Course Discipline and Number: MATH 202　　　　　　　　　**Year: 2020-2021**
Course Title: Calculus II　　　　　　　　　　　　　　　　**Credit Hours: 4**

Attendance Policy: To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.

Services for Students with Disabilities: It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for accommodations. All course materials are available in alternate

Course Description

This course is a continuation of Calculus I. Topics include: slope fields, applications of separable differential equations, area between two curves, volumes of revolution, arc-length, work, advanced integration techniques (parts, trig integrals, trig substitution, and partial fractions), L'Hopital's Rule, improper integrals, infinite series, parametric equations, and polar coordinates. Use of a graphing calculator is required. The course is intended for students in the Computer Science, Engineering Science, Liberal Arts-Adolescence Teacher Education: Mathematics and Physics concentrations, and the Liberal Arts-Math/Science A.S. degree programs. Prerequisites: C or better grade in MATH 201 or equivalent; RDNG 116 if required by placement testing; prior completion or concurrent enrollment in ENGL 100 or ESL 120, 121, and 122 (or prior completion of ESL 103). 4 Cr. (4 Lec.)   Fall and spring semesters.

Course Context/Audience

MATH 202 is required in the Engineering Science, Computer Science, and the Adolescence Education concentrations (Teacher Education Transfer) A.S. degree programs. It covers mathematical concepts and techniques that are important to students in these programs. The course is an elective in the Liberal Arts Math/Science program for those students who wish to pursue a more mathematically focused degree. It is a prerequisite for MATH 203. The course satisfies the TC3 mathematics general education requirement.

Basic Skills/Entry Level Expectations

Writing:　WC　College level writing skills are required. See course co-requisites or pre-requisites.

Math:　MC　College level math skills – Course requires college level math skills. See course description for co-requisite and/or prerequisite requirement(s).

Reading:　R4　Before taking this course, students must satisfactorily complete RDNG 116 or have assessment indicating that no reading course was required.

Course Goals

By successful completing this course, the student will be able to:

1. Solve applied Separable Differential Equations: growth and decay, logistic models, etc.
2. Find the area between two curves and find volumes by the disk and shell methods.
3. Find arc-length and determine work.
4. Perform a variety of techniques of advanced integration; parts, partial fractions, trig substitution, special trig integrals.

5. Evaluate improper integrals, and find limits using L'Hopital's rule.
6. Understand convergence and divergence of infinite series.
7. Learn how to sum geometric series and alternating series.
8. Learn how to use power series for sine, cosine, and exponential functions.
9. Learn how to use polar form of complex numbers.
10. Work with functions and graphs defined parametrically.
11. Work with functions and graphs in the polar coordinate system.

Course Objectives/Topics

Objective/Topic	# Hours
Unit I Differential Equations and Integral applications - The student will learn how to: Generate slope fields, solve separable ordinary differential equations, find the area between two curves, find volumes of revolution, determine arc-length, and determine work.	10 Hours
Unit II Advanced Integrals - The student will: Learn to integrate functions involving $\sin^m(x)$ and $\cos^n(x)$; Learn integration by parts; Learn integration by change of variables; Learn at least the tangent case of trig substitution integration; Learn at least the non-repeated linear case of integration by partial fractions; Learn about the Gamma function as an extension of factorial and as an application of integration by parts and improper integrals (optional).	12 Hours
Unit III Sequences, series, and complex numbers - The student will learn: how to find the limit of a convergent sequence, how to find the sum of a convergent geometric series, how to recognize the harmonic series and understand why it is divergent, how to recognize p-series and whether a given p-series is convergent or divergent, how to compute the sum of a given convergent alternating series to an arbitrary accuracy, how to represent a function with a power series, how to use the ratio test to find the radius of convergence of a given power series, how to use the series for the exponential function to derive the polar form of complex numbers. (Suggestion: Begin this until with power series). Optional: defining Bessel functions by power series, using the polar form of complex numbers to find the nth root of a given complex number.	12 Hours
Unit IV Parametrics and Related Topics - The student will: Learn to graph parametric equations using a calculator; Learn to find derivatives of functions defined parametrically; Learn to find area enclosed by graphs defined parametrically; Learn to find arc-length and curvature of the graphs of functions defined parametrically.	10 Hours
Unit V Polars - The student will learn: how to graph polar expressions using a calculator; the names of the standard polar graphs; how to find derivatives of polar graphs; how to find areas enclosed by polar graphs; how to find arc length and curvature of polar graphs.	10 Hours
Reviews and exams	2 Hours

General Education Goals - Critical Thinking & Social/Global Awareness

CRITICAL THINKING OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
Students will be able to: ➢ develop meaningful questions to address problems or issues.	Students learn to solve higher level math problems via various techniques. Lecture, example and drill.
➢ gather, interpret, and evaluate relevant sources of information.	Students learn that calculators can give erroneous results.
➢ reach informed conclusions and solutions.	Students need to consider the reasonableness of their solutions, "Does the answer make sense?"
➢ consider analytically the viewpoints of self and others.	

Reviewed 03-14

SOCIAL/GLOBAL AWARENESS OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
➢ Students will begin to understand how their lives are shaped by the complex world in which they live.	Smart phone apps can be used by students and are more readily available than computer software programs.
➢ Students will understand that their actions have social, economic and environmental consequences.	Cheating is discussed.

Instructional Methods

The usual manner of presenting course material should be by lecture, with students being allowed to ask questions during lecture. Time should be taken in class to verify that students know how to correctly and efficiently use the calculator applications that occur in the course.

Methods of Assessment/Evaluation

Method	% Course Grade
Unit exams/quizzes	80-100%
Comprehensive final exam (which may be treated as optional and used only to raise the student's course grade) OR half of the final may be used as a fifth unit exam with the second half comprehensive over the first four units.	0-20%

Text(s)

Calculus, Larson, Ron et.al., 10th Edition, © 2014 Houghton Mifflin, Inc.

Bibliography

Other multi-variable calculus texts by Stewart or Anton, etc.

Other Learning Resources

Audiovisual   No resources specified
Electronic   DERIVE computer software;
Other   DYNAMIC Calculus web page: www.monroecc.edu/wusers/pseeburger