



Purpose: It is the intention of this Administrative-Master Syllabus to provide a general description of the course, outline the required elements of the course and to lay the foundation for course assessment for the improvement of student learning, as specified by the faculty of Wharton County Junior College, regardless of who teaches the course, the timeframe by which it is instructed, or the instructional method by which the course is delivered. It is not intended to restrict the manner by which an individual faculty member teaches the course but to be an administrative tool to aid in the improvement of instruction.

Course Title – College Algebra

Course Prefix and Number – MATH 1314

Department - MATH

Division – Math and Science

Course Type: (check one)

- Academic General Education Course (from ACGM – but not in WCJC Core)
- Academic WCJC Core Course
- WECM course (This course is a Special Topics or Unique Needs Course: Y or N)

Semester Credit Hours # : Lecture Hours # : Lab/Other Hours # 3:3:0

Equated Pay hours for course - 3

Course Catalog 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/Co-requisites – TSI satisfied in math

List Lab/ Other Hours
Lab Hours
Clinical Hours
Practicum Hours
Other (list)

Prepared by Dale Neaderhouser

Date 8-24-13

Reviewed by Department Head Dale Neaderhouser

Date 8-24-13

Accuracy Verified by Division Chair Kevin Dees

Date 8-24-13

Approved by Dean or Vice President of Instruction *gghunt*

Date 8-24-13



I. Topical Outline – Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, and clinical or other non-lecture instruction):

**Unit 1: Equations
Sections 1.1, 1.2, 1.3, 1.4, 1.5 and 1.6**

SECTION	OBJECTIVES TO COVER	EXAMPLES TO SKIP	SUGGESTED EXERCISES
1.1 – Linear Equations and Rational Equations	<ul style="list-style-type: none"> • Use the properties of equality • Solve linear equations • Solve rational equations • Solve formulas for a specific variable 	None	P. 93 – 9-59 odd, 78-81 odd
1.2 – Applications of Linear Equations	<ul style="list-style-type: none"> • Solve number problems • Solve geometric problems • Solve investment problems <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Solve break-point analysis problems • Solve mixture problems 	4, 5, 6, 7	P. 101 – 7-15 odd, 21, 23
1.3 – Quadratic Equations	<ul style="list-style-type: none"> • Solve quadratic equations using factoring and the Square Root Property • Solve quadratic equations using completing the square • Solve quadratic equations using the Quadratic Formula • Determine the easiest strategy to use to solve a quadratic equation <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Write rational equations in quadratic form and solve the equations 	9, 10, 11	P. 116 – 7-33 odd, 47-71 odd

1.4 – Applications of Quadratic Equations	<ul style="list-style-type: none"> Solve geometric problems Solve falling body problems 	3, 5, 6	P. 125 – 3, 5, 7, 15, 17
1.5 – Complex Numbers	<ul style="list-style-type: none"> Simplify imaginary numbers Perform operations on complex numbers Solve quadratic equations with complex roots 	1, 7, 8, 9, 11	P. 138 – 9-15 odd, 21-53 odd, 89-115 odd
1.6 – Polynomial and Radical Equations	<ul style="list-style-type: none"> Solve polynomial equations by factoring Solve radical equations <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> Solve other equations by factoring 	2, 7	P. 147 – 5-14 all, 25-41 odd, 47, 51, 53

Unit 2: Inequalities, Absolute Value and the Rectangular Coordinate System
Sections 1.7, 1.8, 2.1, 2.2, 2.3, and 2.4

SECTION	OBJECTIVES TO COVER	EXAMPLES TO SKIP	SUGGESTED EXERCISES
1.7 – Inequalities	<ul style="list-style-type: none"> Use the properties of inequalities Solve linear inequalities and applications Solve compound inequalities <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> Solve quadratic inequalities 	7, 8, 9, 10, 11	P. 162 – 13-51 odd, 85, 87
2.1 – The Rectangular Coordinate System	<ul style="list-style-type: none"> Plot points in the rectangular coordinate system Graph linear equations Graph vertical and horizontal lines Solve applications using linear equations Find the distance between two points Find the midpoint of a line segment 	8	P. 202 – 15-55 odd, 61-85 odd

2.2 – The Slope of a Non-vertical Line	<ul style="list-style-type: none"> • Find the slope of a line • Use slope to solve applications • Find slopes of horizontal and vertical lines • Find slopes of parallel and perpendicular lines 	None	P. 214 – 11-57 odd
2.3 – Writing Equations of Lines	<ul style="list-style-type: none"> • Use point-slope form to write an equation of a line • Use slope intercept form to write an equation of a line • Graph linear equations using the slope and y-intercept • Determine whether linear equations represent lines that are parallel, perpendicular, or neither • Write equations of parallel and perpendicular lines 	9, 10	P. 229 – 7-75 odd
2.4 – Graphs of Equations	<ul style="list-style-type: none"> • Find the x- and y-intercepts of a graph • Identify the center and radius of a circle • Write equations of circles • Graph circles <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Use symmetry to help graph equations 	1, 2, 3, 4, 7, 8	P. 250 – 11-21, 63-79, 91-103 odd

Unit 3 – Functions
Sections: 3.1, 3.2, 3.3, 3.4, and 3.5

SECTION	OBJECTIVES TO COVER	EXAMPLES TO SKIP	SUGGESTED EXERCISES
3.1 – Functions and Function Notation	<ul style="list-style-type: none"> • Understand the concept of a function • Determine whether an equation represents a function • Find the domain of a function • Evaluate a function • Graph a function by plotting points • Use the vertical line test to identify functions • Use linear functions to model applications <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Evaluate the difference quotient for a function 	5	P. 290 – 11-29 odd, 35-57 odd, 71-91 odd, 95, 97, 99
3.2 – Quadratic Functions	<ul style="list-style-type: none"> • Recognize the characteristics of a quadratic function • Find the vertex of a parabola whose equation is in standard form • Graph a quadratic function • Find the vertex of a parabola whose equation is in general form • Use a quadratic function to solve maximum and minimum problems 	None	P. 305 – 9-53 odd, 55, 67
3.3 – Polynomial and Other Functions	<ul style="list-style-type: none"> • Understand the characteristics of polynomial functions • Graph polynomial functions • Identify the intervals on which a function is increasing, decreasing, or constant <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Determine whether a function is even, odd, neither 	3, 5, 6, 7	P. 321 – 11-21 odd, 37-41 odd

<p>3.4 – Transformations of the Graphs of Functions</p>	<ul style="list-style-type: none"> • Use vertical and horizontal translations to graph functions • Graph functions involving two translations • Use reflections about the x- and y-axes to graph functions • Use vertical stretching and shrinking to graph functions • Use horizontal stretching and shrinking to graph functions • Graph functions involving a combination of transformations 	<p>None</p>	<p>P. 339 – 11-77 odd</p>
<p>3.5 – Rational Functions</p>	<ul style="list-style-type: none"> • Find the domain of a rational function • Understand the characteristics of rational functions and their graphs • Find vertical asymptotes of rational functions • Find horizontal asymptotes of rational functions • Graph rational functions <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Identify slant asymptotes of rational functions 	<p>4, 9, 10, 11</p>	<p>P. 361 – 21-43 odd, 51-61 odd,</p>

Unit 4: Function Operations and Inverses, Exponential and Logarithmic Functions
Sections 3.6, 3.7, 4.1, 4.3, 4.5, 4.6

SECTION	OBJECTIVES TO COVER	EXAMPLES TO SKIP	SUGGESTED EXERCISES
3.6 – Operations on Functions	<ul style="list-style-type: none"> Add, subtract, multiply, and divide functions specifying domains Write functions as sums, differences, products, or quotients of other functions. Evaluate composite functions Determine domains of composite functions 	10, 11	P. 378 – 11-65 odd
3.7 – Inverse Functions	<ul style="list-style-type: none"> Understand the definition of a one-to-one function Determine whether a function is one-to-one Verify inverse functions Find the inverse of a one-to-one function Understand the relationship between the graphs of f and f^{-1} 	7	P. 390 – 5-47 odd, 53, 55
4.1 – Exponential Functions and Their Graphs	<ul style="list-style-type: none"> Approximate and simplify exponential expressions Graph exponential functions Solve compound interest problems Define e and graph base-e exponential functions 	4, 7, 8	P. 425 – 15-33 odd, 81, 85, 89, 91
4.3 – Logarithmic Functions and Their Graphs	<ul style="list-style-type: none"> Evaluate logarithms Evaluate common logarithms Evaluate natural logarithms Graph logarithmic functions 	9, 10	P. 448 – 17-99 odd, 105, 107
4.5 – Properties of Logarithms	<ul style="list-style-type: none"> Use properties of logarithms to simplify expressions Use the Change-of-Base formula <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> Use logarithms to solve pH problems 	7, 8, 9	P. 468 – 11-18 all, 25-51 odd, 89-95 odd

4.6 – Exponential and Logarithmic Equations	<ul style="list-style-type: none"> • Use like bases to solve exponential equations • Use logarithms to solve exponential equations • Solve logarithmic equations <p>OPTIONAL TOPICS</p> <ul style="list-style-type: none"> • Solve carbon-14 dating problems • Solve population growth problems 	11, 12	P. 482 – 5-39 odd, 57-71 odd

Unit 5: Polynomial Equations, Systems of Linear Equations, and Matrices
Sections 5.1, 5.3, 6.1, 6.3, 6.4, 6.5

SECTION	OBJECTIVES TO COVER	EXAMPLES TO SKIP	SUGGESTED EXERCISES
5.1 – The Remainder and Factor Theorems; Synthetic Division	<ul style="list-style-type: none"> • Understand the definition of a zero of a polynomial • Use the remainder theorem • Use the factor theorem • Use synthetic division to divide polynomials • Use synthetic division to evaluate polynomials • Use synthetic division to solve polynomial equations 	None	P. 508 – 7-91 odd
5.3 – Roots of Polynomial Equations	<ul style="list-style-type: none"> • Find possible rational roots of polynomial equations • Find rational roots of polynomial equations • Find real and nonreal roots of polynomial equations 	3	P. 528 – 5-21 odd, 33, 45-49 odd
6.1 – Linear Systems	<ul style="list-style-type: none"> • Solve systems using the substitution method • Solve systems using the addition method 	1	P. 560 – 25-45 odd, 53, 57, 59, 71, 75

	<ul style="list-style-type: none"> • Solve systems with infinitely many solutions • Solve inconsistent systems • Solve systems involving three equations in three variables • Solve applications involving systems of equations <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Solve systems using the graphing method 		
6.3 – Matrix Algebra	<ul style="list-style-type: none"> • Add and subtract matrices • Multiply a matrix by a constant • Multiply matrices • Recognize the identity matrix <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Solve applications using matrices 	6, 7	P. 588 – 9-37 odd
6.4 – Matrix Inversion	<ul style="list-style-type: none"> • Find the inverse of a square matrix using row operations • Solve a system of equations by matrix inversion 	6	P. 598 – 5-17 odd, 25-31 odd
6.5 – Determinants	<ul style="list-style-type: none"> • Evaluate determinants of higher-order matrices • Understand and use properties of determinants • Use determinants to solve systems of equations <p><u>OPTIONAL TOPICS</u></p> <ul style="list-style-type: none"> • Write equations of lines • Find areas of triangles 	5, 7, 8, 9	P. 610 – 7-25 odd, 39-42 all

II. Course Learning Outcomes

Learning Outcomes	Assessment Methods
<p>Upon successful completion of this course, the student will:</p> <ol style="list-style-type: none"> 1. <u>Be able to do fundamental operations on algebraic expressions such as simplify, add, subtract, multiply, divide, or factor:</u> <ol style="list-style-type: none"> a. <u>Expressions with exponents, both integer and rational</u> b. <u>Polynomials</u> c. <u>Roots and radicals</u> d. <u>Complex numbers</u> 2. <u>Demonstrate and apply knowledge of properties of functions, including domain and range, operations, compositions, and inverses.</u> 3. <u>Recognize and apply polynomial, rational, radical, exponential and logarithmic functions and solve related equations.</u> 4. <u>Apply graphing techniques.</u> 5. <u>Evaluate all roots of higher degree polynomial and rational functions.</u> 6. <u>Recognize, solve and apply systems of linear equations using matrices.</u> 	<ol style="list-style-type: none"> 1. <u>Hour exam and department final.</u> 2. <u>Hour exam and department final.</u> 3. <u>Hour exam and department final.</u> 4. <u>Hour exam and department final.</u> 5. <u>Hour exam and department final.</u> 6. <u>Hour exam and department final.</u> <p>Outcomes assessed by:</p> <p>Hour exams Final Short Answer Discussion Board</p>

III. Required Text(s), Optional Text(s) and/or Materials to be Supplied by Student.

College Algebra by David Gustafson and Jeffrey Hughes, 11th edition 2013, Cengage (required)
 Calculator (instructor’s discretion)

IV. Suggested Course Maximum - 35

V. List any specific spatial or physical requirements beyond a typical classroom required to teach the course.

Students must have computer access to the WCJC website, their WCJC student email and online accounts. WCJC has open computer labs, with internet access, on all campuses for students to use.

VI. Course Requirements/Grading System – Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course.

Grading System:

- | | |
|---|--------|
| a. Average of one hour exams | 40-85% |
| b. Daily participation, quizzes, extra credit | 0-15% |
| c. Homework grade | 0-20% |
| d. Comprehensive Department Final | 15-30% |

Or grading as specified by the instructor.

A= 90-100

B= 80-89

C= 70-79

D= 60-69

F= 59 and below

VII. Curriculum Checklist

- **Academic General Education Course** (from ACGM – but not in WCJC Core)
No additional documentation needed

- **Academic WCJC Core Course**
Attach the Core Curriculum Review Forms

- Critical Thinking
- Communication
- Empirical & Quantitative Skills
- Teamwork
- Social Responsibility
- Personal Responsibility

- **WECM Courses**
If needed, revise the Program SCANS Matrix & Competencies Checklist.



**Wharton County
Junior College**

Core Curriculum Review Form

Foundational Component Area: **Mathematics**

Course Prefix & Suffix: _____

Core Objective: **Critical Thinking Skills**—to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

SLO Status	Student Learning Outcome (SLO)	Learning Activity	Assessment
The SLO is:	Insert SLO (from Administrative Master Syllabi) below	Provide a brief name and description of the sample learning activity:	Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective:
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			

Department Head: _____

Date: _____



Core Curriculum Review Form

Foundational Component Area: **Mathematics**

Course Prefix & Suffix: _____

Core Objective: **Communication Skills**—to include effective development, interpretation and expression of ideas through written, oral and visual communication

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

SLO Status	Student Learning Outcome (SLO)	Learning Activity	Assessment
The SLO is:	Insert SLO (from Administrative Master Syllabi) below	Provide a brief name and description of the sample learning activity:	Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective:
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			

Department Head: _____

Date: _____



Core Curriculum Review Form

Foundational Component Area: **Mathematics**

Course Prefix & Suffix: _____

Core Objective: **Empirical and Quantitative Skills**—to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

Student Learning Outcome supporting core objective:

For each core objective, there must be at least two different methods of assessment.

SLO Status	Student Learning Outcome (SLO)	Learning Activity	Assessment
The SLO is:	Insert SLO (from Administrative Master Syllabi) below	Provide a brief name and description of the sample learning activity:	Provide a brief name and description of the sample quiz, exam, rubric, assignment, etc. for assessing the objective:
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			
<input type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input type="checkbox"/> State Mandated			

Department Head: _____

Date: _____