



National University of Engineering (UNI)
School of Civil Engineering
Syllabus 2027-I

1. COURSE

CE1M1. Statics (Mandatory)

2. GENERAL INFORMATION

2.1 Course	: CE1M1. Statics
2.2 Semester	: 3 rd Semester.
2.3 Credits	: 4
2.4 Hours	: 4 HT; 4 HP;
2.5 Duration of the period	: 16 weeks
2.6 Type of course	: Mandatory
2.7 Learning modality	: Face to face
2.8 Prerequisites	: BFI101. General Physics. (2 nd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Statics is the first pillar of applied mechanics in Civil Engineering. It provides the tools needed to analyze the equilibrium of particles and rigid bodies subjected to force systems. Understanding the concepts of force, moment, and equilibrium is essential for the analysis and design of structures, enabling the determination of support reactions and internal forces in structural members.

5. GOALS

- Understand and apply Newton's laws and vector algebra to solve equilibrium problems in two and three dimensions.
- Determine internal forces in trusses, frames, and machines accurately.
- Analyze the effect of friction and determine centers of gravity and moments of inertia of complex shapes.

6. COMPETENCES

ABET-1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (Usage)

ABET-6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (Usage)

7. TOPICS

Unit 1: Equilibrium of Particles and Rigid Bodies (8 hours)	
Competences Expected: ABET-1, ABET-6	
Topics	Learning Outcomes
• Equilibrium equations and free-body diagrams for particles and rigid bodies in two and three dimensions • Flexible cables under concentrated and distributed loads	• Apply equilibrium equations to determine support reactions in two- and three-dimensional rigid-body systems [Usage] • Determine cable tension and shape under concentrated and distributed loads [Usage]
Readings : [Hibbeler2016], [Meriam2014]	

Unit 2: Internal Forces in Trusses and Frames (12 hours)	
Competences Expected: ABET-1,ABET-6	
Topics	Learning Outcomes
• Truss analysis using the method of joints and the method of sections • Free-body diagrams and internal-force analysis of multi-member frames and machines • Internal forces in beams: shear-force and bending-moment diagrams	• Analyze planar trusses using both the method of joints and the method of sections [Assessment] • Draw free-body diagrams for multi-member frames and machines and determine internal member forces [Usage] • Construct shear-force and bending-moment diagrams for beams under concentrated and distributed loads [Assessment]
Readings : [Hibbeler2016], [Meriam2014]	

Unit 3: Geometric Properties of Areas and Friction (12 hours)	
Competences Expected: ABET-1,ABET-6	
Topics	Learning Outcomes
• Centroids and centers of gravity of composite areas and lines • Moments of inertia of areas and the parallel-axis theorem • Dry friction: laws of friction, wedges, and screws • Virtual work and stability of equilibrium	• Determine the geometric properties of complex cross-sections used in structural shapes [Usage] • Analyze equilibrium problems involving static friction forces [Assessment] • Apply friction principles to the analysis of wedges and screw mechanisms [Usage] • Evaluate the stability of equilibrium using virtual work principles [Familiarity]
Readings : [Meriam2014]	

8. WORKPLAN

8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

9. EVALUATION SYSTEM

***** EVALUATION MISSING *****

10. BASIC BIBLIOGRAPHY