Wharton County Junior College

Administrative - Master Syllabus
COVER SHEET

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

Type: ACAD

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

Prepared by Dale Neaderhouser   *Date* 10/19/2012

Reviewed by department head Dale Neaderhouser   *Date* 10/19/2012

Accuracy verified by Division Chair Kevin Dees   *Date* 11-9-12

Approved by Dean of Vocational Instruction or Vice President of Instruction LAC   *Date* 12-5-12

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	- 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	- Solve number problems - Solve geometric problems - Solve investment problems **OPTIONAL TOPICS** - Solve break-point analysis problems - Solve mixture problems	4, 5, 6, 7	P. 101 – 7-15 odd, 21, 23
1.3 – Quadratic Equations	- 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 **OPTIONAL TOPICS** - 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	• Solve geometric problems • Solve falling body problems	3, 5, 6	P. 125 – 3, 5, 7, 15, 17
1.5 – Complex Numbers	• 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	• Solve polynomial equations by factoring • Solve radical equations **OPTIONAL TOPICS** • 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	• Use the properties of inequalities • Solve linear inequalities and applications • Solve compound inequalities **OPTIONAL TOPICS** • Solve quadratic inequalities	7, 8, 9, 10, 11	P. 162 – 13-51 odd, 85, 87
2.1 – The Rectangular Coordinate System	• 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	• 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	• 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	• Find the x- and y-intercepts of a graph • Identify the center and radius of a circle • Write equations of circles • Graph circles **OPTIONAL TOPICS** • 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	• 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 **OPTIONAL TOPICS** • 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	• 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	• Understand the characteristics of polynomial functions • Graph polynomial functions • Identify the intervals on which a function is increasing, decreasing, or constant **OPTIONAL TOPICS** • Determine whether a function is even, odd, neither	3, 5, 6, 7	P. 321 – 11-21 odd, 37-41 odd

3.4 – Transformations of the Graphs of Functions	• 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	None	P. 339 – 11-77 odd
3.5 – Rational Functions	• 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 **OPTIONAL TOPICS** • Identify slant asymptotes of rational functions	4, 9, 10, 11	P. 361 – 21-43 odd, 51-61 odd,

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	• 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	• 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	• 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	• 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	• Use properties of logarithms to simplify expressions • Use the Change-of-Base formula **OPTIONAL TOPICS** • Use logarithms to solve pH problems	7, 8, 9	P. 468 – 11-18 all, 25-51 odd, 89-95 odd

SECTION	OBJECTIVES TO COVER	EXAMPLES TO SKIP	SUGGESTED EXERCISES
4.6 – Exponential and Logarithmic Equations	• Use like bases to solve exponential equations • Use logarithms to solve exponential equations • Solve logarithmic equations **OPTIONAL TOPICS** • 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	• 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	• 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	• Solve systems using the substitution method • Solve systems using the addition method	1	P. 560 – 25-45 odd, 53, 57, 59, 71, 75

	• Solve systems with infinitely many solutions • Solve inconsistent systems • Solve systems involving three equations in three variables • Solve applications involving systems of equations **OPTIONAL TOPICS** • Solve systems using the graphing method		
6.3 – Matrix Algebra	• Add and subtract matrices • Multiply a matrix by a constant • Multiply matrices • Recognize the identity matrix **OPTIONAL TOPICS** • Solve applications using matrices	6, 7	P. 588 – 9-37 odd
6.4 – Matrix Inversion	• 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	• Evaluate determinants of higher-order matrices • Understand and use properties of determinants • Use determinants to solve systems of equations **OPTIONAL TOPICS** • Write equations of lines • Find areas of triangles	5, 7, 8, 9	P. 610 – 7-25 odd, 39-42 all

II. Course Learning Outcomes

Course Outcome/Objective	Assessment Method
1. Be able to do fundamental operations on algebraic expressions such as simplify, add, subtract, multiply, divide, or factor: a. Expressions with exponents, both integer and rational b. Polynomials c. Roots and radicals d. Complex numbers 2. Demonstrate and apply knowledge of properties of functions, including domain and range, operations, compositions, and inverses. 3. Recognize and apply polynomial, rational, radical, exponential and logarithmic functions and solve related equations. 4. Apply graphing techniques. 5. Evaluate all roots of higher degree polynomial and rational functions. 6. Recognize, solve and apply systems of linear equations using matrices.	1. Hour exam and department final. 2. Hour exam and department final. 3. Hour exam and department final. 4. Hour exam and department final. 5. Hour exam and department final. 6. Hour exam and department final.

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.

VI.. Outcomes/Objectives and Course Assessment:

Desired Outcomes/ Objectives (Choose one)

☒ - **WCJC Core Course**
 Include the following:
- Basic Intellectual Competencies
- Exemplary Educational Objectives
- Perspectives (attach Core Curriculum Checklist)
- Additional objectives/outcomes in space provided below.

☐ - **General Education Courses (ACGM but non-Core)**
  Include the following:
  - Objectives/outcomes in space below.

☐ - **WECM Courses**
  Include the following:
  - SCANS Competencies (attach Program SCANS Checklist)
  - WECM and other outcomes/objectives in space provided below.

Wharton County Junior College

Core Curriculum Checklist

Page 1: Competencies

Course Prefix & Number: MATH 1314

Competency	Method of Assessment
READING: Reading at the college level means the ability to analyze and interpret a variety of printed materials – books, articles, and documents.	
WRITING: Competency in writing is the ability to produce clear, correct, and coherent prose adapted to purpose, occasion, and audience.	
SPEAKING: Competence in speaking is the ability to communicate orally in clear, coherent, and persuasive language appropriate to purpose, occasion, and audience.	
LISTENING: Listening at the college level means the ability to analyze and interpret various forms of spoken communication.	
CRITICAL THINKING: Critical thinking embraces methods for applying both qualitative and quantitative skills analytically and creatively to subject matter in order to evaluate arguments and to construct alternative strategies.	Department Final Exam
COMPUTER LITERACY: Computer literacy at the college level means the ability to use computer-based technology in communicating, solving problems, and acquiring information.	

Core Curriculum Checklist

Page 2: Perspectives

Course Prefix & Number: MATH 1314	Semester Credit Hours: 3

PERSPECTIVES FOR THIS COURSE	
Perspective	Method of Assessment
1. Helped the student to establish broad and multiple perspectives on the individual in relationship to the larger society and world in which he or she lives, and understand the responsibilities of living in a culturally and ethnically diversified world.	
2. Helped stimulate the student's capacity to discuss and reflect upon individual, political, economic, and social aspects of life in order to understand ways in which to be a responsible member of society.	
3. Helped the student to recognize the importance of maintaining health and wellness.	
4. Helped the student to develop a capacity to use knowledge of how technology and science affect their lives.	Department Final Exam
5. Helped the student to develop personal values for ethical behavior.	
6. Helped the student to develop the ability to make aesthetic judgments.	
7. Helped the student use logical reasoning in problem solving.	Department Final Exam
8. Helped the students integrate knowledge from and understand interrelationships of the scholarly disciplines.	

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Page 3: **Exemplary Educational Objectives**

Component Area: **Mathematics**	
Exemplary Educational Objective	Method of Assessment
1. Apply arithmetic, algebraic, geometric, higher-order thinking, and statistical methods to modeling and solving real-world situations.	Department Final Exam (See Program Management Plan regarding statistical methods. Statistical methods are not a prerequisite and are not in the ACGM.)
2. Represent and evaluate basic mathematical information verbally, numerically, graphically, and symbolically.	Department Final Exam
3. Expand mathematical reasoning skills and formal logic to develop convincing mathematical arguments.	Department Final Exam
4. Use appropriate mathematical thinking and understanding to solve mathematical problems and judge the reasonableness of the results.	Department Final Exam
5. Interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them.	Department Final Exam
6. Recognize the limitations of mathematical and statistical models.	Department Final Exam
7. Develop the view that mathematics is an evolving discipline, interrelated with human culture, and understand its connections to other disciplines.	Department Final Exam