



National University of Engineering (UNI)

School of Civil Engineering
Syllabus 2027-I

1. COURSE

CB1E2. Engineering Drawing II (Mandatory)

2. GENERAL INFORMATION

2.1 Course	: CB1E2. Engineering Drawing II
2.2 Semester	: 3 rd Semester.
2.3 Credits	: 4
2.4 Hours	: 3 HT; 2 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	: CB1E1. Technical Drawing & CAD. (2 nd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Engineering Drawing II is the direct continuation of Technical Drawing and CAD, deepening students' command of descriptive geometry to solve advanced positional and metric problems involving lines, planes, polyhedra, and surfaces of revolution. The course closes with an introduction to Building Information Modeling (BIM), the digital methodology that has become standard practice for the delivery and lifecycle management of civil engineering projects, connecting the graphical foundations built in the prerequisite course to modern digital project delivery workflows.

5. GOALS

- Solve positional problems (parallelism, perpendicularity, and intersections) between lines, planes, and polyhedra using descriptive geometry methods.
- Solve metric problems, including the determination of true distances between geometric elements.
- Represent surfaces of revolution and determine tangent planes to curved surfaces.
- Apply Building Information Modeling (BIM) concepts and tools to produce and manage digital representations of civil engineering projects for digital delivery and asset management.

6. COMPETENCES

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

ABET-2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. (Usage)

7. TOPICS

Unit 1: Positional and Metric Problems in Descriptive Geometry (28 hours)	
Competences Expected: ABET-1	
Topics	Learning Outcomes
• Auxiliary-view and change-of-plane methods for solving positional and metric problems • Parallelism and perpendicularity between lines and planes • Intersections of planes, lines, and polyhedral solids • Metric problems: true distances between points, lines, and planes	• Apply auxiliary-view and change-of-plane methods to solve positional problems in orthographic projection [Usage] • Determine parallelism and perpendicularity relationships between lines and planes, and represent intersections of polyhedral solids [Usage] • Calculate true distances between geometric elements using descriptive geometry methods [Assessment]
Readings : [Luzadder1993], [Pare1997]	

Unit 2: Surfaces of Revolution and Tangent Planes (26 hours)	
Competences Expected: ABET-1	
Topics	Learning Outcomes
• Generation and orthographic representation of surfaces of revolution: cylinders, cones, spheres, and tori • Angle problems between lines, planes, and surfaces • The rotation (change of projection) method as an auxiliary technique • Construction of tangent planes to surfaces of revolution at a point or through an external line	• Represent surfaces of revolution and their principal orthographic views [Usage] • Apply the rotation method to determine true angles between lines, planes, and surfaces [Usage] • Determine tangent planes to a surface of revolution at a given point or through an external line [Assessment]
Readings : [Pare1997]	

Unit 3: Building Information Modeling (BIM) for Digital Delivery and Asset Management (16 hours)	
Competences Expected: ABET-2	
Topics	Learning Outcomes
• BIM concepts: dimensions (3D, 4D, 5D, 6D, 7D), LOD, and LOIN • BIM authoring tools and parametric modeling techniques • Model coordination, clash detection, and interference checking • Collaboration platforms, Common Data Environments (CDE), and BIM execution plans • BIM-based analysis: quantity takeoff, energy simulation, and structural analysis • Digital twins and the connection between BIM and operational data • Interoperability standards: IFC, COBie, and open-BIM • Asset information models (AIM) and BIM for facilities management (FM) • Regulatory submission and automated code compliance checking	• Define the different dimensions of BIM (3D-7D) and their associated information [Familiarity] • Create a basic 3D parametric model of a structural framing system using BIM software [Usage] • Perform a clash detection analysis between architectural and structural models [Assessment] • Outline the key components of a BIM Execution Plan (BEP) [Familiarity] • Extract a material quantity takeoff schedule from a BIM model [Usage] • Explain the relationship between a BIM model and a digital twin for an asset [Familiarity] • Export a BIM model using the IFC format to ensure interoperability [Usage] • Develop an Asset Information Model (AIM) deliverable for handover to a facility manager [Assessment] • Evaluate the potential of automated rule-checking for building code compliance [Assessment]
Readings : [Eastman2018]	

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