COLLIN COUNTY COMMUNITY COLLEGE
COURSE SYLLABUS

COURSE NUMBER: MATH 2414

COURSE TITLE: Calculus II

CREDIT HOURS: 4                           LECTURE HOURS: 3                           LAB HOURS: 3

ASSESSMENTS: None

PREREQUISITE: MATH 2413

COREQUISITE: None

COURSE DESCRIPTION: Differentiation and integration of transcendental functions; parametric equations and polar coordinates; techniques of integration; sequences and series; improper integrals. Lab included.


Online courses: e-mail your professor, vantohe@collin.edu or dbrown@collin.edu for textbook information.

SUPPLIES: Graphing calculator required

STUDENT LEARNING OUTCOMES:

Upon completion of this course, students will:

1. Use the concepts of definite integrals to solve problems involving area, volume, work and other physical applications. (CT/CS)
2. Use substitution, integration by parts, trigonometric substitution, partial fractions and tables of anti-derivatives to evaluate definite and indefinite integrals.
3. Define an improper integral. (CS)
4. Apply the concepts of limits, convergence and divergence to evaluate some classes of improper integrals.
5. Determine convergence or divergence of sequences and series. (CT)
6. Use Taylor and Maclaurin series to represent functions.
7. Use Taylor or Maclaurin series to integrate functions not integrable by conventional methods.
8. Use the concept of polar coordinates to find areas, lengths of curves and representations of conic sections.

COURSE REQUIREMENTS: Completion of required exams, labs and assignments.
COURSE FORMAT: Lecture, lab and guided practice.

METHOD OF EVALUATION: A minimum of four proctored exams, a lab component grade and a proctored comprehensive final exam will be given. Homework and/or quizzes may be used in place of one exam or in addition to exams. The weight of each of these components of evaluation will be specified in the individual instructor’s addendum to this syllabus. All out-of-class course credit, including home assignments, service-learning, etc. may not exceed 25% of the total course grade; thus, at least 75% of a student’s grade must consist of proctored exams, and no student may retake any of these exams.

ATTENDANCE POLICY: Attendance is expected of all students. If a student is unable to attend, it is his/her responsibility to contact the instructor to obtain assignments. Please see the schedule of classes for the last day to withdraw from the course with a grade of W.

RELIGIOUS HOLY DAYS: In accordance with section 51.911 of the Texas Education Code, the college will allow a student who is absent from class for the observance of a religious holy day to take an examination or complete an assignment scheduled for that day within a reasonable amount of time. A copy of the state rules and procedures regarding holy days and the form for notification of absence from each class under this provision are available from the Admissions and Records Office. Please refer to the current Collin Student Handbook.

ADA STATEMENT: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS Office, SCC-D140 or 972.881.5898, (V/TDD 972.881.5950) to arrange for appropriate accommodations. See the current Collin Student Handbook for additional information.

ACADEMIC ETHICS: Please see section 7-2.2 of the Collin Student Handbook. Contact the Dean of Students at 972.881.5771 for the student disciplinary process and procedures.

COURSE CONTENT: Proofs and derivations will be assigned at the discretion of the instructor. The student will be responsible for knowing all definitions and statements of theorems for each section outlined in the following modules.

MODULE 1: APPLICATIONS OF INTEGRATION

The student will be able to:

1. Use the definite integral to find the area between two curves.
2. Use the definite integral to find the volume of a solid by slicing and with disks and washers.
3. Use the definite integral to find the volume of a solid of revolution with cylindrical shells.
4. Use the definite integral to find the work done by a variable force.
5. Use the definite integral to find the average value of a function.
MODULE 2: TECHNIQUES OF INTEGRATION

The student will be able to:

1. Use integration by parts to evaluate definite and indefinite integrals.
2. Evaluate trigonometric integrals- definite and indefinite.
3. Use the method of trig substitution to evaluate definite and indefinite integrals.
4. Use the method of partial fractions to evaluate definite and indefinite integrals for rational functions.
5. Know the basic integration formulas and apply them strategically.
6. Use integral tables to evaluate definite and indefinite integrals.
8. Evaluate improper integrals.

MODULE 3: FURTHER APPLICATIONS OF INTEGRATION

The student will be able to:

1. Use the definite integral to find the arc length of a curve.
2. Use the definite integral to find the area of a surface of revolution.
3. Apply the definite integral to problems in physics and engineering (calculate hydrostatic force and pressure and moments and centers of mass). Also, apply the Theorem of Pappus to find volumes of revolution.
4. (OPTIONAL) Apply the definite integral to problems in economics and biology.

MODULE 4: DIFFERENTIAL EQUATIONS

The student will be able to:

1. Model problems with differential equations.
2. Construct a slope field for a differential equation and use it to sketch solution curves.
3. Use Euler’s method to construct approximate solutions to initial value problems.
4. Solve separable differential equations and various applications (e.g. orthogonal trajectories and mixing problems).
5. Examine and use various models for population growth (e.g. exponential and logistic growth).
6. (OPTIONAL) Solve first-order linear differential equations and applications.

MODULE 5: PARAMETRIC EQUATIONS AND POLAR COORDINATES

The student will be able to:

1. Use, sketch and derive parametric equations for plane curves.
2. Do calculus with parametric curves: find slope, area, arc length and surface area.
3. Review the polar coordinate system and how to plot points and curves, convert to and from polar coordinates and check for symmetry.
4. Find tangents to polar curves.
5. Calculate areas and lengths in polar coordinates, including applications to conic sections.

MODULE 6: INFINITE SEQUENCES and SERIES

The student will be able to:

1. Work with infinite sequences and find the limit of a sequence.
2. Work with and understand the convergence and divergence of infinite series, including geometric series.
3. Use the Test for Divergence.
4. Use the Integral Test and use the Remainder Estimate to estimate the sum of a series.
   Determine the convergence or divergence of $p$-series.
5. Use the Direct and Limit Comparison Tests.
6. Use the Alternating Series Test and the Alternating Series Estimation Theorem.
7. Understand absolute and conditional convergence and apply the Ratio and Root Tests.
8. Apply the various series convergence tests strategically to determine convergence or divergence of a given series.
9. Understand power series and find the radius of convergence and interval of convergence.
10. Work with the power series representation of a given function.
11. Find Taylor and Maclaurin series for a given function. Find binomial series. Use power series to integrate functions and calculate limits.
12. Use Taylor polynomials to approximate functions.