A) COURSE

Course Id:	Course
5600	Dynamics of Machines

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
3	2	3	8	48 hrs. teoría 32 hrs. Práctica Aula 80 hrs. totales

B) GENERAL COURSE INFORMATION:

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:		10			
Course Type (Required/Elective)		Elective			
Prerequisite Course:		It requires that have approved 315 credits			
CACEI Classification:		AE			

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:
It is required that students develop the ability to understand the dynamic operation of any device, for the use of energy and its application. The course is aimed towards a practical activity, primarily related to all reciprocating machines and having a high degree of unevenness in performance.

D) TOPICS (CONTENTS AND METHODOLOGY)

1. Crank mechanism, ground forces and moments, calculation of flywheels.		30 Hours
Specific Objective:	Students will describe the dynamic behavior of simple plain mechanisms and the means to balance the forces created by reciprocates mechanisms.	
1.1. Rotation energy diagram against time for multi-cylinder engines 1.2. Flywheels calculation 1.3. Mass forces, inertia moments 1.3.1. Online motors 1.3.2. V motors and plans		
Readings and other resources	Course notes, complementary bibliography, internet pages, videos, product catalogues and power point presentations.	
Teaching Methodologies	Presentation and explanation of topics in class, PPT presentations, student interactions.	

Learning Activities	Taking notes during class, problem solving, homework realization, and project development.

2. Vibrations.		**47 Hours**
Specific Objective:	Students will be able to model the dynamic behavior of systems subjected to excitations variants over time. They will be also be able to describe and quantify the effects of fluctuations in the machine's environment.	
2.1. Torsional vibrations 2.1.1. Moment of mass inertia 2.1.2. Torsional stiffness 2.1.3. Motion equations 2.1.4. Own vibrations 2.1.5. Moments of excitement in reciprocating machines 2.1.6. Other excitations 2.1.7. Forced vibration under harmonic excitation 2.1.8. Transient vibration 2.1.9. Damping, absorption 2.2 flexural oscillations in rotating arrows 2.2.1. Models of calculation 2.2.2. Lubricant film sliding bearings 2.2.3. Unbalance vibration 2.2.4. Calculation of the first critical rotation speed 2.2.5. Elastic supports 2.2.6. Rotational inertia of gyroscopic effects 2.2.7. Other effects 2.3. Vibration isolation 2.4. Balance 2.4.1. Introduction 2.4.2. Rigid rotor balance 2.4.3. Elastic rotor balance 2.4.4. Balance quality		
Readings and other resources	Course notes, complementary bibliography, internet pages, videos, product catalogues and power point presentations.	
Teaching Methodologies	Presentation and explanation of topics in class, PPT presentations, student interactions.	
Learning Activities	Taking notes during class, problem solving, homework realization, and project development.	

2. Mechanical engineering acoustics.		**3 Hours**
Specific Objective:	Students will understand the basic concepts associated with the acoustic and mechanical engineering. Besides, they should know the most common means for reducing the noise produced by machines.	
3.1. Fundamentals. 3.2. The source of noise in a machine. 3.3. Possibilities in the machinery's noise reduction.		
Readings and other resources	Course notes, complementary bibliography, internet pages, videos, product catalogues and power point presentations.	
Teaching Methodologies	Presentation and explanation of topics in class, PPT presentations, student interactions.	

Learning Activities	Taking notes during class, problem solving, homework realization, and project development.

E) TEACHING AND LEARNING METHODOLOGIES

a) Traditional Exhibition
b) Discussion is encouraged
c) Responsible tasks that the student must deliver on a date fixed with a given presentation.
d) Large number of examples of devices for vibration analysis applied to machines and their interpretation are included.

F) EVALUATION CRITERIA:

Evaluation:	Schedule	Suggested Form of Evaluation and weighting	Topics
1st partial evaluation.	Session 20	**20 % Total Evaluation** Partial evaluation: Exam 90% , Assignments 10%	1
2nd partial evaluation.	Session 40	**20 % Total Evaluation** Partial evaluation: Exam 90% , Assignments 10%	2
3rd partial evaluation.	Session 60	**20 % Total Evaluation** Partial evaluation: Exam 90% , Assignments 10%	3
4th partial evaluation.	Session 80	**20 % Total Evaluation** Partial evaluation: Exam 90% , Assignments 10%	4
5th partial evaluation.	Session 100	**20 % Total Evaluation** Partial evaluation: Exam 90% , Assignments 10%	5
Ordinary final evaluation		**100%** (Average value of the partial evaluations)	
Second chance final exam	Week 17 of the semester in progress	100% Exam	100% topics
Third chance final exam	According to Secretary school setting	100% Exam	100% topics
Regularization Exam	According to Secretary school setting	100% Exam	100% topics

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

Main Books

a) Hibbeler r.c., ingeniería mecánica: dinámica, prentice hall, 2002
b) Dinámica de las máquinas. Juan león l. Editorial limusa, méxico. 2013
c) George henry martin. Kinematics and dynamics of machines. Mc graw hill.12009
d) Kenneth j. Waldron, gary l. Kinzel. Kinematics, dynamics and design of machinery. John wiley & sons. 2001
e) Hamilton h. Mabie, charles f. Reinholtz. Mechanisms and dynamics of machinery. Ed. John wiley & sons. 2011

Complementary Books

a) Dubbel, handbook of mechanical engineering, edited by w. Beitz and k.-h. Küttner. English edition edited by m.j. shields. Springer verlag london limited 1994.
b) William t. Thomson and marie d. Dahleh, theory of vibration with applications, 5th edn., prentice hall

Internet Links

Web-sites of manufactures and suppliers of machine elements.

Videos regarding the function of the different machine elements.

Software CAD: CATIA, SolidWorks, AutoCAD, Unigraphics.