5.16 Mathematics - Code: 18125A

Toán

1. Credits: *3 credits* **Assignment (ASGMT)** ☐ **Project (PRJ)** ☐

2. Department: Department of Mathematics *Email:*

3. Credit hours:

- Total (TOT): 45 periods.
- Theory (THE): 29 periods.
- Experiment (EXP): 00 periods.
- Exercise (EXE): 14 periods.
- Guidance for ASGMT/PRJ (GD): 00 periods.
- Test (TST): 02 periods.

4. Prerequisite:

5. Course description:

This course is an introduce to calculus, with a focus on problem solving and applications to economics and business. This course covers: matrices, system of linear equations and inequalities, linear programming; exponential and logarithmic functions; the concepts of derivative and integral and their applications.

6. Course books, Reference books and Software's:

Course books

[1] Marvin L. Biting, David J. Ellenbogen and Scott A. Surgent (2012), *Calculus and its applications,* 10th ed., Pearson.

[2] A. Barnett, R. Ziegler, E. Byleen, Dave Sobecki, (2011)*, College Algebra trigonometry*, 9th ed., McGraw – Hill.

Reference books

[3] Chiang, A.C, (2005), *Fundamental methods of mathematical economics*, 4th ed., Mc Graw-Hill.

[4] Michael Hoy, John Livernois, Chris Mckenta, Ray Rees, Thanasis Stengos, (2001), Mathematics for economics, 2nd ed., The MIT Press.

[5] Carl P. Simon, Lawrence Blume, (1994), *Mathematics for Economists*, Norton.

7. Course goals

Goals (Gx)	Descriptions	Program learning Outcomes (X.x.x)
G1	Understand elementary concepts of matrices, systems of linear equations and inequalities. Understand the definition of derivative, partial derivative, integral and their basic properties; Understand the concepts of exponential and logarithmic functions; functions of several variables.	1.1.2
G4	Compute mathematics problems. Apply mathematical knowledge in solving business and economics problems.	4.4.3

8. Course learning outcomes:

CLOs (G.x.x)	Descriptions	Teaching levels (I, T, U)
G1.1	Describe concepts of matrices, exponential and logarithmic functions; functions of several variables.	**T3.0**
G1.2	Explain the meaning of derivative, integral.	**T3.0**
G1.3	Recognize mathematical notations: matrix, systems of linear equations and inequalities, derivative, and integral.	**T3.0**
G4.1	Solve systems of linear equations.	**T3.0**
G4.2	Solve linear programing problems.	
G4.3	Compute derivatives of basic algebraic functions. Use derivatives to analyze and solve applied optimization problems.	**T3.0**
G4.4	Find derivatives of exponential and logarithmic functions; Use exponential functions and logarithms in problems involving compound interest rates, and exponential growth and decay.	**T3.0**
G4.5	Compute indefinite and definite integrals of basic functions. Use integrals to analyze and solve applied problems in economics and business.	**T3.0**
G4.6	Find partial derivatives of a function of several variables. Solve maximum – minimum problems.	**T3.0**

9. Course assessment:

Ass. components	Ass. evidences (X.x)	CLOs (Gx.x)	%
X. Progress grade.	X1	G4.1, G4.3	25
	X2	G4.5	25
Y. End - of -course grade	Y	G4.2; G4.4; G4.6	50

- Course requirements and expectations:
  - The minimum attendance requirement for students is at least 75%
  - The average of two mid-term exams is greater or equal to 4: $(X_1+X_2)/2 \geq 4$.
- Progress grade:
  $X = (X_1+X_2)/2$ for students will be allowed to appear for the final examination.
  $X = 0$ for students will not be allowed to appear for the final examination.
- Course evaluation grade

$Z = 0.5X + 0.5Y$ if $X \geq 4$ and $Y \geq 4$;

$Z = 0$ if $Y < 4$ and $X = 0$.

10. Lesson plan

Contents	Credit hours	Course learning outcomes	Teaching and learning activities	Ass. evidence
Chapter 1. Matrix – System of linear equations and inequalities *1.1. Matrix* *1.2 Systems of linear equations* *1.3 Systems of linear inequalities* *1.4 Linear programming*	11	G1.1 G1.3 G4.1 G4.2	*Teaching:* - Use multi-media tools in introducing and teaching lessons. - Introduce concepts of matrices, systems of linear equations, systems of linear inequalities, and linear programing. *Study in class*: Discuss and give examples on related contents. *Study at home*: Do homework. Read chapter 10.	X1,Y
Chapter 2. Functions of one variable *2.1. Differentiation* *2.2. Applications of differentiations in economics and business.* *2.3. Exponential and logarithmic functions.*	10	G1.2 G1.3 G4.3 G4.4	*Teaching:* - Use multi-media tools in introducing and teaching lessons. - Introduce the definition of differentiation, exponential and logarithmic functions. How to find derivative of a function. Application of differentiation in economics and business. *Study in class*: Discuss and give examples on related contents. *Study at home*: Do homework. Read chapter 3	X1,Y
Mid-term Test	**1**			
Chapter 3: Integration and its applications *3.1 Anti-differentiation and definite integrals.*	10	G1.2 G1.3 G4.5	*Teaching:* - Use multi-media tools in introducing and teaching lessons.	X2

Contents	Credit hours	Course learning outcomes	Teaching and learning activities	Ass. evidence
3.2 Area and definite integrals *3.3 Applications of integrations*			- Introduce the definition of integration. How to find integrals. Application of integration in economics and business. *Study in class*: Discuss and give examples on related contents. *Study at home*: Do homework. Read chapter 4, 5	
Chapter 4: Functions of several variables *4.1 Functions of several variables and partial derivatives.* *4.2 Maximum-Minimum problems* *4.3 Constrained maximum and minimum values: Lagrange Multipliers*	11	G1.2 G1.3 G4.6	*Teaching:* - Use multi-media tools in introducing and teaching lessons. - Introduce the concepts of functions of several variables. How to find partial derivatives. How to solve maximum – minimum problems. *Study in class*: Discuss and give examples on related contents. *Study at home*: Do homework. Read chapter 6	Y
Mid-term Test	**1**			
Final Examination	**1**			

11. Approval date: *...../...../.....*

12. Approved by:

Dean of faculty/Head of institute **Head of department** **Editor**

13. Updating progress:

First update: *date...../...../.....*	Reviser

Content:	Head of department
Second update: *date...../...../.....* **Content**:	Reviser Head of department