

# UNIVERSIDAD AUTÓNOMA DE BAJA CALIFORNIA

## COORDINACIÓN GENERAL DE FORMACIÓN BÁSICA

### COORDINACIÓN GENERAL DE FORMACIÓN PROFESIONAL Y VINCULACIÓN UNIVERSITARIA

#### LEARNING UNIT PROGRAM

#### I. IDENTIFICATION DATA

1. **Academic Unit:** Facultad de Ingeniería, Arquitectura y Diseño, Ensenada; Facultad de Ciencias Químicas e Ingeniería, Tijuana; Facultad de Ingeniería, Mexicali; Facultad de Ingeniería y Negocios, Tecate; and Escuela de Ciencias de la Ingeniería y Tecnología, Valle de las Palmas.
2. **Educational program:** Industrial Engineer
3. **Educational plan:** 2019-2
4. **Name of the Learning Unit:** Renewable Energy
5. **Code:** 34930
6. **HC:** 03 **HL:** 00 **HT:** 00 **HPC:** 00 **HCL:** 00 **HE:** 03 **CR:** 06
7. **Formation Stage to Which Belongs:** Basic
8. **Type of the Learning Unit:** Optional
9. **Requirements to take the Learning Unit:** None



**Learning Unit design team**

Julio Cesar Gómez Franco

**Signature**

**Approval of deputy director (s) of Academic Unit (s)**

Alejandro Mungaray Moctezuma  
José Luis González Vázquez  
Humberto Cervantes de Ávila  
Angélica Reyes Mendoza  
María Cristina Castañón Bautista

**Signature**

**Date:** September 6, 2018

## **II. GENERAL PURPOSE OF THE COURSE**

The aim of this course is that students acquire general knowledge of the use of renewable energies, generation means, and of the sectors that require higher energy consumption, and economic aspects and international and regional impact on the implementation of these alternatives that influence on improving living conditions, through case analysis and presentation of proposals for implementation.

This course will be useful to the student as it provides knowledge that allows identification of emergent tendencies of the generation and commercialization on energy sector, and what it opportunities of professional development on this field.

This is an elective course at the basic (optative) level.

## **III. COMPETENCE (S) OF THE COURSE**

Evaluate the use of renewable energy, the impact of the sectors that demand greater energy consumption and measures to be taken to reduce it without minimizing comfort or performance, through the analysis of technical reports of the energy sector, for non-conventional energy use with social responsibility and respect for the environment.

## **IV. EVIDENCE(S) OF PERFORMANCE**

Prepares and presents a Technical Report of Analysis of a renewable energy project that contains at least the evaluation of economic and technical feasibility, as well as the identification and assessment of the elements of contextualization that conditions its viability.

## V. Development by units

### Unit I.

#### Competence

Identify the main concepts of energy systems they represent, through the study of historical evolution and annual reports of energy commissions at the regional and international level, to identify trends and potential market opportunities, with a critical attitude of the different conceptual approaches.

#### Content

**Duration** 12 hours

- 1.1 Historic background
  - 1.1.1 How it all started
  - 1.1.2 Energy and challenges of modern economy
  - 1.1.3 Energy as a commodity and indicator of economic well-being
  - 1.1.4 Units for Energy
- 1.2 Where do we use the energy and in what form?
  - 1.2.1 Transportation
  - 1.2.2 Domestic
  - 1.2.3 Commercial
  - 1.2.4 Industrial
  - 1.2.5 Agricultural
- 1.3 Conversion Methods
  - 1.3.1 Internal, kinetic, potential
  - 1.3.2 Conservation of Energy and efficiency (definition)

## Unit II. Conventional and Renewable Energy Sources

### Competence

Analyze components of the energy market, identifying the individual applications according to the type of energy used, to examination responses and compare with conventional generation sources, to increase efficiency in these systems debating the details applied to each of a respectful and consistent manner.

### Content

**Duration** 12 hours

#### 2.1 Traditional Energy Resources, US, Mexico and the World

2.1.1 Petroleum

2.1.2 Natural Gas

2.1.3 Coal

#### 2.2 Renewable Energies basics Solar

2.2.1 Wind

2.2.2 Hydroelectric

2.2.3 Marine Energy (Clean Power from ocean waves)

2.2.4 Geothermal

2.2.5 Biomass

### Unit III. Regional Economic and Consumption Context

#### Competence

Select renewable energy systems with regionally impact, through cost / benefit analysis and energy consumption patterns in order to support the formulation and increase the profitability of energy generation and commercialization projects with a creative and responsible attitude towards the environment.

#### Content

**Duration** 12 hours

- 3.1 The Economics of Energy in S. California and U.S.-Mexico border region
  - 3.1.1 Cost of production
  - 3.1.2 Peak power
  - 3.1.3 Utility bills
- 3.2 Energy Conservation and Management
  - 3.2.1 Habits
  - 3.2.2 Methods
  - 3.2.3 Case Studies: Successes and Failures

## Unit IV.

### Competence

Propose a solution of a current energy problem using analysis of the technological offerings of renewable energies and market opportunities, to meet energy needs with a creative attitude, in solidarity with society and responsible to the environment.

### Content

**Duration** 12 hours

#### 4.1 Effects of Energy Use and Production

4.1.1 Health related issues

4.1.2 Environment related issues

4.1.3 Social related issues

## VII. WORK METHODOLOGY

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

### **Teaching strategy** (teacher)

It uses expository techniques, encourages discussion at forums and the active participation of students.

Provides bibliographic material (printed or digital)

Present case studies to exemplify the content.

Advise and provide feedback on the final project and activities.

### **Learning strategy** (student)

This will be centered on the development of teamwork in a collaborative way and the transmission of one's own learning through debate activities, case analysis, proposals for improvements in current energy systems, analysis of texts and current articles, such as guided discussions and Select topics proposed for discussion, such as the defense of your proposed application project in a planned colloquium.

## VIII. EVALUATION CRITERIA

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

### **Accreditation criteria**

- In order to have the right to ordinary and extraordinary exam, the student must comply with the percentages of attendance established in the current School Statute.
- Scaled from 0 to 100, with a minimum approval of 60

### **Evaluation criteria**

- 3 partial exams .....	50%
- Tasks .....	20%
- Evidence of performance .....	30%
(Technical Analysis Report of an Energy project Renewables)	
<b>Total.....</b>	<b>100%</b>

## IX. BIBLIOGRAPHY

### Basic

Vaughn C. Nelson, Kenneth L. Starcher. (2015). *Introduction to Renewable Energy. Series: Energy and the Environment*. USA: CRC Press.

Colmenar, A., Calero R., Carta J.A. y Castro, M. (2013). *Centrales de energías renovables: generación eléctrica con energías renovables*. USA: PEARSON.

National Renewable Energy Laboratory; U.S. Department of Energy; (S.f.). Recuperado de: Publications: [www.nrel.gov](http://www.nrel.gov).

Fornasiero, P. y Graziani M. (2016). *Renewable Resources and Renewable Energy: A Global Challenge*. USA: CRC Press.

### Complementary

Vega de Kuyper, J.C. y Ramírez S. (2014). *Fuentes de energía, renovables y no renovables. Aplicaciones*. México: Alfaomega,

## X. TEACHER'S PROFILE

The teacher of this subject must have a degree in Electrical, Electronic, Mechanical or related Engineering, preferably with a postgraduate degree and training in the subject of Renewable Energies.

Preferably professional experience of three years or on teaching, in both cases with verifiable knowledge in the area of formulation, development and evaluation of renewable energy technologies at the project level. Additionally, desirable to have teacher training courses during the last year.

The teacher must be proactive, innovation prone, analytical, socially and environmentally responsible, and interested in creating a multidisciplinary teaching environment.