



Dept. of Mathematics

Math 170 Calculus w/Analytic Geometry I Spring 2018

Instructor's Name:

Office Location:

Office Hours:

Office Phone:

E-mail:

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

Credit and Contact Hours:

Lecture 5

Lab 0

Credit Hours 5

Prerequisites: Satisfactory placement test score or "C" or better in MATH 138 and MATH 139 or MATH 142 or equivalent.

Books, Supplies, and Supplementary Materials

A. Textbooks

Required: Calculus Early Transcendentals w/Quick Reference Card, 8th Ed., 2015; Stewart, ISBN: 9781285741550, Cengage

or Calculus Early Transcendentals, 8th Ed. (Single Variable), 2015 Stewart, ISBN: 9781305270343

WebAssign software available

Single Variable Calculus student solutions manual (optional),

Stewart, ISBN: 9781305272422, Cengage

Multivariable Calculus student solutions manual (optional),

Stewart, 978130527182, Cengage

B. Other Required Materials

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

Methods of Instruction:

Lecture

Online

Student Learning Outcomes: General Education Student Learning Outcomes:

Students will demonstrate the ability to accurately apply correct mathematical methods and techniques in various applications such as applied sciences, theoretical mathematics, physics, natural sciences and other applied sciences.

Objectives

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 derivative 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’Hôpital’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 a 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 Riemann 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 that transcendental functions play in the modeling of real world problems
28. Understand the role of e in exponential growth problems such as cell division or continuing compounding
29. Develop and use derivative formulas for hyperbolic functions and their inverses

TOPICAL OUTLINE

Based on a 16 week semester with 48 lectures of 90 minutes

No. Lessons	Topics
6	Review of Precalculus <ol style="list-style-type: none">1. Functions: Polynomial; Power, Rational; Trigonometric; Exponential; Logarithmic2. Inverse functions, transformation of functions, composition of functions
8	Develop Limits and Derivatives <ol style="list-style-type: none">1. Introduce tangent and velocity2. Limit of a function, Limit laws3. Precise definition of a limit4. Continuity5. Limits at Infinity6. Application of derivatives as rates of change7. The derivative function
11	Differentiation <ol style="list-style-type: none">1. Derivatives of Functions: Polynomial; Exponential; Trigonometric; Logarithmic; Hyperbolic2. Product, Quotient and Chain Rule3. Implicit Differentiation4. Related Rates5. Linear Approximation and Differentials6. Physical Application to Rates of Change in the Natural and Social Sciences and Exponential Growth and Decay
9	Applications of Derivatives <ol style="list-style-type: none">1. Maximum and Minimum Values2. Rolle's Theorem and Mean Value Theorem3. L'Hospital's Rule for Limits4. Graphing Functions using First and Second Derivatives5. Optimization Applications6. Newton's Method to Approximate Zeros of a Function7. Antiderivatives
7	Integrals <ol style="list-style-type: none">1. Area and Distance2. The Definite Integral3. The Fundamental Theorem of Calculus4. Indefinite Integrals5. The Net Change Theorem6. Integration using the Substitution Method7. Application to Area between Graphs and the Average Value of a Function
7	Seven days to allow for exams and leeway.

Graded Assignments and Policies

Graded Assignments

In class Quizzes	0 – 20%
Participation	0 - 5 %
Projects	0 – 20%
Homework	0 – 30%
Tests	50 - 85%
Final	15 – 30%

Grading Policy

The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly.

Each instructor will set minimum standards for performance on tests.

Major Tests and Quizzes

The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly. Each instructor will set minimum standards for performance on tests. A comprehensive final examination will be given.

Classroom Policies and Procedures

General Information

Attendance Policy

Make-up Policy

Extra-credit Policy

Final Exam Information

A comprehensive final examination will be given.

Academic Honor Code

The objective of the academic honor code is to sustain a learning-centered environment in which all students are expected to demonstrate integrity, honor, and responsibility and recognize the importance of being accountable for one's academic behavior.

College Statement about grades of "F" and Withdrawal from Class

Students may withdraw from a course by processing an add/drop form during regular office hours through the Registration and Records Office at Main Campus or Romeoville Campus, or by phone at 815-744-2200. Please note the withdrawal dates listed on your bill or student schedule. Every course has its own withdrawal date. Failure to withdraw properly may result in a failing grade of "F" in the course.

At any time prior to the deadline dates established, an instructor may withdraw a student from class because of poor attendance, poor academic performance or inappropriate academic behavior, such as, but not limited to, cheating or plagiarism.

Intellectual Property

Students own and hold the copyright to the original work they produce in class. It is a widely accepted practice to use student work as part of the college's internal self-evaluation, assessment procedures, or other efforts to improve teaching and learning and in promoting programs and recruiting new students. If you do not wish your work to be used in this manner, please inform the instructor.

Student Code of Conduct

Each student is responsible for reading and adhering to the Student Code of Conduct as stated in the college catalog.

Sexual Harassment Joliet Junior College seeks to foster a community environment in which all members respect and trust each other. In a community in which persons respect and trust each other, there is no place for sexual harassment. JJC has a strong policy prohibiting the sexual harassment of one member of the college community by another. See the Catalog or Student Handbook.

Student Support <http://jjc.edu/services-for-students/pages/default.aspx>

- a. Disability Services: <http://www.jjc.edu/disability-services/Pages/default.aspx>.
Student Accommodations and Resources (StAR): If you need disability-related accommodations, specialized tutoring, or assistive technology in this class, if you have emergency medical information you wish to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class. New students should request accommodations and support by scheduling an appointment with the Student Accommodations and Resources (StAR) Office, Campus Center 1125, (815) 280-2230.
- b. Tutoring: <http://jjc.edu/tlc/Pages/default.aspx>
- c. Counseling and Advising: <http://www.jjc.edu/counselingadvising/Pages/default.aspx>
- d. Academic Resources: <http://www.jjc.edu/academic-resources/Pages/default.aspx>
- e. Support Programs and Services:
<http://www.jjc.edu/support-programs-services/Pages/default.aspx>
- f. Technology Support: <http://jjc.edu/services-for-students/Pages/technology-support.aspx>
- g. My Degree Progress: My Degree Progress is a computerized system to track a student's progress toward graduation. The report indicates every course and places these courses into their appropriate category as a General Education, Major Course, or Elective, according to the degree requirements. This tool is useful for preparing before an advising appointment, for planning, for registering, and for checking that the student is on track for graduation. <https://eresources.jjc.edu>

*** Instructor reserves the right to modify, add to or change the syllabus. Any changes to the syllabus or schedule will be announced in class.**

Prepared by:

Reviewed by:

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Prof. Jean McArthur
Department Chair

Date

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