



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 – Calculus 1

Course Prefix and Number – MATH 2413

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 #** **4:4:0**

Equated Pay hours for course - 4

Course Catalog Description – Limits and continuity; the Fundamental Theorem of Calculus; definition of the derivative of a function and techniques of differentiation; applications of the derivative to maximizing or minimizing a function; the chain rule, mean value theorem, and rate of change problems; curve sketching; definite and indefinite integration of algebraic, trigonometric, and transcendental functions, with an application to calculation of areas.

List Lab/ Other Hours
Lab Hours 0
Clinical Hours 0
Practicum Hours 0
Other (list) 0

Prerequisites/Co-requisites – TSI satisfied in math and credit for or concurrent enrollment in MATH 1348 or 2312; or credit for college level pre-calculus; or credit for MATH 1314 and 1316; or consent of department head.

Type: ACAD

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 *ggghunt*

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, clinical or other non- lecture instruction):

<u>Week</u>	<u>Day</u>	<u>Sections:</u>	<u>Comments:</u>
1	1	1, 2	Most students need a little of this review chapter
	2	3, 4	
	3	5, 6,(7)	
2	4	1.1, 1.2	Tangent, Velocity, Limit of Function
	5	1.3	Limit Laws, Finding Limits
	6	1.4, 1.5	Def. of Limit and Continuity
	7	1.6	Tangents, Velocities, Rates of Change
3	8	REVIEW 1	
	9	>>TEST # 1>>	
4	10	2.1	Derivatives (By Definition Only)
	11	2.2	Diff. Formulas
	12	2.3	Rates of Change
	13	2.4	Derivatives of Trig. Functions
	14	2.5	Chain Rule
	15	2.6, 2.7	Implicit Diff., Higher Derivatives
	16	2.8	Related Rates
5	17	2.9	Differentials and Linear Approximations
	18	2.10	Newton's Method
	19	REVIEW 2	
6	20	>>TEST # 2>>	
	21	3.1	Max and Min Values
7	22	3.2, 3.3	Mean Value Theorem, 1 st Derivative Test
	23	3.4	2 nd Derivative. Test, Concavity, Inflection Pts.
	24	3.5	Limits at Infinity, Horizontal Asymptotes
	25	3.6	Curve Sketching
	26	3.7	Graphing with Calculus and Calculators
	27	3.8	Applied Max-Min Problems
8	28	3.10(3.9Opt.)	Antiderivatives (Applied to Economics)
	29	REVIEW 3	
	30	>>TEST#3>>	
9	31	4.1	Sigma Notation
	32	4.2	Area
	33	4.3	Definite Integral
	34	4.4	Properties of Def. Integral
10	35	4.5	Fundamental Theorem Calculus
	36	4.6	Substitution Rule
	37	REVIEW 4	
11	38	>>TEST #4>>	
	39	5.1	Areas Between Curves
12	40	5.2	Volumes
	41	5.3	Volumes by Shells
	42	5.4	Work
	43	5.5	Average Value of Functions
	44	REVIEW5	
13	45	>>TEST #5>>	
	46	6.1	Inverse Functions

	47	6.2	Derivatives of Exp. Functions.
	48	6.3	Logarithmic Functions
14	49	6.4	Derivatives of Logarithmic Functions
	50	6.5	Exponential Growth and Decay
	51	6.6	Inverse Trigonometric Functions
	52	6.7	Hyperbolic Functions
15	53	6.8	Indeterminate Forms and L'Hospital's Rule
	54	REVIEW	
	55	REVIEW	Some extra time for topics above can be taken from these review days
	56	REVIEW	
16	57	REVIEW	
	58	REVIEW	
	59	REVIEW	
		FINAL EXAM	

II. Course Learning Outcomes

Upon successful completion of this course, students will:

- A. Develop solutions for tangent and area problems using the concepts of limits, derivatives, and integrals.
- B. Draw graphs of algebraic and transcendental functions considering limits, continuity, and differentiability at a point.
- C. Determine whether a function is continuous and/or differentiable at a point using limits.
- D. Use differentiation rules to differentiate algebraic and transcendental functions.
- E. Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
- F. Evaluate definite integrals using the Fundamental Theorem of Calculus.
- G. Articulate the relationship between derivatives and integrals using the Fundamental Theorem of Calculus.
- H. Find limits for certain polynomial and rational functions.
- I. Differentiate polynomial, algebraic, and rational functions.
Differentiate trig, exponential, log and hyperbolic functions.
- J. Find antiderivatives of polynomial and algebraic functions, and all the other functions mentioned above.
Use the derivatives and graphing techniques to find the max and min, relative and absolute values of these same functions along with their zeroes using Newton's method.
- K. Evaluate definite integrals.
- L. Know the definitions of:
 1. Limit of a function
 2. A continuous function
 3. The derivative of a function
 4. The antiderivative
 5. The definite integral
 6. One to one functions and inverses of functions
- M. Be able to state and apply from memory:
 1. Rolle's Theorem
 2. The Mean Value Theorem
 3. The Intermediate Value Theorem
 4. L'Hospital's Rule

- N. Develop competency in using sigma notation
- O. Develop the ability to solve problems involving the areas under a curve
- P. Be able to calculate the area between two curves
- Q. Be able to calculate the work in problems pertaining to dynamics
- R. Be able to find volumes of solids of revolutions by all of the classical methods.
- S. Be able to solve the customary classical exponential growth and decay problems.

Methods of Assessment:

Outcomes assessed by:

Hour exams
 Final
 Short Answer
 Discussion Board

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

Calculus, 7th Edition 2011; Stewart; 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

Unit tests, class participation, and final examination
 Semester Grade: Final Examination 20-25%
 Remainder of work 75-80%
 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.



Core Curriculum Review Form

Foundational Component Area: **Mathematics**

Course Prefix & Suffix: **Math 2413**

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 (AMS)) 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 checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems. (AMS SLO E)	A word problem (application) where the student must identify variables, assemble the correct formulas and solve for the desired result. Including a brief paragraph explaining what was done.	A quiz, test or discussion board artifact showing the student's written answer. Grading for correctness and the rubric for critical thinking will assess this.
<input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Develop solutions for tangent and area problems using the concepts of limits, derivatives, and integrals. (AMS SLO A)	A written paragraph explaining the steps one takes to find the solution.	A quiz, test or discussion board artifact showing the student's written answer. Grading for correctness and the rubric for critical thinking will assess this.
<input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Determine whether a function is continuous and/or differentiable at a point using limits. (AMS SLO C)	Have the student grade an incorrect problem. The student should write a brief paragraph stating what was done incorrectly and what must be done to correct the solution.	A quiz, test or discussion board artifact showing the student's written answer. Grading for correctness and the rubric for critical thinking will assess this.



Core Curriculum Review Form

Foundational Component Area: **Mathematics**

Course Prefix & Suffix: Math 2413

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 (AMS)) 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 checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems. (AMS SLO E)	A word problem (application) where the student must identify variables, assemble the correct formulas and solve for the desired result. Including a brief paragraph explaining what was done.	A quiz, test or discussion board artifact showing the student's written answer. Grading for correctness and the rubric for communication will assess this.
<input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Develop solutions for tangent and area problems using the concepts of limits, derivatives, and integrals. (AMS SLO A)	A written paragraph explaining the steps one takes to find the solution.	A quiz, test or discussion board artifact showing the student's written answer. Grading for correctness and the rubric for communication will assess this.
<input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Use differentiation rules to differentiate algebraic and transcendental functions. (AMS SLO D)	Have the student grade an incorrect problem. The student should write a brief paragraph stating what was done incorrectly and what must be done to correct the solution.	A quiz, test or discussion board artifact showing the student's written answer. Grading for correctness and the rubric for communication will assess this.



Core Curriculum Review Form

Foundational Component Area: **Mathematics**

Course Prefix & Suffix: **Math 2413**

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 (AMS)) 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 checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Develop solutions for tangent and area problems using the concepts of limits, derivatives, and integrals. (AMS SLO A)	A problem where the student computes the solution of a given problem to the required significant digits.	A quiz, test or discussion board artifact showing the student's written answer. Grading for correctness and the rubric for EQS will assess this.
<input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Draw graphs of algebraic and transcendental functions considering limits, continuity, and differentiability at a point. (AMS SLO B)	The student graphs an algebraic or transcendental function giving correct values for limits, points of discontinuity, asymptotes and intercepts to the required number of significant digits.	A quiz, test or scanned artifact showing the student's written answer. Grading for correctness and the rubric for EQS will assess this.
<input checked="" type="checkbox"/> Existing <input type="checkbox"/> Revised <input type="checkbox"/> New <input checked="" type="checkbox"/> State Mandated	Evaluate definite integrals using the Fundamental Theorem of Calculus. (AMS SLO F)	Have the student grade an incorrect problem and show the correct work to the required significant digits.	A quiz, test or discussion board artifact showing the student's written answer. Grading for correctness and the rubric for EQS will assess this.