MATH-1620: CALCULUS II

Cuyahoga Community College

Viewing: MATH-1620 : Calculus II

Board of Trustees:
2012-03-22

Academic Term:
Fall 2019

Subject Code
MATH - Mathematics

Course Number:
1620

Title:
Calculus II

Catalog Description:
Second of three-semester sequence. Includes study of logarithmic and exponential functions, trigonometric and inverse trigonometric functions, and hyperbolic and inverse functions; techniques of integration, parametric and polar coordinates, conics, indeterminate forms, improper integrals; and sequences and series.

Credit Hour(s):
5

Lecture Hour(s):
5

Lab Hour(s):
0

Other Hour(s):
0

Requisites

Prerequisite and Corequisite
MATH-1610 Calculus I, or departmental approval: equivalent coursework.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course.

The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.
III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is based in part on enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of their financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course before financial aid funds can be applied to students’ accounts.

Therefore, attendance is recorded in the following ways:

- For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.
- For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

At the conclusion of the first two weeks of a semester or equivalent, instructors report any registered students who have “Never Attended” a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class or wants or needs to withdraw, for any reason, it is the student’s responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with coursework due to a prolonged absence should confer with the instructor or a counselor.

IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called ‘artifacts,’ for assessment of course and program outcomes and the College’s Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

V. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available at http://www.tri-c.edu/student-resources/documents/studenthandbook.pdf You must also comply with the College’s Zero Tolerance for Violence on College Property available at http://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf
VI. CORONAVIRUS/COVID-19 STATEMENT

Students are responsible for adhering to all College health and safety guidance, including that which relates to the COVID-19 pandemic.

Public health requirements and standards are changing rapidly, and the College is adapting its guidance accordingly. Please check your Tri-C email and visit tri-c.edu/coronavirus regularly for updates.

All students must adhere to the following general guidelines, until further notice:

- Remain at home if you are ill or experiencing symptoms of illness. Do not attend any in-person class or gathering.
- Notify your instructor(s) if you are ill, have tested positive for COVID-19, or were exposed to an individual who has tested positive for COVID-19 and they will report the information to the Tri-C Compliance & Risk Management team and you may be contacted for follow-up information.
- Wear a mask or face covering at all times, including, but not limited to: upon entering and exiting any Tri-C facility, in class, and in all common areas.
- Maintain a distance of at least six feet between yourself and others at all times and if you must pass near an individual do it quickly and do not linger.
- Provide the College with relevant information about your current health status and participate in any required on-site checks (e.g., temperature checks, current contact information, symptom profile, etc.).
- Use only designated areas of Tri-C facilities, including entrances and exits. Sign in and out of Tri-C facilities as directed.

The general guidelines listed above do not encompass all coronavirus-related guidance. These guidelines are subject to change at the discretion of the College and under the direction of public health authorities. Students who fail to adhere to this guidance may be subject to disciplinary action under the College’s Student Code of Conduct and the Student Judicial Code.

Outcomes

Course Outcome(s):

N/A

Objective(s):

1. Use antiderivatives to evaluate definite integrals.
2. Evaluate definite integrals as the limits of Riemann sums; apply definite integrals in a variety of applications to model physics, engineering, biological, and economic situation problems: areas, volumes of solids of revolution, arc length, area of surfaces of revolution, work, moments, centers of gravity, centroids, and fluid pressure and forces.
3. Employ a variety of integration techniques to evaluate special types of integrals, including integration of logarithmic and exponential functions, other functions defined by integrals, and trigonometric and inverse trigonometric functions.
4. Evaluate limits that result in indeterminate forms, including the application of L’Hôpital Rule.
5. Apply a variety of integral techniques to evaluate special types of integrals, including substitution, integration by parts, trigonometric substitution, partial fraction decomposition, integrating trigonometric functions, and integration by using tables and computer algebra systems.
6. Evaluate integrals using numerical integration: trapezoidal rule and Simpson’s rule.
7. Recognize and evaluate improper integrals, including integrals over infinite intervals, as well as integrals in which the integrand becomes infinite on the interval of integration.
8. Apply the definite integrals to solve a variety of STEM applications and real world situation problems.
10. Use Euler’s method to find numerical solutions to differential equations.
11. Use mathematical modeling with differential equations to solve STEM applications.
12. Determine the existence of limits of sequences; estimate limits numerically, graphically, and algebraically.
13. Determine whether a series converges by using appropriate tests, including comparison, ratio, integral, and alternative series tests.
14. Find local linear and local quadratic approximations of n-th Maclaurin polynomial.
15. Find n-th Taylor polynomial at a specified center for a function and estimate the error term.
16. Use appropriate techniques to differentiate, integrate, and find the radius and interval of convergence for power series of various functions. Model physics applications with Taylor series.
17. Graph parametric equations, analyze parametric curves, and find tangent lines and arc lengths defined by such curves.
18. Graph polar equations, analyze graphs in polar coordinates, and find tangent lines, arc lengths, and areas of regions defined by such curves.
19. Find, graph, and apply the equations of conics in the standard positions, including conics where the principal axes are not parallel to the coordinate axes.
20. Find, graph, and apply the equations of conics in polar coordinates.
21. Apply precise mathematical thinking, logical reasoning, analytical, decision-making, problem-solving, and communication skills to learning theoretical concepts and solving problems as emphasized the calculus reform movement.
22. Use graphics calculator and computer technology to assist in graphing, problem solving, computations, and manipulations of calculus.
Methods of Evaluation:
1. Periodic exams
2. Quizzes
3. Homework
4. In class collaborative work
5. Research projects: applied and discovery
6. Graphics calculator/computer application problems
7. Comprehensive final exam

Course Content Outline:
1. Applications of the definite integrals
   a. Area
   b. Volume of solids of revolutions
   c. Length of a Plane Curve
   d. Area of surfaces of revolution
   e. Work
   f. Moments, centers of gravity, and centroids
   g. Fluid pressure and fluid force
   h. STEM applications and real world situation problems
2. Integration techniques, L'Hôpital Rule, and Improper Integrals
   a. Integrating exponential, logarithmic, and other functions defined by integrals by miscellaneous substitutions
   b. L'Hôpital Rule and indeterminate forms
   c. Integrating inverse trigonometric functions
   d. Integration by parts
   e. Integrating trigonometric functions
   f. Integration by trigonometric substitution
   g. Integration of rational functions by partial fractions
   h. Integration by tables and computer algebra systems
   i. Numerical integration: Trapezoidal rule and Simpson’s rule
   j. Integrating improper integrals
   k. Solving STEM applications and real world situation problems
3. Mathematical Modeling with differential equations
   a. Modeling with differential equations
   b. Separation of variables
   c. Slope fields, Euler’s method
   d. First order of differential equations and applications
4. Sequences and series
   a. Properties and convergence of sequences
   b. Convergence tests for infinite series
      i. The comparison tests
      ii. Ratio tests
      iii. Root tests
   c. Alternating series
   d. Absolute and conditional convergence
   e. Maclaurin and Taylor polynomials
      i. Local linear approximations
      ii. Local quadratic approximations
      iii. Sigma notation
   f. Maclaurin and Taylor series and their convergence
   g. Power series and their convergence
      i. Radius of convergence
      ii. Interval of convergence
      iii. Representation of functions by Maclaurin and Taylor series
      iv. Differentiation and integration of power series
      v. Modeling with Taylor series
5. Parametric and polar curves; conic sections
a. Parametric equations
   i. Tangent line for parametric curves
   ii. Arc length for parametric curves
   iii. Cycloid

b. Polar coordinates
   i. Polar coordinate systems
   ii. Relationship between polar and rectangular coordinates
   iii. Graphs in polar coordinates
   iv. Tangent lines, arc length, and area for polar curves
   v. Families of curves

c. Conic sections: parabolas, ellipses, and hyperbolas in standard positions
   i. Techniques for sketching graphs
   ii. Translated conics
   iii. Reflection properties
   iv. Rotation of axis and second-degree equations
   v. Conic sections in polar coordinates: polar equations of coordinates and sketching conics graphs
   vi. Applications using graphics calculator/computer.

Resources


Resources Other
1. Various computer algebra systems programs
2. Softwares provided with the textbooks
3. Computer algebra systems: Derive, Maple, Mathematica, Converge, and others

Instructional Services

OAN Number:
TMM006, and TMM017 (2 of 2 courses, both must be taken)

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