

UTEC - University of Engineering and Technology

Course syllabus- 2017 II

1. Course code and name: EG0003-Matemática 1

2. Credits: 4 credits

3. Hours per session (theory and laboratory): 4 Theory

Total number of sessions per type: 64 - Theory

4. Name, e-mail and hours of attention of the instructor or coordinator of the course:

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5. Bibliography

a) Basic:

- Stewart, J. *"Calculus". CENCAGE Learning. 7th Edition México D.F. 2012.*
- Ron Larson. *"Calculus". Brooks Cole. 10th Edition. 2012*

b) Complementary:

- Dennis G. Zill. *"Cálculo: Trascendentes Tempranas". 4ta Edición.*
- Demana, F., Foley, G., Kennedy, D. y Waits, B. *"Precálculo: Gráfico numérico y algebraico". Pearson Addison Wesley 7ma Edición. México. 2014.*
- Edwards. H. *"Cálculo con geometría analítica". Prentice Hall México. 1994.*
- Purcell, E., y Varberg, D. *"Cálculo con geometría analítica". Prentice Hall México Hispanoamericana. 1995*

6. Course Information

a) Brief description of course content

The course aims to develop in students the ability to analyze models in science and engineering using tools of differential and integral calculus, with real functions of real variable.

In the course, concepts related to functions, derivatives and integrals of real functions of a variable are studied and applied, which will be used as a basis and support for the study of new contents and subjects. It also seeks to achieve heuristic, reasoning, and communication capabilities to address real-world problems through learned concepts and procedures.

b) Prerequisites or co-requisites: Matemática 0

c) Indicate if it is a compulsory or elective course: Obligatory

7. Objectives of the course

a. Competitions

At the end of the course the student will be able to:

a1: Apply knowledge of functions, derivatives and integrals, to solve problems related to science and engineering (Level 1)

a3: Apply engineering knowledge to solve to problems related to phenomena and change

and change. (Level 1)

The course addresses the following outcomes of the ICACIT / ABET student: a

b. Learning outcomes

a. Functions of a variable

- Explain the notion of real function of real variable
- Recognizes the main characteristics of a function.
- Model real situations using functions applying elementary mathematics.
- Graphs functions using manual procedures, with Geogebra or EXCEL.
- Model a real situation by adjusting point clouds to functions.
- Recognizes various types of elementary functions and their characteristics.
- Use transformations to graph new functions from others.
- Solve real problems that involve operating with functions.
- Analyzes real periodic phenomena using sinusoidal models.
- Solve real situations involving exponential and logarithmic models

b. Derivatives

- Solve real situations involving concepts such as average rate of change, average speed, average speed, instantaneous speed.
- Interprets the derivative of a function as a ratio of change between its two variables.
- Interprets the derivative as the slope of the tangent to a curve at a given point
- Approximates functions through the derivative and the differentials.
- Calculates derivatives by defining, using tables, derivation rules and symbolic calculators.
- Calculates derivatives of compound functions (chain rule, implicit derivation, logarithmic).
- Solve real context problems involving the calculation of related velocities.
- Analyze the behavior of a function by its derivative.
- Solve real context problems involving function optimization

c. Integrales

- Estimate the area under a curve by dividing into rectangles and Riemann sums.
- Interprets the integral as a result of the infinitesimal changes of a real phenomenon.
- Establishes physical interpretations of the integral in kinematics.
- Establish significant reactions between the derivative and the integral of a function.
- Study real phenomena through derivation (differential change) and integration (accumulation of changes).
- Find indefinite integrals by several methods.
- Calculate areas between two curves using integrals.
- Calculate the volume of a revolution solid obtained by rotating a flat region around a horizontal or vertical axis, by several methods.
- Applies the integrals to the calculation of the average value of a function, to the work done by a variable force, to the amount of movement, among others.
- Calculates the arc length of a given curve explicitly or parametrically

8. List of topics to be studied during the course

1. Functions of a single variable
2. Limits and derivatives
3. Integrals

9. Methodology and evaluation system

Methodology:

The course focuses on developing skills of problem solving, reasoning, modeling and student communication. To this end, an active and participatory methodology is developed with the rational use of technology and collaborative workspaces. The activities designed for each session range from an intuitive approach to high levels of cognitive demand. All sessions start from significant contextual situations that motivate the student to get involved in their solution.

Evaluation system:

The evaluation system focuses on expected accomplishments and provides the student with recovery spaces.

Each practice note (PC) consists of a continuous individual assessment (EC) and an assessment of classroom performance (TC).

To obtain the grade of each evaluation, the PC and TC grades are weighted averages according to the following formula:

$$PC_i = 0.75EC_i + 0.25TC_i$$

If a student disapproves of a PC, he / she has the opportunity to give a recovery evaluation whose maximum grade will be stipulated by the teachers.

At the end of the course, students will be able to pass a proficiency test (PS) referring to all the learning outcomes of the course and that will replace the lowest grade of the four CPs.

To approve the course you must approve the four practices. (PC1, PC2, PC3, PC4).

If the student approved the course, his **final grade** is obtained by averaging the scores of the four PCs.

If the student did not approve the course, his **final grade** will be the maximum disapproval of the four CPs.