from exponential form to logarithmic form and vice versa
	11.4	Know the common logarithm and the natural logarithm
	11.5	Know the graphs/properties of log_b(x) for b>1
	11.6	Graph logarithmic functions using transformations
	11.7	Simplify logarithmic statements using the base to rewrite the expression inside the logarithm
	11.8	Know and use the properties of logarithms
	11.9	Use the change of base formula

Standard 12	Objectives	
Exponential and Logarithmic Equations	12.1	Solve logarithmic and exponential equations using the appropriate base
	12.2	Solve exponential equations using the common logarithm or natural logarithm and properties of logarithms
	12.3	Solve logarithmic equations using exponentials and properties of logarithms
	12.4	Understand that solutions should be checked to make sure that they lie within the domain of the original equation

Standard 13	Objectives	
Modeling	13.1	Solve problems involving direct variation
	13.2	Model with piecewise functions
	13.3	Model with rational functions
	13.4	Solve applications/problems involving variation
	13.5	Model with power functions
	13.6	Compound interest for compounding annually, n times a year, and continuously
	13.7	Construct a model given the half-life of a substance with and without the formula
	13.8	Solve word problems modeled by exponentials and logarithms
	13.9	Understand the difference between interpolation and extrapolation.

Standard 14	Objectives	
Regression	14.1	Use linear regression to model a situation
	14.2	Use quadratic regression to model a situation
	14.3	Use cubic and quartic regression to model a situation
	14.4	Use power regression to model a situation
	14.5	Use exponential regression to model a situation
	14.6	Use logarithmic regression to model a situation
	14.7	Use logistic regression to model a situation
	14.8	Determine which type of regression best models a set of data from: linear, quadratic, cubic, quartic, power, exponential, logarithmic, and logistic regression

REQUIRED TEXTS

***College Algebra and Trigonometry*, 7th edition, Aufmann, Barker, and Nation, 2011**

- You will check out a copy of this book from the CLHS Library in the first week of school. Once checked out, you are responsible to keep track of and take care of the book for the entire year. Fines may apply for damaged or lost books in accordance with library policy.

CLASSROOM POLICIES

ASSESSMENT BASED-LEARNING

Willamette Promise Math courses are Assessment-Based Learning credit, which means that students will receive college credit if their instructor and the Western Oregon University faculty determine that their work meets the standards set by the program. Students will not receive credit if their work does not meet standards, or if they choose to not transcribe the grade they received.

COLLEGE-LEVEL CONTENT

Curriculum for this course is determined by the Western Oregon college faculty that oversees this Willamette Promise course. In college, students are expected to have mastered the prerequisite material. As such, assessment questions are written with the assumption that prerequisites have been satisfied. If you are struggling with prerequisite material, please reach out to your teacher for help.

GRADING POLICY:

High School Grade

(30%) **Homework quizzes.** We will have homework assignments corresponding to nearly every lesson. You will not be responsible to turn in these assignments - however, we will have a weekly timed quiz on the content of those assignments. The expectation is that you make use of the homework assignments as you need to be prepared for the quizzes, which will, in turn, prepare you for the college assessments. *There will be no retakes of homework quizzes, and you will not be allowed any notes.* Typical homework quizzes will take 10-15 minutes, and take place on the last day of class during the week.

(30%) **Labs.** These are activities that we will do mostly in class (that you will possibly finish up at home). Typically, most problems will be graded on effort, and one problem will be chosen at random to be graded on accuracy. The purpose of labs is to go in-depth on particular concepts, and give you a chance to explore this rich area of mathematics. *Labs must be turned in by the prescribed due date. I will not accept any late assignments in this course.* Feel free to talk to me if you need an extension - which I can give on a limited basis for legitimate reasons.

(40%) **Tests.** These are the same assessments that will determine your college grade (see below). They will consist of a series of **unit tests** and a **final exam** given at the end of the semester. Per university policy, retakes are not an option on these tests. You will also not have access to any notes. It is therefore your responsibility to be prepared to exceed expectations on these assessments on the day they are given. The primary purpose of the homework quizzes and labs is to ensure such preparedness. *Note: This score is identical to your "college grade."*

College Grade

College Grade is determined by the 30 assessment questions only, distributed between unit tests and a final exam at the end of the semester.

- **There will be no exam retakes for college credit.**

- Percent Scores for each question are as follows:
  4 ↔ 100%, 3 ↔ 85%, 2 ↔ 60%, 1 ↔ 10%, 0 ↔ 0%
  Every exam question is weighted identically.

- Letter grades are assigned as follows:

Mean of Percent Scores for 30 Question Assessment	**WOU Grade**
(93, 100)	A
[90, 93)	A-
[86, 90)	B+
[83, 86)	B
[80, 83)	B-
[76, 80)	C+
[73, 76)	C
[70, 73)	C-
[66, 70)	D+
[63, 66)	D
[60, 63)	D-
[0, 60)	F

Your college grade will only be recorded on your college transcript if you earn a C or better. A grade of D or F will not be recorded on your college transcript or result in college credit.

ATTENDANCE AND OTHER POLICIES

The best part of college is your freedom. You can eat whatever you'd like, study as much as you want, pay as much attention in class as you'd like, etc. The hardest part of college is also your freedom, because you still have to make all the right decisions. In this class, you will make good choices, because you will not succeed if you do not. Therefore, the following guidelines are the expectations that I expect you to adhere to in this class:

- Act with the utmost decency, respect, and kindness towards *yourself*, your classmates, and me, at all times, in and out of class. I expect myself to follow the same standard - if you see me deviate from this, please talk to me about it.
- Follow all existing COVID-19 safety guidelines.

- Turn in any assignments and assessments on time. I will not accept late work in this course.

Everything else is your decision and responsibility.

WOU POLICIES

DISABILITY ACCOMMODATIONS:
WOU values diversity and inclusion; we are committed to fostering full participation for all students. Please notify your instructor if there are aspects of the instruction or design resulting in barriers to your participation. Disability related accommodations are determined through the Office of Disability Services (ODS).

Students with disabilities are encouraged to contact both your instructor and the Office of Disability Services, APSC 405, or at 503-838-8250. Please keep in mind that accommodations are not retroactive and should be discussed as early as possible in the term. For more information, please contact: Casie Moreland, Willamette Promise Manager at 503-540-4420 or Casie.Moreland@wesd.org.

VETERANS' ACCOMMODATIONS
Western Oregon University recognizes that those who are actively serving in the Reserves or National Guard of the United States are required by their military contract to attend mandatory training. If you will be absent due to military orders, I strongly encourage you to communicate that with me as soon as possible so we may discuss alternative arrangements.

ACADEMIC INTEGRITY:
Students must adhere to WOU's Code of Student Responsibility. Academic dishonesty will not be tolerated in this course. Any student who violates the policy will receive 0 points on the assignment, and MAY also be given a failing grade for the course. Examples of inappropriate behavior include doing assigned work for another student, sharing answers on work assigned to be done individually, copying answers during an exam, sharing exam questions or answers, or portraying another person's writing as your own. If you have questions about what might be considered inappropriate, please contact Casie Moreland, Willamette Promise Manager at 503-540-4420 or Casie.Moreland@wesd.org.

TENTATIVE SCHEDULE

This course will be completed over the course of the first semester (9/7/21-2/1/22). In general, we will follow a pace that is best suited to your learning – thus, we may spend more or less time on topics than outlined here. However, this schedule will give you a sense of the topics we will be covering throughout the term. Course standards are referenced by numbering (For instance, "1.1" corresponds to the standard "Use set builder notation on page 1).

Week 1 (9/7-9/10)

Begin Unit 1: Sets, Intervals, Features of Function Graphs

- 1.1, 1.2, 1.3

Week 2 (9/13-9/17)

Continue Unit 1: Rate of change, difference quotient, continuity

- 1.4, 1.5, 1.6, 1.7, 1.8

- 13.1, 13.4, 13.9

Week 3 (9/20-9/24)

Complete Unit 1: Piecewise functions, and parent functions

- 2.1, 2.2
- 3.3, 13.2

Week 4 (9/27-10/01)

Unit 2: Transformations of parent functions

- 3.1, 3.2, 3.4

Week 5 (10/4-10/8)

Complete Unit 2, Begin Unit 3: Basic Polynomial behavior

- 3.5, 3.6
- 4.1, 4.2, 4.3

Week 6 (10/11-10/15)

Continue Unit 3: Polynomial division and the Remainder theorem + Factor Theorem

- 4.4, 4.5, 4.6, 4.7

Week 7 (10/18-10/22)

Continue Unit 3: The Factor Theorem, Synthetic Division, Fundamental theorem of Algebra

- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6

Week 8 (10/25-10/29)

Finish Unit 3: Putting it together with Polynomials: factoring and problem-solving

- 5.7, 5.8, 5.9, 5.10

Week 9 (11/1-11/5)

Begin Unit 4: Rational functions

- 6.1, 6.2, 6.3, 6.4
- 13.3

Week 10 (11/8-11/12)

Complete Unit 4: Power functions

- 7.1, 7.2, 7.3
- 13.5

Week 11 (11/15-11/19)

Begin Unit 5: Function Operations: Sum, difference, product, quotient, composites, and inverses

- 8.1, 8.2, 8.3, 8.4, 9.1, 9.6

Week 12 (11/29-12/03)

Complete Unit 5: Inverse Functions

- 9.2, 9.3, 9.4, 9.5, 9.7, 9.8

Week 13 (12/6-12/10)

Begin Unit 6: Exponential Functions

- 10.1, 10.2, 10.3, 10.4, 10.5
- 13.6

Week 14 (12/13-12/17)

Continue Unit 6: The properties of logarithms

- 11.1, 11.3, 11.4, 11.7, 11.8, 11.9

Week 15 (1/3-1/7)

Continue Unit 6: Understanding logarithmic Functions

- 11.2, 11.5, 11.6,

Week 16 (1/10-1/14)

Complete Unit 6: Putting it together with exponential and logarithmic functions

- 12.1, 12.2, 12.3, 12.4
- 13.7, 13.8

Week 17 (1/17-1/21)

Unit 7: Modeling using functions and regression

- 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8

Week 18 (1/24-1/26)

Final exam week

- **Take the final exam for the semester.**
- Assemble portfolios, discuss any leftover content.