A) COURSE

Course Id:	Course
5641	**MECHANICS OF MATERIALS II**

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
3	0	3	6	48 hours total

B) GENERAL COURSE INFORMATION:

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:		IV	V	V	IV
Course Type (Required/Elective)		Required	Required	Required	Required
Prerequisite Course:		5695	5695	5695	5695
CACEI Classification:		EC	EC	EC	EC

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:
The development of concepts and methods in the discipline, to determine the stresses and deformations that occur in members structural and machine components, and from acquired knowledge, infer causes of failure as: deformation in excess of the allowable limit, fracture, or unstable behavior of the element.

D) TOPICS (CONTENTS AND METHODOLOGY)

1. STABILITY PROBLEMS	**8 Hours**
Specific Objective:	Student understands the concepts of buckling and bulging and their effect on elements that act as columns.

1. Buckling in columns
    - 1.1 Buckling in elastic zone, Euler's equation.
    - 1.2 Buckling in inelastic zone, tetmajer straight line.
    - 1.3 Another empirical methods for calculation of buckling.
    - 1.4 Columns with cross-section and axial load variables.
    - 1.5 Torsion and buckling.
- 1.2 Wobbling.
- 1.3 Bulging.

Readings and other resources	Books, articles, extra references, Internet.
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.

2. THIN WALLED ELEMENTS		**7 Hours**
Specific Objective:	Student knows the theory of calculation and design of thin-walled elements, cylindrical vessels, including the states of stress or instability that may occur.	
2.1 Longitudinal stress and circumferential stress. 2.2 Cylinders, spheres and other geometries. 2.3 Bending in thin-walled cylinders. 2.4 Rules for calculation of pressure vessels.		
Readings and other resources	Books, articles, extra references, Internet.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.	

3. CURVED ELEMENTS		**13 Hours**
Specific Objective:	Introduce students to the analysis of elements with radius of curvature subject to pure bending under certain conditions.	
3.1 Introduction. 3.2 Neutral plane and its radial location. 3.3 Equation of bending stress in curved elements. 3.4 Problems of application.		
Readings and other resources	Books, articles, extra references, Internet.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.	

4. THEORY OF ELASTICITY		13 Hours
Specific Objective:	Knowledge of the states of stress and strain at specific points in a system or component, taking into consideration their boundary conditions.	
4.1 Introduction. 4.2 State of stress. 4.2.1 Uniaxial state of stress. 4.2.2 Plane state of stress. 4.2.3 Three-dimensional state of stress. 4.3 Main stresses. 4.3.1 Transformation of stresses. 4.3.2 Mohr's circle (applied to stress). 4.4 State of strains. 4.5 Main strains 4.5.1 Transformation of strains. 4.5.2 Mohr's circle (applied to deformation)		
Readings and other resources	Books, articles, extra references, Internet.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.	

5. Combined stresses several theories of failure.		**14 Hours**
Specific Objective:	Students will learn the stress states and existing theories to predict the failure of an item subject to two or more stresses.	
5.1 Introduction. 5.2 Failure criteria. 5.3 Failures in ductile materials 5.3.1 Used methods for ductile materials analysis. 5.4 Failures in fragile materials. 5.4.1 Used methods for fragile materials analysis.		
Readings and other resources	Books, articles, extra references, Internet.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, info graphics, synoptic squaring.	

E) TEACHING AND LEARNING METHODOLOGIES

a) LECTURE STRATEGY PROPOSING SPECIFIC PROBLEMS FOR GROUP ANALYSIS AND SOLUTION.
b) EVALUATION EXAMS ARE APPLIED FOR INITIAL STATISTICAL ANALYSIS (WITHOUT KNOWLEDGE) AND FINAL (WITH KNOWLEDGE).
c) AFTER COMPLETING THIS COURSE PROVIDES AN ANALYSIS OF REAL EXAMPLES OF MAINTENANCE DEPARTMENTS IN THE INDUSTRY.
d) A VISIT IS SCHEDULED FOR STUDENT TO A COMPANY.

F) EVALUATION CRITERIA:

Evaluation:	Schedule	Suggested Form of Evaluation and weighing	Topics
1er. Evaluación Parcial	Session 16	**33 % Total Evaluation** Partial evaluation: Exam 90% , Assignments 10%	1 and 2
2º Evaluación Parcial	Session 32	**33 % Total Evaluation** Partial evaluation: Exam 90% , Assignments 10%	3 and 4
3er. Evaluación Parcial	Session 48	**33 % Total Evaluation** Partial evaluation: Exam 90% , Assignments 10%	4 and 5
Evaluación Final Ordinario		**100%** (Average value of the partial evaluations)	
Examen Extraordinario	Week 17 of the semester in progress	100% Exam	100% topics
Examen a título	According to Secretary school setting	100% Exam	100% topics
Examen de regularización	According to Secretary school setting	100% Exam	100% topics

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

Main Books

Pytel/singer.
Resistencia de materiales, cuarta edición ed. Harla, México d.f. 1982

Hibbeler, russell c.
Mecánica de materiales, sexta edición pearson, México d.f. 2006

Beer, johnston y dewolf
Mecánica de materiales. Cuarta edición. Editorial MCgraw-hill, México 2007

James m. Gere barry J. Mecánica de materiales editorial cengage, abril 2009

Complementary

Mecánica de materiales ,
Ed. Iberoamericana , méxico d.f., 1986
Craig, roy r. Jr.

Mecánica de materiales, segunda edición cecsa, méxico 2002
Riley/sturges/morris

Mecánica de materiales
Mdsolids v1.7 con problemas modelo timothy a. Philpot, segunda edición.
Norman e. Dowling

Mechanical behavior of materials
Engineering methods for deformation, fracture and fatigue

Internet Sites:

Moodle Platform
Sociedad Americana de Ingenieros Mecánicos: ASME
https://www.asme.org

Data Bases:

About materials properties.
http://www.matweb.com

Fundamental knowledge on Mechanic Engineering materials, unit conversion factors, mechanical design, equations and formulae, fabricating processes, solid mechanics, fluids and mathematics.
http://www.efunda.com/home.cfm

Simulators:

Simulate Software:
MD Solid Simulator