

SYLLABUS

TITLE: Calculus II
CODE: MAT 202
PREREQUISITE: MAT 201
CREDITS: 5 credits | 75 contact hours | 1 term

DESCRIPTION

The course is theoretical and practical in nature and deals with the knowledge and application of integral calculus. By applying integrals, problems of volumes of solids of revolution, areas of surfaces, and arc lengths are solved. The different techniques of integration are learned. Problems with indeterminate forms and improper integrals are solved. Problems using sequences and series are introduced and solved. Vectors are introduced and applied and functions of several variables are studied through partial derivatives and multiple integrals. Problems are solved using different mathematical models that apply to diverse areas of scientific and social knowledge. The course is offered face-to-face, with WEB support integrating WEB 2.0 applications and the distance education system of the USC.

JUSTIFICATION

The skills developed in the study of this course are necessary for the efficient performance of the tasks of any scientist, whether mathematician, chemist, physicist or biologist. Although the course is mostly designed for students of Natural Sciences, also, in recent years and in tune with the demands of modern technology, the use of Calculus has been adapted to many areas of Social Sciences and Business Administration.

COMPETENCES

The course develops in the student the following competencies:

- **Critical Thinking**
- **Communication**

OBJECTIVES

At the end of the course, students will be trained to:

1. Demonstrate skills in solving integrals by discerning the characteristics of the problem.
2. Demonstrate knowledge and skills in applying definite integrals.
3. Demonstrate knowledge and skills in applying the derivatives and integrals of transcendental functions and functions of several variables.
4. Demonstrate critical thinking in classifying exercises of integrals, sequences and series, and vectors to apply different solution techniques.
5. Solve problems using special WEB 2.0 applications for mathematics.

CONTENT

- I. Applications of the definite integral
 - A. Volumes of solids of revolution
 1. Disc method
 2. Ring method
 3. Method of cylindrical shells
 - B. Surface area and logarithmic area
 - C. Arc length and surfaces of solids of revolution
 - D. Work problems
 - E. Liquid pressure and force problems
- II. Exponential and logarithmic functions
 - A. Derivative of the inverse function
 - B. Derivatives and integrals of the Natural Logarithm and Exponential functions
 - C. Derivatives and integrals of the Logarithmic and General Exponential functions
- III. Trigonometric functions and their inverses.
 - A. Trigonometric functions
 1. Derivatives
 2. Integrals
 - B. Inverse of trigonometric functions
 1. Derivatives
 2. Integrals

- IV. Hyperbolic functions and their inverses
 - A. Derivatives and integrals of hyperbolic functions
 - B. Derivatives and integrals of inverse hyperbolic functions
 - C. Indeterminate forms and L'Hospital's Rule
- V. Integration techniques
 - A. Formulas
 - B. Integration by parts
 - C. Integration of the powers of Trigonometrics
 - D. Integration by trigonometric substitution and quadratic forms
 - E. Integration by decomposition into partial fractions
 - F. Miscellaneous substitutions
 - G. Improper integrals
- VI. Successions and series
 - A. Successions
 - 1. Convergence and Divergence
 - 2. Bounded
 - B. Infinite series
 - 1. Convergence and divergence
 - 2. Alternating series
 - 3. Power series
 - 4. Representation of functions by power series
- VII. Vectors
 - A. Vector algebra in the plane and the space
 - 1. Norm of a vector
 - 2. Operations
 - 3. Normalized vector
 - 4. Dot product
 - a. Definition
 - b. Applications
 - 5. Cross product
 - a. Definition
 - b. Applications
- VIII. Functions of several variables
 - A. Evaluation of functions

- B. Partial Derivatives
- C. Iterated Integrals
- D. Double integrals and applications

METHODOLOGY

The following strategies of the active learning methodology are recommended:

- Class discussion
- Computer lab
- Use of WEB 2.0
- Activities aimed at solving mathematical problems

EVALUATION

Partial Assignment	60%
Online assignments	20%
Project or final exam	<u>20%</u>
Total	100%

LEARNING ASSESSMENT

The institutional assessment rubric is applied to the core activity of the course.

BIBLIOGRAPHY

TEXT

Larson R., Edwards B.H. (2018). *Calculus*. (11th edition). Boston: Cengage Learning.

REFERENCES

Larson R., Falvo D.C. (2016) *Precalculus with Limits*. (4th edition) Boston: Cengage Learning.

Miller J., Gerken D. (2017) *Precalculus*. (1st edition) New York: McGraw-Hill Education.

Stewart J. (2016) *Calculus: early transcendentals*. (8th edition). Boston: Cengage Learning.

Swokowski E. (2019) *Precalculus: Functions & Graphs*. (13th edition) New York:
Addison Wesley.

ELECTRONIC RESOURCES

<https://www.khanacademy.org/math/calculus>

<https://www.symbolab.com/>

<https://www.wolframalpha.com/>

Find more information resources related to the course topics on the library page
<http://biblioteca.sagrado.edu/>

REASONABLE ACCOMMODATION

To obtain detailed information on the process and the required documentation, you must visit the corresponding office. To guarantee equal conditions, in compliance with the ADA (1990) and the Rehabilitation Act (1973), as amended, all students who need reasonable accommodation services or special assistance must complete the process established by the Vice Presidency for Academic Affairs.

ACADEMIC HONESTY, FRAUD AND PLAGIARISM

Any student who misses the policy of honesty, fraud and plagiarism is exposed to the following sanctions: received a grade of zero in the evaluation and / or repetition of the work in the course, grade of F (*) in the seminar: suspension or expulsion as established in the Academic Honesty Policy document (DAEE 205-001) effective August 2005.

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