Wharton County Junior College

Administrative Master Syllabus

Course Information

Course Title	Calculus I
Course Prefix, Num. and Title	MATH 2413
Division	Math & Physical Sciences
Department	Mathematics
Course Type	Academic WCJC Core Course
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.
Pre-Requisites	MATH 1314 – College Algebra and MATH 1316 – Trigonometry; or MATH 2312 – Precalculus; or consent of department head
Co-Requisites	None

Semester Credit Hours

Total Semester Credit Hours (SCH): Lecture Hours: Lab/Other Hours	4:4:0
Equated Pay Hours	4
Lab/Other Hours Breakdown: Lab Hours	0
Lab/Other Hours Breakdown: Clinical Hours	0
Lab/Other Hours Breakdown: Practicum Hours	0
Other Hours Breakdown	0

Approval Signatures

Title	Signature	Date
Prepared by:	Yvonne Smith Digitally signed by Yvonne Smith DN: cn=Yvonne Smith, o=WCJC, ou=Math and Physical Science, email=smithy@wcjc.edu, c=US Date: 2020.04.22 10:17:41 -05'00'	4-22-2020
Department Head:	Yvonne Smith Digitally signed by Yvonne Smith DN: cn=Yvonne Smith, o=WCJC, ou=Math and Physical Science, email=smithy@wcjc.edu, c=US Date: 2020.04.22 10:17:53 -05'00'	4-22-2020
Division Chair:	Jennifer Mauch Digitally signed by Jennifer Mauch DN: cn=Jennifer Mauch, o=Wharton County Junior College, ou=Mathematics, email=mauchj@wcjc.edu, c=US Date: 2020.04.21 16:47:11 -05'00'	4-21-2020
Dean/VPI:	Leigh Ann collins Digitally signed by Leigh Ann collins DN: cn=Leigh Ann collins, o=WCJC, ou=VPI, email=lacollins@wcjc.edu, c=US Date: 2020.04.23 15:40:01 -05'00'	4-23-20
Approved by CIR:	Paul J. Quinn Digitally signed by Paul J. Quinn Date: 2020.04.27 13:14:52 -05'00'	12-11-19

Additional Course Information

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).

Ch. 1 - Functions and Limits
1.1 Four Ways to Represent a Function
1.2 Mathematical Models: A Catalog of Essential Functions
1.3 New Functions from Old Functions
1.4 The Tangent and Velocity Problems
1.5 The Limit of a Function
1.6 Calculating Limits Using the Limit Laws
1.7 The Precise Definition of a Limit (Optional)
1.8 Continuity

Ch. 2 - Derivatives
2.1 Derivatives and Rates of Change
2.2 The Derivative as a Function
2.3 Differentiation Formulas
2.4 Derivatives of Trigonometric Functions
2.5 The Chain Rule
2.6 Implicit Differentiation
2.7 Rates of Change in the Natural and Social Sciences
2.8 Related Rates
2.9 Linear Approximations and Differentials

Ch. 3 - Applications of Differentiation
3.1 Maximum and Minimum Values
3.2 The Mean Value Theorem
3.3 How Derivatives Affect the Shape of a Graph
3.4 Limits at Infinity; Horizontal Asymptotes
3.5 Summary of Curve Sketching
3.6 Graphing with Calculus and Calculators (Optional)
3.7 Optimization Problems
3.8 Newton's Method (Optional)
3.9 Antiderivatives

Ch. 4 - Integrals
4.1 Areas and Distances
4.2 The Definite Integral
4.3 The Fundamental Theorem of Calculus
4.4 Indefinite Integrals and the Net Change Theorem
4.5 The Substitution Rule
5.1 Areas Between Curves (Optional)

Ch. 6 - Inverse Functions: Exponential, Logarithmic, and Inverse Trigonometric Functions
6.1 Inverse Functions (Optional)
6.2 Exponential Functions and Their Derivatives
6.3 Logarithmic Functions
6.4 Derivatives of Logarithmic Functions
6.5 Exponential Growth and Decay (Optional)
6.6 Inverse Trigonometric Functions

6.7 Hyperbolic Functions (Optional)
6.8 Indeterminate Forms and l'Hospital's Rule

Course Learning Outcomes:

Learning Outcomes – Upon successful completion of this course, students will:

1. Develop solutions for tangent and area problems using the concepts of limits, derivatives, and integrals.
2. Draw graphs of algebraic and transcendental functions considering limits, continuity, and differentiability at a point.
3. Determine whether a function is continuous and/or differentiable at a point using limits.
4. Use differentiation rules to differentiate algebraic and transcendental functions.
5. Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
6. Evaluate definite integrals using the Fundamental Theorem of Calculus.
7. Articulate the relationship between derivatives and integrals using the Fundamental Theorem of Calculus.

Methods of Assessment:

Final Exam (Required)

Other Methods of Assessment:

- Hour Exams
- Homework
- Quizzes
- Short Answer
- Discussion Board
- Participation
- Projects

Required text(s), optional text(s) and/or materials to be supplied by the student:

"Calculus" by Stewart, Cengage, 8th Edition.

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.

Suggested Course Maximum:

35

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

None

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

A. Final Exam 15-30%

B. Other Course Requirements 70-85%

A = 90-100
B = 80-89
C = 70-79
D = 60-69
F = 59 or below

Curriculum Checklist:

☐**Administrative General Education Course** (from ACGM, but not in WCJC Core) – No additional documents needed.

☒**Administrative WCJC Core Course**. Attach the Core Curriculum Review Forms

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

☐**WECM Course** -If needed, revise the Program SCANS Matrix and Competencies Checklist

Wharton County Junior College

Core Curriculum Review Form

Foundational Component Area: Core 020: Mathematics

Course Prefix & Suffix: MATH 2413 – Calculus I

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
State Mandated	Evaluate definite integrals using the Fundamental Theorem of Calculus. (SLO #6)	A word problem (application) where the student must identify variables, assemble the correct formulas and solve for the desired result. A brief paragraph will be included explaining what was done.	A quiz, test, or discussion board artifact showing the student's written work. Grading for correctness and the rubric for critical thinking will assess this.
Choose a SLO status.	Insert SLO (from Administrative Master Syllabi)	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.
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Core Curriculum Review Form

Foundational Component Area: Core 020: Mathematics

Course Prefix & Suffix: MATH 2413 – Calculus I

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
State Mandated	Evaluate definite integrals using the Fundamental Theorem of Calculus. (SLO #6)	A word problem (application) where the student must identify variables, assemble the correct formulas and solve for the desired result. A brief paragraph will be included explaining what was done.	A quiz, test, or discussion board artifact showing the student's written work. Grading for correctness and the rubric for communication skills will assess this.
Choose a SLO status.	Insert SLO (from Administrative Master Syllabi)	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.
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Core Curriculum Review Form

Foundational Component Area: Core 020: Mathematics

Course Prefix & Suffix: MATH 2413 – Calculus I

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
State Mandated	Evaluate definite integrals using the Fundamental Theorem of Calculus. (SLO #6)	A word problem (application) where the student must identify variables, assemble the correct formulas and solve for the desired result. A brief paragraph will be included explaining what was done.	A quiz, test, or discussion board artifact showing the student's written work. Grading for correctness and the rubric for EQS will assess this.
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