



FICHA TÉCNICA DE LA ASIGNATURA

Datos de la asignatura	
Nombre completo	Introduction to Statics
Código	DIM-SAP-211
Cuatrimestre	Semestral
Créditos	6,0 ECTS
Carácter	Optativa
Departamento / Área	Departamento de Ingeniería Mecánica
Responsable	Eduardo Iglesias Jiménez
Horario	Tuesday, 10:15 - 12:00h and Thursday 16:00h - 18:00h
Horario de tutorías	Tuesday, 9:30h - 10:15 and Thursday 18:00h - 18:30h

Datos del profesorado	
Profesor	
Nombre	Eduardo Iglesias Jiménez
Departamento / Área	Departamento de Ingeniería Mecánica
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DATOS ESPECÍFICOS DE LA ASIGNATURA

Contextualización de la asignatura

Competencias - Objetivos

BLOQUES TEMÁTICOS Y CONTENIDOS

METODOLOGÍA DOCENTE

Aspectos metodológicos generales de la asignatura

EVALUACIÓN Y CRITERIOS DE CALIFICACIÓN

BIBLIOGRAFÍA Y RECURSOS

DIM-SAP-211 Introduction to Statics

SEMESTER: Fall

CREDITS: 6 ECTS (4 hrs. per week)

LANGUAGE: English

DEGREES: SAPIENS program

Course overview

This course is designed to give you an introduction to engineering mechanics in static systems. Statics deals with two- and three-dimensional systems of particles and rigid bodies in static equilibrium. Statics is indispensable in the design and analysis of structures that must hold their shape while bearing a load or performing a task where dynamic forces are absent or negligible.

Course objectives

At the end of this course, the students will be able to: calculate the moment of a force and couple vector in 3D-space using vector algebra; determine the resultants of force systems acting on rigid bodies; establish the equations of equilibrium for a rigid body or a group of rigid bodies; calculate the internal forces in engineering structures; determine the geometric properties of surfaces and volumes.

Prerequisites

General Physics and Vector calculus.

Course contents

- 1. General Principles**
 - 1.1 Fundamental Concepts
 - 1.2 General Procedure for Analysis
 - 1.3 Scalars and Vectors
 - 1.4 Addition of Cartesian Vectors
 - 1.5 Dot Product
- 2. Equilibrium of a Particle**
 - 2.1 The Free-Body Diagram
 - 2.2 Three-Dimensional Force Systems

3. Force System Resultants

- 3.1 Moment of a Force
- 3.2 Moment of a Force about a Specified Axis
- 3.3 Simplification of a Force and Couple System
- 3.4 Reduction of a Simple Distributed Loading

4. Equilibrium of a Rigid Body

- 4.1 Equations of Equilibrium
- 4.2 Free-Body Diagrams
- 4.3 Constraints and Statical Determinacy

5. Structural Analysis

- 5.1 The Method of Joints
- 5.2 The Method of Sections

6. Internal Forces

- 6.1 Internal Loadings Developed in Structural Members
- 6.2 Relations between Distributed Load, Shear, and Moment

7. Friction

- 7.1 Characteristics of Dry Friction
- 7.2 Frictional Forces on Screws, Collar Bearings, Pivot Bearings, Disks.
- 7.3 Rolling Resistance

8. Center of gravity and centroid

- 8.1 Center of Gravity, Center of mass and the centroid of a body
- 8.2 Theorems of Pappus and Guldinus
- 8.3 Resultant of a General distributed loading.
- 8.4 Fluid Pressure

9. Moments of Inertia

- 9.1 Center of Gravity, Center of Mass, and the Centroid of a Body
- 9.2 Theorems of Pappus and Guldinus
- 9.3 Parallel-Axis Theorem for an Area
- 9.4 Moments of Inertia for Composite Areas
- 9.5 Mohr's Circle for Moments of Inertia
- 9.6 Mass Moment of Inertia

10. Virtual Work

- 10.1 Principle of Virtual Work
- 10.2 Principle of Virtual Work for a System of connected rigid bodies
- 10.3 Conservative forces
- 10.4 Potential Energy

Textbook

Engineering Mechanics: Statics, (2016) by Hibbeler, R.C., Pearson-Prentice Hall, 14th ed.

Grading

ORDINARY:

The grade will be determined by:

1. Exams (55%): 2 midterms (25%; 12,5% each) and a final examination (30%)
2. Homework (40%)
3. Attendance and Participation: 5%

The exams are all closed notebook and closed textbook.

The course will not be graded on a curve, i.e., there is no bound on the numbers of A's, B's, C's etc.

EXTRA-ORDINARY:

The grade will be determined by two ways: the student can choose the weight of the retake exam it as its best choice.

1st way.

1. Exams (65%): Midterms (25%; already done) and **the final retake exam** (40%):
2. Homework (30%; already done)
3. Attendance and Participation: (5%; already done)

2nd way.

4. Midterms (10%; 5% each) and **a final retake exam** (75%)
5. Homework (10%; already done).
6. Attendance and Participation: (5% already done)

The exams are all closed notebook and closed textbook.

The course will not be graded on a curve, i.e., there is no bound on the numbers of A's, B's, C's etc.