



National University of Engineering (UNI)

School of Civil Engineering

Syllabus 2026-II

1. COURSE

CE3S6. Masonry, Adobe, and Timber (Mandatory)

2. GENERAL INFORMATION

2.1 Course	: CE3S6. Masonry, Adobe, and Timber
2.2 Semester	: 10 th Semester.
2.3 Credits	: 3
2.4 Hours	: 2 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	: CE3S4. Earthquake-Resistant Engineering and Disaster Prevention. (9 th Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Masonry, Adobe, and Timber covers the seismic-resistant design of low-rise buildings using the structural systems most widely used in Peruvian construction: structural masonry, adobe, and timber. Building on the seismic engineering fundamentals from Earthquake-Resistant Engineering, the course develops a design studio that applies material selection criteria, seismic code requirements, and structural detailing to complete building design projects in masonry, adobe, and timber.

5. GOALS

- Formulate the design process for a low-rise building, integrating site conditions, material selection, and applicable Peruvian building codes.
- Design structural and non-structural masonry walls for gravity and seismic loads.
- Design adobe walls and specify seismic reinforcement techniques according to Standard E.080.
- Design timber structural elements and connections for buildings and light structures.

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: Design Process for Low-Rise Buildings (12 hours)	
Competences Expected: ABET-1,ABET-2	
Topics	Learning Outcomes
• Site and soil recognition, project requirements, and applicable regulatory framework (E.030, E.070, E.080, E.010) • Criteria for selecting a structural system among masonry, adobe, and timber based on site conditions, materials availability, and seismic hazard • Integration of the structural design with the architectural layout of a building project	• Describe the design process of a low-rise building, identifying site conditions and the applicable Peruvian regulatory framework [Familiarity] • Select an appropriate structural system for a building project based on site conditions, materials, and seismic hazard [Usage] • Formulate the scope and requirements of a building project that integrates masonry, adobe, or timber systems [Assessment]
Readings : [Ins21], [Ser18]	

Unit 2: Masonry Structural Design (22 hours)	
Competences Expected: ABET-1,ABET-2	
Topics	Learning Outcomes
• Masonry materials, units, and mortar properties • Unreinforced masonry wall design for compression and flexure • Reinforced masonry design and detailing • Seismic design of masonry and timber structures	• Identify masonry unit types and specify appropriate mortar for applications [Familiarity] • Design unreinforced masonry walls for gravity and lateral loads [Assessment] • Proportion reinforced masonry elements and specify reinforcement details [Usage] • Implement seismic design provisions for masonry and timber buildings [Usage]
Readings : [DH08], [Cap06b]	

Unit 3: Timber and Light-Gauge Steel Framing Design (33 hours)	
Competences Expected: ABET-1,ABET-2	
Topics	Learning Outcomes
• Timber properties, grading, and design values • Sawn lumber and glued-laminated timber design • Timber connections including nails, bolts, and metal connectors • Cold-formed steel members and sectional properties • Light-gauge steel framing systems and design • Engineered wood products including I-joists and structural composite lumber	• Select timber species and grades based on structural requirements [Familiarity] • Design timber beams, columns, and combined loading members [Assessment] • Specify timber connections and calculate their capacity [Usage] • Calculate effective section properties for cold-formed steel members [Assessment] • Design light-gauge steel wall studs and floor joists [Usage] • Apply engineered wood products in floor and roof systems [Assessment]
Readings : [Bre+15], [Cap06a]	

Unit 4: Adobe Structural Design (17 hours)	
Competences Expected: ABET-1,ABET-2	
Topics	Learning Outcomes
• Adobe as a structural material: mechanical properties and seismic behavior • Adobe wall design for gravity loads and verification of thickness and slenderness per Standard E.080 • Seismic reinforcement techniques for adobe construction: meshes, geomeshes, and horizontal and vertical reinforcement	• Characterize the mechanical properties of adobe and its seismic behavior [Familiarity] • Design adobe walls according to the thickness, slenderness, and geometric requirements of Standard E.080 [Assessment] • Specify seismic reinforcement techniques for new and existing adobe buildings [Usage]
Readings : [BGB03], [Cap17]	

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

- [BGB03] Marcial Blondet, Gladys Villa Garcia, and Svetlana Brzev. *Earthquake-Resistant Construction of Adobe Buildings: A Tutorial*. Tech. rep. EERI/IAEE World Housing Encyclopedia, 2003.
- [Cap06a] Servicio Nacional de Capacitación para la Industria de la Construcción (SENCICO). *Norma Técnica E.010: Madera*. Tech. rep. Reglamento Nacional de Edificaciones del Perú, 2006.
- [Cap06b] Servicio Nacional de Capacitación para la Industria de la Construcción (SENCICO). *Norma Técnica E.070: Albañilería*. Tech. rep. Reglamento Nacional de Edificaciones del Perú, 2006.
- [DH08] Robert G. Drysdale and Ahmad A. Hamid. *Masonry Structures: Behavior and Design*. 3rd. Masonry Society, 2008.
- [Bre+15] Donald E. Breyer et al. *Design of Wood Structures ASD/LRFD*. 8th. McGraw-Hill, 2015.
- [Cap17] Servicio Nacional de Capacitación para la Industria de la Construcción (SENCICO). *Norma Técnica E.080: Diseño y Construcción con Tierra Reforzada*. Tech. rep. Reglamento Nacional de Edificaciones del Perú, 2017.
- [Ser18] Construcción y Saneamiento del Perú Servicio Nacional de Capacitación para la Industria de la Construcción (SENCICO) / Ministerio de Vivienda. *Norma Técnica E.030: Diseño Sismorresistente*. Tech. rep. Reglamento Nacional de Edificaciones del Perú, 2018.
- [Ins21] Project Management Institute. *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. Tech. rep. Project Management Institute, 2021.