# COLLEGE OF DUPAGE

# COURSE SYLLABUS Spring 2012

## MATH 2231 section 002; Calculus I 5 credit hours

## IAI Course Code for General Education: M1 900-1

### **Instructor:** Beatrice Jaynes

**Instructor Information**

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| First Name: Beatrice | Last Name: Jaynes |
| Office Location: B IC3631J | E-Mail Address: jaynes@cod.edu |
| Contact Telephone: 630-942-2062 | Instructor Web Page: |

**Office Hours**:

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Monday: |  | Tuesday: |  | Wednesday: |  | Thursday: |  | Friday: |  |
| 11:30-1:50 |  | 8:30-9:20 |  | 11:30-1:50 |  | 8:30-9:20 |  |  |  |
|  |  | 12:30-1:50 |  |  |  | 12:30-1:50 |  |  |  |
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**Catalog Description**

Lines, circles, functions, limits, continuity, the derivative, rules for differentiation of algebraic, trigonometric, and the transcendental functions, related rates, mean value theorem, optimization and curve sketching, differentials, Newton's method, antiderivatives and integration, and the fundamental theorem of calculus.

**Prerequisites and Compliance Criteria**

Math 1431 with a grade of C or better and Math 1432 with a grade of C or a qualifying score on the mathematics placement test or a qualifying ACT Math score

**Course Materials**

Calculators: Generally, you will take your exams and quizzes without a calculator, although you will need a scientific calculator for parts of this course. Graphing calculators such as a TI82 or TI83 or symbolic manipulator calculators will not be allowed at all.

**Required Texts**

Calculus, by Larson, Hostetler & Edwards, Ninth Edition Houghton Mifflin

**Days to Remember**

1/16 no classes

In-service day 3/9 no classes

Spring Break 4/2 to 4/8

Last Day of Classes 5/4

Final Exam 5/9 9:00 – 10:50

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**Attendance**: If you find that you must be absent, you must take the responsibility for finding out what you missed from a classmate. You are not excused from class expectations because of absence. If you need to contact me for missed classes, please do so in person if possible or by phone during my office hours. E-mail is not a effective form of communication for this.

**Homework**

Homework is an essential part of this course and will be assigned every class period. At the beginning of each class, a reasonable amount of time will be spent answering questions on the homework assignment due that day. If you have questions on material prior to that, or if you have questions that were not answered in class, you should plan to see me outside of class for some extra help.

**General:** In grading your exams and quizzes, your method of solution will be evaluated. A correct method will receive partial credit. An incorrect method (or no work at all) will receive no credit even if the answer is correct. You work must be organized and readable. If I can’t read or follow your work, you will not receive credit for the problem.

**Quizzes** Your quiz grade will be based on the 5 best of 6 twenty point quizzes. Some of these quiz grades might be replaced with assignments that you hand in at my discretion. The quizzes will be similar to recent homework problems. Make-up quizzes will not be given. If you miss a quiz or assignment due to absence you will receive a zero

Quiz schedule: Quiz 1: Jan 25th

Quiz 2: Feb 17th

Quiz 3: March 12th

Quiz 4: March 21th

Quiz 5: April 18th

Quiz 6: May 2st

**Examinations**

Exams: There will be four hour exams, and a final. If you are absent on the day an hour exam is given, you will get a zero on that exam. Make-up tests will not be given. However, the lowest of the four exam grades will be dropped. All students must take the final exam.

Exam schedule: Exam 1 will be on Feb 6th

Exam 2 will be on Feb 29th

Exam 3 will be on March 28th

Exam 4 will be on April 27th

Final Exam 5/9 9:00 – 10:50

**Final Grade Computation**

Grades: Exams 300 points

Quizes 100 points

Final 100 points

Total 500 points

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|  | Your final course grade will be computed as follows: | | |
|  | Grade | Percentage |  |
|  | A = | 90% - 100% |  |
|  | B = | 80% - 89.9% |  |
|  | C = | 70% - 79.9% |  |
|  | D = | 60% - 69.9% |  |
|  | F = | 0% - 59.9% |  |
|  | S = | 70% and above |  |

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| **Classroom Policies/Standards of Conduct** | |
| * Cell phones must never be in use during exams and quizzes and must be turned off. They must not be in use during class. * Headphones may not be used during exams and quizzes. * Be sure to check your COD email regularly * Be sure to use your college e-mail account when you contact me via e-mail. This will lessen the chance that your e-mail will end up in my junk folder. Also, when you e-mail me, be sure to use standard English. |

**Pass/Fail option**. If you plan to take this course using the pass/fail option, you must fill out the proper form. Be advised that to get a grade of "PASS", you must get the equivalent of a "C" or better. A "D" or "F" is a "FAIL".

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| **Plagiarism/Academic Dishonesty** | | | | |
|  | (See COD catalog, Course-Related Academic Integrity, Board Policy 5050 and Board Procedure 5715.) | | | |
|  | Academic dishonesty is prohibited. Disciplinary action will be pursued in all instances in which it is determined that academic dishonesty has occurred. Disciplinary action may include, but is not limited to | | | |
|  | 1. | | Assignment of a failing grade for a test, examination or assignment. | |
|  | 2. | | Assignment of a failing grade for a course. | |
|  | 3. | | Student disciplinary sanction under Board Procedure #5715, Student Rights and Responsibilities. | |
| **Incomplete Policy** | | | | |
| Incomplete grades are rarely given and are reserved for emergencies. Incompletes are not granted due to poor grades. | | | |
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| |  |  |  | | --- | --- | --- | | **Withdrawal Policy** | | | |  |  | | |  | **Student Withdrawal Procedures** | | |  |  | The student may withdraw from a course and receive a grade of "W", by contacting the Registration office up until the college’s official Last Date to Withdraw. I do not extend this date by issuing withdrawal permits. It is your responsibility to be aware of this date. Do not ask me to make an exception. It is not fair to other students. | |  |  |  | |  | | | |  | **Administrative/Instructor Withdrawal Procedures** | | |  |  | Students not actively pursuing the completion of course objectives may be withdrawn from the class by the instructor at midterm. | |  | | | |  | **Medical Withdrawal Procedures** | | |  |  | Contact the Health and Special Services (SSC 3249, 942-2154) for the procedures. | | | | | |
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|  |  | | |  |  | | --- | --- | | **Classroom Policies/Standards of Conduct** | | |  | * In grading your exams and quizzes, your method of solution will be evaluated. A correct method will receive partial credit. An incorrect method (or no work at all) will receive no credit even if the answer is correct. * Cell phones must never be in use during exams and quizzes and must be turned off. They must not be in use during class. * Headphones may not be used during exams and quizzes. * Be sure to check your COD email regularly * Be sure to use your college e-mail account when you contact me via e-mail. This will lessen the chance that your e-mail will end up in my junk folder. Also, when you e-mail me, be sure to use standard English. | | |
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Objectives/Goals

Upon successful completion of this course, the student should be able to do the following:

1. Express and use the definition of the limit of a function

2. Evaluate limits graphically, numerically, and algebraically

3. Evaluate one-sided limits

4. Determine the continuity of a function at a point and over an interval

5. Define and use the derivative of a function

6. Determine the differentiability of a function at a point and over an interval

7. Describe and use the intermediate value theorem

8. Use the rules of differentiation to find the derivative of a function (including the product, quotient, and chain rules)

9. Differentiate implicitly

10. Use derivatives in geometry and other applications that involve rates of change

11. Determine higher order derivatives, with applications to linear motion

12. Determine the differential of a function and use it in error analysis

13. Locate and identify all relative and absolute extrema of a function, by using its first and second derivatives

14. Use the derivative to determine where a function is increasing, where it is decreasing, where its graph is concave upward, and where its graph is concave downward

15. Use the extreme value theorem

16. Describe and use Rolle's theorem and the mean value theorem

17. Determine the limit of a function at infinity

18. Locate all (if any) vertical, horizontal, and slant asymptotes on the graph of a function

19. Construct the graph of a function by locating all intercepts, asymptotes, and relative extrema points, and by determining concavity over the domain of the function

20. Solve optimization problems including applications

21. Determine the approximate zeros of a function using Newton's Method

22. Solve related rate problems including applications

23. Determine the antiderivative of a function

24. Solve a separable differential equation and an initial value problem

25. Demonstrate the ability to estimate a definite integral using a Riemann sum, the trapezoidal rule, and Simpson's rule

26. Evaluate a definite integral by taking the limit of a Riemann sum

27. Use the fundamental theorem of calculus to evaluate a definite integral

28. Use substitution to determine definite and indefinite integrals

29. Use the properties of definite and indefinite integrals

30. Determine the mean value of a continuous function over a closed interval

31. Define and graph the exponential and logarithmic functions

32. Demonstrate the ability to simplify expressions using properties of logarithms

33. Differentiate and integrate logarithmic and exponential functions including those with bases other than e

34. Apply logarithmic differentiation

35. Evaluate integrals that result in logarithmic functions

36. Evaluate expressions involving inverse trigonometric functions

37. Differentiate expressions involving inverse trigonometric functions and trigonometric functions

38. Define and graph hyperbolic trigonometric functions

39. Demonstrate the ability to verify identities involving hyperbolic trigonometric functions

40. Differentiate and integrate functions involving hyperbolic trigonometric functions

41. Differentiate functions involving inverse hyperbolic trigonometric functions

Topical Outline

This course will include but not be restricted to the following topics:

1. Review
   1. Straight lines and circles
   2. Functions and their graphs
      1. Symmetry
      2. Domain and range
      3. Interval notation
      4. Special functions
         1. Absolute value
         2. Polynomial
         3. Rational
         4. The greatest-integer function
         5. Logarithmic and exponential functions
   3. Trigonometry
      1. Special angles and radian measure
      2. Trigonometric identities
      3. Inverse trigonometric functions
2. Limits and continuity
   1. Limits
      1. Numerical and graphical approach to limits
      2. Definition and proof using epsilon and delta
      3. Limit theorems and techniques for evaluation of limits
      4. One-sided limits
      5. Infinite limits
      6. Trigonometric limits
   2. Continuity
      1. Definition
      2. Properties
   3. The intermediate value theorem
3. The derivative
   1. Definition
      1. Derivative as a slope of tangent line
      2. Derivative as instantaneous rate of change
      3. Velocity and acceleration in linear motion
   2. Formulas for finding derivatives
      1. Sum, difference, product, and quotient rules
      2. Power rule and chain rule
      3. Sine, cosine, tangent, cosecant, secant, and cotangent
      4. Logarithmic and exponential functions
   3. Implicit differentiation
   4. Logarithmic differentiation
   5. Higher order derivatives
   6. Derivatives and continuity
4. Application of the derivative
   1. Related rates
   2. Maxima and minima
      1. Extreme value theorem
      2. Rolle's theorem
      3. Mean value theorem
      4. Test for increasing and decreasing functions
      5. First derivative test and second derivative test
      6. Concavity and points of inflection
      7. Applications
   3. Limits at infinity
   4. Asymptotes
   5. Newton's method
   6. Business applications (optional)
   7. Differentials
5. Definite and indefinite integrals
   1. Antiderivatives and the indefinite integral
   2. Integration by substitution
   3. Sigma notation and Riemann sums
   4. The definite integral and area
   5. The fundamental theorem of calculus
   6. The properties of the definite integral
   7. Definite integrals with substitution
   8. Mean value theorem for integrals
   9. Simpson's rule and the trapezoidal rule
6. Transcendental functions
   1. Logarithmic and exponential functions
      1. Integration
      2. Bases e, 10, and other
   2. Inverse trigonometric functions and their derivatives
   3. Hyperbolic functions
      1. Definitions and graphs
      2. Derivatives and integrals
      3. Inverse hyperbolic trigonometric functions and their derivatives