A) COURSE

Course Id:	Course
0062	PHYSICS B

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
3	2	3	8	80

B) GENERAL COURSE INFORMATION

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:		II	II		
Course Type (Required/Elective)		Required	Required		
Prerequisite Course:		PHYSICS A	PHYSICS A		
CACEI Classification:		CB	CB		

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:
On concluding the course, the student, based on the rational way of thought obtained in the Physics A course, will be able to objectively understand the principles and basic laws of angular mechanics, rigid body static, oscillating movement mechanics, fluid mechanics, thermometry, heat and the first law of thermodynamics.

D) TOPICS (CONTENTS AND METHODOLOGY)

1.- ROTATIONAL MECHANICS	
Specific Objective:	The student will: a) understand what the fundamental concepts of rotational mechanics are b) be able to apply the fundamental concepts to problems suggested in textbooks of the appropriate level.

1.1 ANGULAR KINEMATICS 1.1.1The angle, its definition and units (degrees, radians and revolutions) y the transfer of a unit to the other two 1.2 ANGULAR CONCEPTS (analysis) 1.2.1 Angular position 1.2.2 Angular displacement 1.2.3 Mean, constant and instantaneous angular velocity 1.2.4 Mean, constant and instantaneous angular acceleration 1.2.5 Applications 1.3 ANGULAR PARAMETERS AS VECTORS (brief and qualitative introduction) 1.4 RELATIONSHIP BETW EEN LINEAR AND ANGULAR KINEMATICS 1.5 ROTATIONAL DYNAMICS 1.5.1 Angular Dynamics, Analysis and definition of the torque 1.5.2 Analysis and definition of Rotational Inertia regarding the Mass center 1.5.3 Determination of Rotational Inertia regarding some regular bodies 1.6 NEW TON´S SECOND LAW IN ROTATIONAL MECHANICS 1.6.1 Applications of the second law to particles, rigid bodies and mechanical systems 1.7 ROTATIONAL INERTIA (regarding a P point in a different position from the mass center. Parallel Axis Theorem) 1.8 WORK AND ENERGY 1.8.1 Determining work with angular parameters carried out by an external agent 1.8.2 Applications 1.9 W ORK AND ENERGY THEORM 1.9.1Applications 1.10 LAW OF ENERGY CONSERVATION (applied to rotational movement). 1.11 IMPULSE AND ANGULAR MOMENTUM (deduction and analysis) 1.12 RELATION BETW EEN IMPULSE AND ANGULAR MOMENTUM 1.12.1 Applications 1.13 CONSERVATION OF ANGULAR MOMENTUM 1.13.1 Applications (spinning top, yoyo, etc.)

Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

2.- STATICS	
Specific Objective:	The student: a) Will be able to apply all the concepts and principles of linear mechanics and angular mechanics when a body is at equilibrium. b) Will apply the appropriate techniques toward the solution of applied problems in his subjects of Mechanics I and II.
2.1EQUILIBRIUM 2.1.1Discussion and analysis 2.2 Equilibrium of Translation 2.2.1Applications 2.3 Equilibrium of Rotation 2.3.1Applications 2.4 EQUILBRIUM OF TRANSLATION AND ROTATION 2.4.1 Applications.	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

3.- OSCILLATING MOVEMENT	
Specific Objective:	The student: a) Will learn the principles of mechanics of the oscillating movement. b) Will be capable of applying these principles to simple harmonic oscillations.
3.1 INTRODUCTION TO VIBRATING MOVEMENT. 3.2 MOVEMENT IN ONE DIMENSION (Using the expression F= -cx). 3.3 UNIFORM CIRCULAR MOVEMENT (and its relationship to the vibrating movement). 3.4 SIMPLE HARMONIC MOVEMENT (S. A. M.). 3.5 KINEMATICS OF S.A.M. (position, speed, and acceleration as time functions). 3.6 GRAPHIC ANALYSIS OF: x-t, v-t, a-t. 3.7 APPLICATIONS. 3.8 DYNAMIC OF S.A.M. 3.9 WORK AND ENERGY OF S.A.M. 3.10 CONSERVATION OF S.A.M. ENERGY. 3.11 PROBLEMS. 3.12 GRAPHIC ANALYSIS AND CONSERVATION OF S.A.M. ENERGY 3.13 IMPULSE AND MOMENTUM OF S.A.M. 3.14 ANALYSIS OF S.A.M. PARAMETERS (Oscillation, angular frequency, oscillation frequency, oscillation period and amplitude). 3.15 APPLICATIONS OF S.A.M. MECHANICS. 3.15.1 Movement of pendulum. 3.15.2 Movement of a spring mass system. 3.15.3 Pendulum of torsion.	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

4.- ELASTICITY	
Specific Objective:	The student: a) Will understand, at an introductory level, the principles and laws governing body deformations. b) Will be able to apply these principles to the problems generated in the subject of Material Resistance.
4.1 ELASTICITY (introduction and principles) 4.2 FUNDAMENTAL CONCEPTS 4.2.1 STRESS (definition, classification, analysis and application) 4.2.2 DEFORMATIONS (definition, classification and application) 4.3 RELATION BETW EEN STRESS AND DEFORMATION (Elastic modules) 4.3.1 Tension and Compression (Young module) 4.3.2 Rigidness (Shar module) 4.3.3 Compressibility (Bulk module) 4.3.4 Applications 4.4 ELASTICITY AND PLASTICITY 4.4.1 Graphic analysis of the stress–deformation relation Elasticity 4.4.2 Law of Hooke 4.4.3 Application	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

5.- FLUID MECHANICS	
Specific Objective:	The student: a) will understand the laws and principles of fluid mechanics b) will be able to apply these principles in the Hydraulic courses
5.1 FLUID STATICS (introduction, scope, methods and principles). 5.2 FUNDAMENTA CONCEPTS (Fluid static). 5.2.1 Fluid. 5.2.2 Absolute and relative density. 5.2.3 Specific, absolute and relative weight. 5.2.4 Relation between specific weight and density. 5.2.5 Absolute, Atmospheric, and Relative and Pressure. 5.2.6 Analysis of measuring devices. a) Barometers b) Manometers 5.2.7 Pressure within a in a settled fluid 5.2.8Determination and analysis of the following principles : a) Pascal b) Torricelli c) Archimedes 5.2.9 Problems and applications 5.3FLUID DYNAMICS (introduction, scope, methods and principles) 5.4FUNDAMENTAL CONCEPTS (OF FLUID DYNAMICS) 5.4.1Flow 5.4.2Power line and flow tube 5.4.3Determination and analysis of the following principles: a) continuity b) Bernoulli 5.4.4Measuring devices a) Venturi b) Pitot 5.4.5Problems and applications 5.5VISCOSITY AND TURBULENCE	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

6.- TEMPERATURE, DILATION, HEAT, FIRST & SECOND LAW OF THERMODYNAMICS	
Specific Objective:	The student: a) Will understand what the basic ideas are, the existing methods and scales that allow to determine the temperature of bodies. b) Will understand that when the temperatures of bodies change, their size also changes. c) Will understand that heat is a form of energy, pointing out the principles and laws governing its transfer.

6.1 TEMPERATURE AND DILATION 6.2 THERMODYNAMIC CONCEPTS 6.2.1Thermodynamic system and surroundings 6.2.2W alls of a Thermodynamic system 6.2.3Thermodynamic variables 6.2.4Thermo-Equilibrium 6.2.5Thermometers and thermo-scales 6.2.6Triple point and constant volume gas thermometer 6.2.7Changes in volume due to heat changes 6.2.8Applications 6.3 HEAT AND FIRST LAW OF THERMODYNAMICS 6.3.1Heat as energy 6.3.2 Units of heat 6.3.3 Calorific capacities and specific heat 6.3.4 Applications 6.3.5 Heat transfer: a) conduction b) convection, (qualitative analysis) c) radiation (qualitative analysis) 6.3.6 Thermodynamic heat and work 6.3.7 Heat Mechanical equivalent 6.3.8 Ideal gas and state equation 6.3.9 Thermodynamic processes for an ideal gas a) isobaric b) Isothermal c) Isochoric d)Adiabatic 6.3.10 Internal energy of an ideal gas 6.3.11 First Law of Thermodynamics 6.3.12 Applications 6.3.13 Entropy and second Law of Thermodynamics 6.4.1 Reversible and irreversible processes 6.4.2 Direction of Thermodynamic processes 6.4.3 Thermal machines and the second Law 6.4.4 Refrigerators and the second Law 6.4.5 Thermal machine efficiency 6.4.6 Equivalence of Clausius and Kelvin Planck Statements 6.4.7 The Carnot Cycle 6.4.8 Entropy and the second Law	
Readings and other resources	Readings to investigation of concepts, as well as to complement and strengthen the topics discussed in class.
Teaching methods	Exhibition topics by teacher and / or students; use of some didactic techniques like teamwork, learning based in problems and/or projects.
Learning activities	Exercise class and homework, as well as them respective interpretation of results.

E) TEACHING AND LEARNING METHODOLOGIES

Theoretical one-hour classes will be given the professor will be at liberty to use, aside from the blackboard, chalk and eraser, the new technological techniques to increase learning.

F) EVALUATION CRITERIA

Evaluation, according to the Institutional standards, must include four partial exams scheduled by the institution and a percentage that the academy establishes for the Physics workshop. Moreover, the type of evaluation that each professor

personally considers convenient for reporting in a general way, a grade that will accredit or not, the course covered by the student

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

Main Books:

- Resnick/ Halliday/Krane
  Fisica Vol. I
  CECSA, 5a Edición México 2004

- Serway A. Raymond/Jewet John.
  Física I.
  Thomson, 3a Edición México 2004

- Sears/Zemansky/Young/Freedman.
  Física Universitaria Vol. I
  Pearson-Addison W esley, 11a Edición México 2004

- Tipler A. Paul
  Física para la ciencia y la tecnología
  Edit. Reverté, Barcelona, 2001

- Gettys/Keller/SKove.
  Física Tomo 1 (para ciencias e ingeniería).
  Mc Graw Hill, 2ª Edición México 2005.

Complementary Books: