

UNIVERSIDAD AUTÓNOMA DE BAJA CALIFORNIA

COORDINACIÓN GENERAL DE FORMACIÓN BÁSICA

COORDINACIÓN GENERAL DE FORMACIÓN PROFESIONAL Y VINCULACIÓN UNIVERSITARIA

PROGRAMA DE UNIDAD DE APRENDIZAJE

I. IDENTIFICATION INFORMATION

- 1. Academic Unit:** Faculty of Engineering, Mexicali; Faculty of Chemical Sciences and Engineering, Tijuana; Faculty of Engineering and Business, Tecate; Faculty of Engineering, Architecture and Design, Ensenada and School of Sciences of Engineering and Technology, Valle de las Palmas.
- 2. Study Program(s):** Aerospace Engineering, Civil Engineering, Electrical Engineering, Computer Engineering, Electronic Engineering, Renewable Energy Engineering, Mechatronics Engineering, Industrial Engineering, Mechanical Engineering, Chemical Engineering, Nanotechnology Engineering, Software Engineering and Bioengineering.
- 3. Plan Duration:** 2019-2
- 4. Name of Learning Unit:** Economic Engineering
- 5. Code:** 33556
- 6. HC:** 02 **HL:** 00 **HT:** 02 **HPC:** 00 **HCL:** 00 **HE:** 02 **CR:** 06
- 7. Learning stage to which it belongs:** Disciplinary
- 8. Character of Learning Unit:** Obligatory
- 9. Requirements for enrollment in learning unit:** None



PUA Formulated by:

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II. GENERAL PURPOSE OF THE COURSE

Introduce the student to the principles and criteria of economic analysis for the application and evaluation of investment projects, through methods that assist in making decisions from an economic-financial perspective.

This subject is important for the student's training since it will allow him to develop the ability to propose or suggest economically feasible projects within the professional field, aware of the importance of the value of money over time, the risk and the uncertainty that arise in. Through the design of a complete project that includes the timely application of financial indicators, criteria and tools and the viability of the investment assessment, the student will complete its integral and professional preparation.

III. COURSE COMPETENCIES

Analyze the economic aspect of investment projects focused on the area of engineering, which allows to determine its economic viability and support the implementation of such investment, as well as offer proposals that facilitate decision making, through the application and use of tools, financial indicators and timely comparisons of the benefits and costs generated during the development of the project, with responsibility, critical and proactive thinking.

IV. EVIDENCE OF PERFORMANCE

It prepares and delivers the financial analysis and presents a technical report with the comparative evaluation between different investment alternatives and / or suppliers on which the decision-making is based. It must be composed of the following elements: Capital, Income, expenses, net cash flows, interest rate, economic evaluation using different financial indicators, depreciation and risk analysis.

V. DEVELOPMENT BY UNITS

UNITY I. Decision making

Competency:

Identify general concepts of economic engineering, through the study of their theories, to understand, the process of decision making in the solution of economic problems, with analytical and reflective attitude.

Content:

- 1.1. General aspects of economic engineering
- 1.2. Process for decision making

Duration: 4 hours

UNITY II. Interest and equivalences

Competency:

Determine the financial analysis of the project, with the use of financial tools, to perform economic evaluations, with an analytical and reflective attitude.

Content:

Duration: 8 hours

- 2.1. Value of money in time and interest
- 2.2. The equivalence, simple and compound interest
- 2.3. Net cash flow (FNE)
- 2.4. Formulas and notation of factors of interest
- 2.5. Tables of interest
- 2.6. Unknown interest rates and periodicity
- 2.7. Nominal and effective interest rates

UNITY III. Criteria for evaluating projects

Competency:

Evaluate investment projects, to determine their economic viability and decision making, through the different evaluation criteria, with analytical attitude, with social responsibility, critical and analytical thinking.

Content:**Duration:** 10 hours

- 3.1. Attractive minimum rate of return (TMAR)
- 3.2. Net present value (NPV)
- 3.3. Equivalent annual value (VAE)
- 3.4. Internal rate of return (IRR)
- 3.5. Cost-benefit analysis (B/C)

UNITY IV. Sensitivity and other economic analyzes

Competency:

Analyze the sensitivity and risk of the project, through the recovery of investment and break-even point, in order to execute the project, with social responsibility, critical and analytical thinking.

Content:

Duration: 10 hours

- 4.1. Recovery period
- 4.2. Sensitivity and risk analysis
- 4.3. Balance point
- 4.4. Incremental and differential costs
- 4.5. Submerged costs
- 4.6. Depreciation models and taxes
- 4.7. Replacement analysis

VI. STRUCTURE OF PRACTICES

Practice No.	Proficiency	Description	Support materials	Time
UNIT II				
1	Calculate economic equivalences in different periods of time, with the use of financial tools, to perform economic evaluations, with an analytical and reflective attitude	<p>Elaborate and deliver as a team the financial analysis of the project in which the report of:</p> <ol style="list-style-type: none"> 1. The analysis of the value of money over time and the interest rate. 2. The analysis of equivalence, simple and compound interest 3. The analysis of the net cash flow (FNE) 4. The analysis of the investment considering: the value of money over time, the FNE, the available financial information of the project, as well as the restrictions or constraints that the project implies; for this, it considers the use of unknown formulas, interest tables, interest rates and periodicity, and / or the nominal and effective interest rates. 	Computer, financial calculator, sheets, pencils, erasers, paint, blackboard, cannon, laptop, internet, software.	10 hours
UNIT III				
4	Calculate the values, rate of return and cost-benefit, through financial analysis, to determine the viability of the project, in an orderly, collaborative and honest way	<p>Elaborate and deliver in team the analysis of evaluation criteria in which the report of:</p> <ol style="list-style-type: none"> 1. Attractive minimum rate of return (TMAR) 2. Net present value (NPV) 3. Equivalent annual value (VAE) 4. Internal rate of return (IRR) 5. Cost-benefit analysis (B/C) 	Computer, financial calculator, sheets, pencils, erasers, paint, blackboard, cannon, laptop, internet, software.	10 hours

UNIT IV				
6	Calculate the recovery of investment and break-even point, by means of formulas of financial analysis, in order to determine the sensitivity and the risk of the project, in an orderly, collaborative and honest way	Prepares and delivers as a team the analysis of the recovery of investment and point of equilibrium in which the report of: 1. Balance point 2. Recovery period 3. Sensitivity and risk analysis 4. Depreciation models and taxes 5. Replacement analysis	Computer, financial calculator, sheets, pencils, erasers, paint, blackboard, cannon, laptop, internet, software.	12 hours

VII. WORK METHOD

Framing: The first day of class the teacher must establish the work form, evaluation criteria, quality of academic work, rights and obligations teacher-student.

Teaching activities:

Employs exhibition techniques

Use discussion tables

Delivery of bibliographic material (work booklet)

Advise and provide feedback on the topics and activities carried out

Promotes the active participation of students

Present case studies to exemplify the themes

Students activities:

Analysis of materials proposed by the teacher

Literature research electronically

I work collaboratively

Discussion about printed materials

Make exhibitions in class

Project elaboration

Participate in the discussion tables

Delivery reports of the analyzes carried out

VIII. EVALUATION CRITERIA

The evaluation will be carried out permanently during the development of the learning unit as follows:

Accreditation criterion

- To be entitled to ordinary and extraordinary exam, the student must meet the percentages of attendance established in the current School Statute.
- Scaled from 0 to 100, with a minimum approval of 60

Evaluation Criterion

2 Exams	30%
Jobs and tasks	10%
Participation.....	10%
Evidence of performance	50%

(financial analysis and submit a technical report with the benchmarking between different alternatives investment and / or provision on which the decision making. You must integrate the following elements depending on the dimension of the analysis: fixed assets, initial investment, fixed expenses, depreciation, physical projections, sales, income statement flow of cash, internal rate of return, net present value, cost benefit ratio, equilibrium point and balance sheet)

Total.....	100%
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IX. BIBLIOGRAPHY

Required

- Alvarado, V. (2014). *Ingeniería Económica: nuevo enfoque. Edición 1.* México:Grupo Editorial Patria.
- Baca Urbina, Gabriel. (2015). *Ingeniería económica. Edición 6.* México: McGraw Hill.
- Blank, L., y Tarquin, A. (2018). *Engineering economy. Edición 8.* USA: McGraw Hill.
- Sullivan William, G. (2004). *Ingeniería Económica de Degarmo. Edición 1.* USA: Prentice Hall. [clásica]

Suggested

- Grant, E. (2009). *Principios de la ingeniería económica. México: Editorial CECSA.* [clásica]
- Izar, J M. (2016). *Ingeniería Económica y Financiera. Edición 2.* México: Editorial Trillas.
- Park, C. (2009). *Fundamentos de Ingeniería Económica. Edición 2.* México: Pearson. [clásica]
- Vidaurri. H. M. (2013). *Ingeniería Económica Básica. Edición 1.* USA: Cengage Learning.
- Microsoft. (sf). *Funciones financieras (referencia).* Recuperado de:<https://support.office.com/es-es/article/funciones-financieras-referencia-5658d81e-6035-4f24-89c1-fbf124c2b1d8>

IX. PROFESSOR PROFILE

The teacher who teaches this subject must have a title Bachelor of Business Administration, Accounting, related area or Engineering with a financial focus, preferably with a postgraduate degree in economic-administrative area.

Experience preferably of three years in the professional area and / or in teaching, in both cases with verifiable knowledge in the area of development and evaluation of investment projects, as well as sensitivity and risk analysis where applied methodologies, techniques and economic indicators for the decision making It is expected that he has participated in the formation and development of entrepreneurship activities, in addition, preferably having teacher training courses during the last year.

The teacher must be respectful, responsible, proactive, innovative, analytical, with the ability to propose methodical solutions to a given problem and with an interest in teaching.