JOLIET JUNIOR COLLEGE
1901
DEPARTMENT OF MATHEMATICS

Math 170
Calculus with Analytic Geometry I

Course Description
This is the first course in the calculus sequence. The topics include limits and an introduction to both differential and integral calculus. Several applications are studied such as area and optimization of functions. The calculus of transcendental functions is part of this course.

Illinois Articulation Initiative (IAI) number: M1 900-1; MTH 901

Credit and Contact Hours:

Lecture	**5**
Lab	**0**
Credit Hours	**5**

Prerequisites: Appropriate placement score or minimum grade "C" in MATH 139 or MATH 142 or equivalent.

Books, Supplies, and Supplementary Materials

A. **Required Textbooks**

Cengage Unlimited Subscription. WebAssign will be used for online coursework (homework, quizzes, tests, etc.) and can be accessed by logging into iCampus/Canvas and selecting this course. If you are comfortable reading the textbook on the computer, you may use the eText alone. **There is no need to purchase a physical textbook for this course; the Cengage Unlimited Subscription for the eText and WebAssign was included in your course fees. Registration instructions are posted in our iCampus/Canvas site.**

B. **Other Required Materials**

TI-83+ or TI-84+ graphing calculator or equivalent

C. **Methods of Instruction:**

Lecture, Hybrid, or Online

General Education Student Learning Outcome

1. Quantitative Literacy: Students possess the ability to reason and solve quantitative problems from an array of contexts.

Course Learning Outcomes (CLOs)

1. Analyze problems using limit techniques.
2. Analyze problems using differentiation techniques.
3. Analyze problems using integration techniques.

Lesson Learning Outcomes (LLOs)

1. Explain the concept of an "average rate of change" and an "instantaneous rate of change."
2. Understand the precise definition of a limit and use the graphing calculator to give epsilon-delta demonstrations of the existence of a limit at a point.
3. State the definition of "continuity" and use it to demonstrate the continuity of a function at a point or over an interval.
4. Define a derivate and use it to develop rules for calculations of a derivative.
5. Calculate one-sided and two-sided limits and limits at infinity.
6. Find limits of trigonometric functions.
7. Understand the Squeeze Theorem for limits and demonstrate its use.
8. Use the rules of differentiation such as the rule for power functions, product rule, quotient rule, and rule for composite functions (chain rule) and differentiate expressions with fractional exponents.
9. Use derivatives to find instantaneous velocities and accelerations.
10. Differentiate implicit functions; find equations of tangents to implicit functions.
11. Calculate the linear approximation of a given function and maximum error.
12. Apply Newton's method to find approximations to zeros.
13. Solve problems of related rates.
14. Find critical numbers and understand their role in finding relative extrema.
15. Test for concavity.
16. Use intercepts, asymptotes, relative extrema, and concavity to graph functions.
17. Use the various forms of L'Hopital's rule to solve indeterminate forms of limits.
18. Use and understand the various forms of the mean value theorem.
19. Use the indefinite integral to solve initial value problems such as motion problems and exponential growth or decay.
20. Calculate the area under a curve using the definite integral.
21. Use the Mean Value Theorem for Definite Integrals in the evaluation of Riemann Sums.
22. State and apply the Fundamental Theorem of Integral Calculus.
23. Integrate by substitution.
24. Use numerical methods such as the Reimann Sums to approximate definite integrals and understand some aspects of error estimation.
25. Apply definite integrals to find areas bounded by curves.
26. Explain the inverse relationship between derivatives and integrals.
27. Understand the role of e in exponential growth problems such as cell division or continuing compounding.
28. Develop and use derivative formulas for hyperbolic functions and their inverses.

Final Course Grading Scale

Grade	Percentage
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	lower than 60%

Faculty Commitment

Faculty members are committed to providing a quality learning experience through thoughtful planning, implementation, and assessment of course activities. They are also committed to being readily available to students throughout the semester by returning e-mails and phone calls within 48 hours and to returning graded course work within a week. Furthermore, they are committed to selecting appropriate course materials and making them available in an organized and timely manner.

Student Commitment

For every credit hour a student is enrolled in, they should expect to spend at least 2 hours outside of class studying, working on assignments, and preparing for class each week of the fifteen-week semester. For example, for this five credit-hour class, students can expect to spend five hours per week in class actively engaged in learning the material by participating in face-to-face classes or viewing lectures and instructional material online. In addition, students should expect to spend another ten hours per week outside of class completing homework and assignments, posting to discussion boards online, or studying for quizzes and tests. This means students should spend a minimum of 15 hours per week engaged in achieving the learning outcomes for this course. If you are not achieving your desired results in this class, you should consider increasing your prep time outside of class, in addition to using available resources such as instructor office hours and tutoring services.

By registering for this course, you commit yourself to active participation in course activities as well as the submission of all assignments and exams on time. Furthermore, you commit to accessing the course site and checking your JJC e-mail several times a week.