Universidad de Ingeniería y Tecnología
Course Syllabus -2017 I

1. **Course number and name**
   EG0003 Mathematic 1

2. **Credits 5**

3. **Hours per session: 4 Theory, 2 Laboratory**

   Total number of sessions : 28 Theory, 14 Laboratory

4. **Instructor's or course coordinator's name, e-mail and attention hours**

   Coordinator

   Juan Carlos Broncano, jbroncano@utec.edu.pe
   Xyoby Chávez Pacheco, xchavez@utec.edu.pe *, Mo 12:00-13:00 o Tu 12:00-14:00*

   Instructors

   Alejandro Rios Cuadros arios@utec.edu.pe ,
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   Rosa Fabiola Jabo Bereche rjabo@utec.edu.pe ,
   Sonia Escalante Huamani sescalante@utec.edu.pe

5. **Text book, title, author, and year**

   Suggestion:

   - *Calculus., Stewart, J. (2012). 7th edition México D.F: CENGAGE Learning. (515/S79C)*
   - *Calculus 10th Edition by Ron Larson ión. 2014*

   a. other supplemental materials

   - *Stewart, Precáculo Matemáticas para el Cálculo 6ta edición*
   - *Dennis G. Zill. Calculo. Transcendentes Tempranas. 4a edición.*

- *Demana, F., Foley, G., Kennedy, D. y Waits, B., (2007). Precálculo: Gráfico, numérico y algebraico. 7a. ed. México D.F: Pearson Addison Wesley. (515/D56)*
- *Edwards H. (1994). Cálculo con Geometría Analítica. México D.F: Prentice Hall. (515/E26)*
- *Gilat, A. (2005). Matlab. Una introducción con ejemplos prácticos. Reverté.*
- *Grossman, S. (2008). Algebra Lineal. 6a ed. México D.F: McGrawHill. 512.5/G82)*
- *Howard, A. (2004). Introducción al Algebra Lineal. México D.F: Limusa. (512.5/A62)*
- *Purcell, E., y Varberg, D. (1995) Cálculo con Geometría Analítica. México D.F: Prentice Hall Hispanoamericana.(515/P97)*

6. Specific course information

a. Brief description of the content of the course (catalog description)

The course aims to develop in students the skills to deal with models in science and engineering related to single variable differential calculus skills. In the course it is studied and applied concepts related to calculation limits, derivatives and integrals of real and vector functions of single real variables to be used as base and support for the study of new contents and subjects. Also seeks to achieve reasoning capabilities and applicability to interact with real-world problems by providing a mathematical basis for further professional development activities.

b. Prerequisites or co-requisites None

c. Indicate whether a required, elective, or selected elective course in the program: Required

7. Goals for the course

a. Specifc Goals for the course

- a3: Apply the concepts of functions to solve problems related to science and engineering.
- a3: Apply mathematical concepts and techniques of differential calculus of one variable to solve problematic situations of science and engineering.
- a1: Calculate mathematical expressions of indefinite integrals with accuracy, order and clarity in the treatment of the data.

b. Learning Results

i. Functions of a single variable

a. Define a function of single variable and understand and be able to determine its domain and range.

b. Recognize different specific types of functions and create scatter plots and select an appropriate model.
c. Explain how a change in base affects the graph of exponentials and logarithmic functions.
d. Recognizes and builds trigonometric functions.
e. Apply rules to transform functions
f. Be able to solve simple applications problems such as regression and curve fitting using Excel, modelling bacterial growing , Logarithmic scale, etc.

ii. Limits and derivate

a. Explain the concept of limits from the graph of a function.
b. Predict the limits from the graph of a function.
c. Calculate limits through the limit and algebraic laws.
d. Compute vertical and horizontal asymptotes.
e. Compute derivative of functions applying tables and derivate rules.
f. Interpret the derivative as a rate of change.
g. Calculate the derivatives of basic and composed function
h. Approximates functions using derivate concepts and compute relative errors.
i. Calculate critical numbers, and absolute and local maximum and minimum value for continuous function.
j. Apply L'Hospital theorem to calculate some limits.
k. Formule a mathematical model from optimization real problems
l. Solve optimization real problems through derivatives.
m. Formule a mathematical model from change real problems.
n. Solve change real problems trough derivates.
o. Be able to solve simple applications problems such as velocity, exponential growth and decay, pile increasing gravel, optimization of a can, etc

iii. Integrals

a. Solve properly estimate area using left and right endpoint and midpoint rectangles.
b. Use the Fundamental theorem to find derivatives of functions of evaluate definite and indefinite integrals using substitution.
c. Use different technic to integrate functions
d. Apply integrals to found areas.
e. Compute volumes of solids obtained by rotating a bounded region about either the x−axis or the y−axis.
f. Compute the volume of solids obtained by rotating a bounded region about either the x−axis or the y−axis by considering cylindrical shells.
g. Compute the average value of a function.

h. Compute work done by a force and compute center of mass for a flat plate in the plane.
i. Define parametric curves and vectorials functions finding relationships between them.
j. Apply integrals to calculate the length of curves described by a vectorial functions
k. Be able to solve simple applications problems such as traffic on an Internet service, fuel consumption, tomography: volume of the brain, pump the water, mass in thickener, superformula, volume in Wankel machine, length of DNA molecule helix, etc.

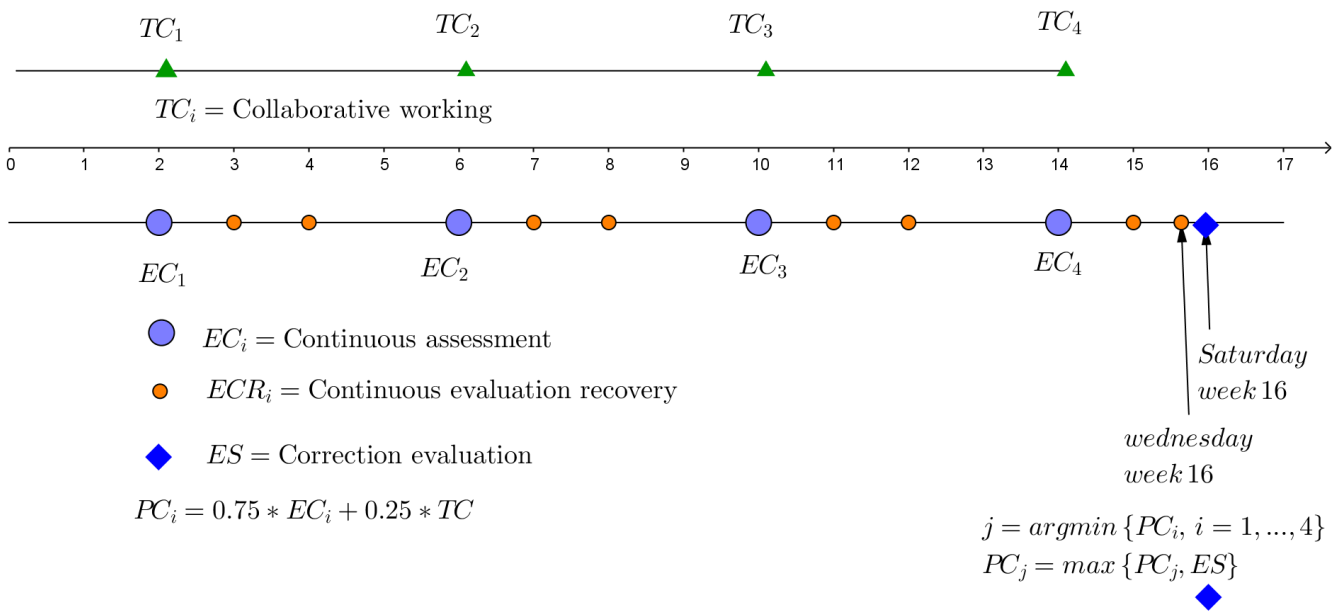
8. Brief list of topics to be covered

1. Complex numbers
2. Functions of a single variable
3. Limits and derivates
4. Integrals

9. Methodology and evaluation system

The course id offered to all careers of the university in a co-teaching basis. Faculty are expected constantly treat themes of relevance of interest for all careers, both as for the topics covered and as for the teaching perspective.
Student participation is the toll ensuring a dynamics and active learning methodology for the course. It is expected that students have a good base of elementary mathematics and have a good study methodology.

Evaluation system:



$$\text{Final Grade} = \begin{cases} \overline{PC_i}, & PC_i \geq 11\ , \forall i = 1, \cdots, 4 \\ \min\limits_{i=1,\cdots,4} \{PC_i\}, & \exists i / PC_i < 11 \end{cases}$$