

# UNIVERSIDAD AUTÓNOMA DE BAJA CALIFORNIA

## COORDINACIÓN GENERAL DE FORMACIÓN BÁSICA

### COORDINACIÓN GENERAL DE FORMACIÓN PROFESIONAL Y VINCULACIÓN UNIVERSITARIA

#### LEARNING UNIT PROGRAM

#### I. DATOS DE IDENTIFICACIÓN

1. **Academic Department:** 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. **Degree Program:** Industrial Engineer, Electronics Engineer and Chemical Engineer
3. **Study Program:** 2019-2
4. **Learning Unit Name:** Topics on Continuous Improvement
5. **Key Code:** 34917
6. **HC:** 00 **HL:** 02 **HT:** 02 **HPC:** 00 **HCL:** 00 **HE:** 00 **CR:** 04
7. **Training stage to which it belongs:** Disciplinary
8. **Subject Type:** Mandatory
9. **Prerequisite:** None



#### Subject Design

#### Signature

Yolanda Angélica Báez López  
 José Luis Javier Sánchez González  
 Karla Isabel Velázquez Victorica  
 Julián Israel Aguilar Duque  
 Velia Verónica Ferreiro Martínez

**Fecha:** 6 de septiembre de 2018

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

#### Signature

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

## II. PURPOSE OF THE LEARNING UNIT

The purpose of the learning unit is to provide the required quality related knowledge for the optimization of production or services processes within organizations, applying tools and methodologies for continuous improvement.

In the "Continuous Improvement Topics" learning unit, the student acquires the theoretical and practical knowledge of Lean Manufacturing and Six Sigma philosophies, to reduce and/or eliminate waste; improving manufacturing or services processes flow, thus complementing the student's training on world-class improvement philosophies.

The Learning Unit is mandatory, belongs to the area of quality and is part of the disciplinary stage of the Educational Program of Industrial Engineer, corresponds to an integrating subject. For the Electronics Engineer program, it is taught in the disciplinary stage with an optional character. In the Chemical Engineer program, it is taught in the terminal stage as an elective.

## III. LEARNING UNIT COMPETENCE

Analyze productive or service systems, through the implementation of Lean Manufacturing and Six Sigma methodologies, in order to increase productivity in the manufacturing process or industrial services, with critical thinking and responsibility.

## IV. PERFORMANCE EVIDENCE

Final project of continuous improvement methodologies application in a local company, that includes:

- \*Takt time diagnostics of the manufacturing process.
- \*Rating of the manufacturing process.
- \*Company's SIPOC diagram.

Workshop and laboratory portfolio, that includes:

- \* Mental and conceptual map
- \* Takt time diagnostic
- \* Workshop exercises

## V. DEVELOPMENT BY UNITS

### **Content:**

1. Lean Manufacturing philosophy.
2. Lean Manufacturing tools.
3. Six Sigma introduction.
4. Stages of a Six Sigma project.
5. Six Sigma strategies.

## VI. WORKSHOP STRUCTURE

Session number	Competence	Description	Support material	Time length
<b>UNIT I</b>				
1	Distinguishes general aspects of Lean Manufacturing philosophy, by means of its basic components, to promote understanding of later topics, with creativity.	In a team effort, students create a mental map that shows the difference between mass manufacturing and lean manufacturing.	Bibliographic references Internet or other bibliographic sources. Computer	2 hours
2	Differentiate push-and-pull systems, through the study of basic concepts, to substantiate the operation of a lean manufacturing system, analytically and with creativity.	Develop a conceptual map on the differences between push and pull systems.	Bibliographic references Internet or other bibliographic sources. Computer	2 hours
3	Distinguishes Just-in-time production goal's, to facilitate concept learning, with creativity and proactive attitude.	In a team effort, the just-in-time goal's are analyze in a class discussion.	Class debate.	2 hours
<b>UNIT II</b>				
4	Identify tools used in Lean Manufacturing, through the knowledge socialization, for his assertive selection in solving problems, with an analytical and creative attitude.	Lean Manufacturing tools are distributed between student teams, each team will do a power point presentation where they'll show examples and/videos of the tool's applications in a company setting.	Free internet references, Computer, Projector.	10 hours
5	Prepare Value Flow maps, through Lean Manufacturing guidelines, to identify opportunities of flow improvements and obtain a improvement plan, systematically and with creativity.	Using Flow of Value maps, with Lean Manufacturing guidelines students identify opportunities for flow improvements	Class dinamic	3 hours
<b>UNIT III</b>				
6	Explains background and characteristics of Six Sigma, by	In teams, the students will discuss, and solve the questions	Bibliographic references Internet or other bibliographic	3 hours

	means of a questionnaire, to propose an improvement strategy, with an analytical attitude.	provided by the teacher and available in the bibliography.	sources. Questionnaire Computer	
<b>UNIT IV</b>				
7	Describe a Six Sigma project stages, through its methodology, to solve study cases, with attitude of collaboration and commitment	In teams, the students will discuss, and solve the questions and exercises provided by the teacher and available in the bibliography.	Bibliographic references Questionnaire and study cases. Computer	4 hours
<b>UNIT V</b>				
8	Distinguish variations and alternative fields of application of Six Sigma methodology and the slim process, through the analysis of the theory, to solve exercises in class, with responsibility and analytical attitude.	In teams, the students will discuss, and solve the questions and exercises provided by the teacher and available in the bibliography.	Bibliographic references Questionnaire and study cases. Computer	6 hours

## VI. LABORATORY WORK STRUCTURE

Session number	Competence	Description	Support material	Time length
<b>UNIT I</b>				
1	Identify waste in manufacturing processes or services, through the use of lean manufacturing guidelines, to designate areas of improvements, with entrepreneurial and analytical attitude.	In teams, in an assigned company, students identify what wastes exist, list them, describe them, and propose how can they be reduced or eliminated, and make a diagnosis that includes positive observations and describe the opportunities that the company has.	Computer Study cases	3 hours
2	Analyze the takt time, through the diagnosis of a study case of a company, to identify strengths, weaknesses, opportunities and threats to the productivity, analytically and with a an attitude of commitment.	As a team, analyze a study case to make a diagnosis of the takt time that includes positive observations and describe the opportunities of the company to increase its productivity.	Computer Study cases	3 hours
<b>UNIT II</b>				
3	Identify the level at which each of the lean manufacturing principles are used in a company by means of an assessment, to generate data that allows analysis each of its areas, analytically and with responsibility.	As a team, elaborate a quick assessment that includes positive observations and describe the opportunities of the company.	Computer Study cases	6 hours
4	Analyze study cases of companies that could benefit of apply lean manufacturing, through the evaluation of their value chain, to build proposals for improvement, with an analytical, critical and responsible attitude	In teams the students will discuss, solve, elaborate and present the two cases of companies.	Computer Projector.	6 hours

5	Analyze the process and environment of the company, through the identification of suppliers, inputs, the process itself, its outputs and users, for the application of a SIPOC diagram, with attitude of analysis and responsibility.	As a team they should prepare a SIPOC diagram for the process of preparing a good coffee	Computer	4 hours
6	Argue the importance of applying the analysis of the mode-and-effect of failure of a process, by analysis of industrial process or service, to identify, characterize and assign a priority to the potential failures of a process, with critical thinking and responsibility.	In teams, the students will discuss, and solve the questions and exercises provided by the teacher and available in the bibliography	Bibliographic references Questionnaire and study cases. Computer	4 hours
<b>UNIT IV</b>				
7	Identify the important elements of a six sigma project, through the knowledge of each stage, to increase efficiency of a industrial process, with responsible and analytical attitude	In teams, the students will discuss, and solve the questions and exercises provided by the teacher and available in the bibliography	Bibliographic references Questionnaire and study cases. Computer	6 hours

## VII. WORK METHODOLOGY

**Syllabus:** On first day of class, the teacher will describe the schoolwork requirements criteria, evaluation and expected quality, right and obligations of students and teacher.

### **Teaching strategies (teacher)**

The teacher functions as a facilitator and guide during the educational process.

Expository technique for the presentation of the theory; promotion of collaborative and individual work, application of diagnoses and evaluations.

### **Learning strategies (students)**

Individual and collaborative study in the formulation of research projects, diagnosis and improvement of manufacturing processes in a company, case studies, practical exercises, and presentations.

## VIII. GRADE CRITERIA

Grade assignment will be a sustain activity during the course length, 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

### **Grade Assignment Criteria**

- Exam (2).....	30%
- Team presentation y Technical Report.....	10%
- Performance evidence (Final project).....	30%
- Performance evidence (Workshop and laboratory portfolio ).....	30%
<b>Total.....</b>	<b>100%</b>



## IX. REFERENCES

Required	Complementary
<p>Cudney, E. A., Agustiad, T. K. (2017). <i>Design for Six Sigma: A practical approach through innovation</i> (Continuous improvement series). EUA: CRC Press.</p> <p>Brook Q. (2017). <i>Lean Six Sigma and Minitab</i> (5th edition): The complete toolbox guide for business improvement. EUA: OPEX Resources Ltd.</p> <p>Gutiérrez, H. (2009). <i>Control Estadístico de Calidad y Seis Sigma</i>. México: McGraw-Hill [clásica]</p> <p>Harry, M. (2010). <i>Practitioner's guide for statistics and lean six sigma for process improvements</i>. Estados Unidos: John Wiley' Sons. [clásica]</p> <p>Socconini, L. (2015). <i>Lean Six Sigma Green Belt</i>. 1era. Edición. Lean Six Sigma Institute, SC. Barcelona, España.</p> <p>Villaseñor, A. (2007). <i>Manual de Lean Manufacturing, Guía Básica</i>, México: Limusa. [clásica]</p> <p>Villaseñor, A. (2008). <i>Conceptos y reglas de Lean Manufacturing</i>. México: Limusa [clásica]</p>	<p>Chase, R., Jacobs, F. y Aquilano, N. (2009). <i>Administración de Operaciones, Producción y Cadena de Suministros</i>. México: McGraw-Hill. [clásica]</p> <p>Gutiérrez, H. (2010). <i>Calidad Total y Productividad</i>. México: McGraw-Hill. [clásica]</p> <p>Rother, M. (2001). <i>Creating continuous flow, The Lean Enterprise institute</i>. [clásica]</p> <p>Rother, M. (2003). <i>Learning to see, The Lean Enterprise Institute</i>. [clásica]</p> <p>Villaseñor, A. (2011). <i>Sistema 5 S's Guía de Implementación</i>. México: Limusa. [clásica]</p>

## **X. TEACHER PROFILE**

The teacher should have a degree in Industrial Engineering, Mechanical Engineering, or similar, preferably with a five year professional experience in an industry setting, or with a minimum of two years experience on implementation of Continuous Improvement projects. He/She has to have qualities such as tolerance, empathy, and prudence; ability to manage students as well as to establish favorable learning, communication and leadership environments, and be able to formulate teaching materials, manage team work, and specialize software.